



DIRECTIONS IN DEVELOPMENT
Information and Communication Technologies

38332

From Envisioning to Designing e-Development

The Experience of Sri Lanka

Nagy K. Hanna



THE WORLD BANK

From Envisioning to Designing e-Development

From Envisioning to Designing e-Development

The Experience of Sri Lanka

Nagy K. Hanna



THE WORLD BANK

©2007 The International Bank for Reconstruction and Development / The World Bank
1818 H Street NW
Washington DC 20433
Telephone: 202-473-1000
Internet: www.worldbank.org
E-mail: feedback@worldbank.org

All rights reserved

1 2 3 4 5 10 09 08 07

This volume is a product of the staff of the International Bank for Reconstruction and Development / The World Bank. The findings, interpretations, and conclusions expressed in this volume do not necessarily reflect the views of the Executive Directors of The World Bank or the governments they represent.

The World Bank does not guarantee the accuracy of the data included in this work. The boundaries, colors, denominations, and other information shown on any map in this work do not imply any judgement on the part of The World Bank concerning the legal status of any territory or the endorsement or acceptance of such boundaries.

Rights and Permissions

The material in this publication is copyrighted. Copying and/or transmitting portions or all of this work without permission may be a violation of applicable law. The International Bank for Reconstruction and Development / The World Bank encourages dissemination of its work and will normally grant permission to reproduce portions of the work promptly.

For permission to photocopy or reprint any part of this work, please send a request with complete information to the Copyright Clearance Center Inc., 222 Rosewood Drive, Danvers, MA 01923, USA; telephone: 978-750-8400; fax: 978-750-4470; Internet: www.copyright.com.

All other queries on rights and licenses, including subsidiary rights, should be addressed to the Office of the Publisher, The World Bank, 1818 H Street NW, Washington, DC 20433, USA; fax: 202-522-2422; e-mail: pubrights@worldbank.org.

ISBN-10: 0-8213-6866-4
ISBN-13: 978-0-8213-6866-4
eISBN-10: 0-8213-6867-2
eISBN-13: 978-0-8213-6867-1
DOI: 10.1596/978-0-8213-6866-4

Cover photo: Ismail Radwan/World Bank.

Cover design: Naylor Design.

Library of Congress Cataloging-in-Publication Data

Hanna, Nagy K.

From envisioning to designing e-development : the experience of Sri Lanka / Nagy K. Hanna.
p. cm.

Includes bibliographical references and index.

ISBN-13: 978-0-8213-6866-4

ISBN-10: 0-8213-6866-4

ISBN-10: 0-8213-6867-2 (electronic)

1. Information technology—Economic aspects—Sri Lanka. 2. Communication in economic development—Sri Lanka. 3. Telecommunications—Sri Lanka. 4. Sri Lanka—Economic policy. I. Title.

HC424.Z9I554 2007
303.48'33095493—dc22

2006037316

Contents

<i>Foreword</i>		<i>xi</i>
<i>Acknowledgments</i>		<i>xiii</i>
<i>Abbreviations</i>		<i>xvii</i>
Chapter 1	Introduction	1
	Challenges Facing Developing Countries	2
	Learning from e-Sri Lanka	4
	Focus of the Book	6
PART 1	Designing the Program and Managing the Process	9
Chapter 2	Designing e-Sri Lanka: Process, Principles, Lessons	11
	Origins of e-Sri Lanka	12
	Guiding Principles	19
	Lessons Learned	30
Chapter 3	The e-Sri Lanka Program Design	43
	Strategic Context: Sri Lanka's e-Readiness	44

	The Vision and Program of e–Sri Lanka	47
	An Evolving Program Design	60
PART 2	Developing the ICT Industry and Human Resources	65
Chapter 4	A Strategy for the Software and Information Services Industry	67
	Potential for Growth	69
	The Industry and Its Environment: Constraints and Opportunities	70
	Prospects for the Industry	80
	A Strategy for Developing the Industry	86
	An Agenda for Action	89
	Annex 4.1 SWOT Analysis: Strengths, Weaknesses, Opportunities, and Threats	94
Chapter 5	A Fund for Building Capacity and Promoting the Industry	99
	Rationale for the Funding Mechanism	101
	The Four Programs of the Fund	102
	Implementation of the Fund	109
PART 3	Extending an Affordable Information Infrastructure to All	117
Chapter 6	Extending Access to Services: Policy and Regulatory Reforms and Smart Subsidies	119
	Gaps in Rural Services—and Ways to Close Them	120
	Reforms to Bridge the Market Efficiency Gap	123
	Smart Subsidies to Bridge the Access Gap	127
	Tools for Reinforcing Demand	128
	A Changing Environment	129
Chapter 7	Designing the Telecenter Program for Poverty Reduction	133
	Basic Design of the Telecenter Program	134
	Analysis of the Issues and Options	139

Principles Guiding Program Design for Poverty Reduction	142
Annex 7.1 Poverty in Sri Lanka	161
Chapter 8 Designing the Telecenter Program for Impact and Sustainability	165
Thinking through Impact and Sustainability	166
Opportunities for Maximizing Impact	171
Challenges to Financial Sustainability	178
Early Implementation and Lessons	188
Bibliography	195
Index	211
Boxes	
3.1 What e-Government Services Are Priorities?	59
4.1 Promising Niches for the Software and IT-Enabled Services Industry in Sri Lanka	85
4.2 An Action Plan for Developing the Software and IT-Enabled Services Industry in Sri Lanka	90
7.1 Access to Which Technologies?	147
7.2 What Are the Key Elements of a Good Business Plan for a Telecenter?	149
7.3 Building Capacity to Promote Participation in the Telecenter Program	152
7.4 How to Get Started with Content: Malaysia's Demonstrator Application Grant Scheme	156
7.5 Which Sri Lankan NGOs Could Make Good Use of Telecenters to Help the Poor?	158
8.1 E-Government Simplifies Land Titling in Karnataka	175
8.2 Three Software Markets: Open Source, Desktop, and Networking Applications	180
Figures	
2.1 Synergies among Key Elements of e-Development	21
3.1 Structure of Sri Lanka's ICT Agency	51

4.1	Sri Lanka's Export Growth Potential in IT and IT-Enabled Services by Business Segment	86
4.2	Sri Lanka's Export Growth Potential in Packaged Software by Business Segment	87
6.1	Trends in Telecommunications Investment in Sri Lanka, 1993–2002	124
7.1	Key Institutional Roles and Links in the Telecenter Program	137

Tables

3.1	Networked Readiness Index Rankings for Selected Asian Countries, 2003–04	44
3.2	Digital Access Index for Selected Asian Countries, 2002	45
3.3	Development Objectives and Outcome Indicators for e–Sri Lanka	48
3.4	World Bank Financing of e–Sri Lanka Components	50
4.1	Employment and Value Added in Selected Industries in Sri Lanka, 2003	70
4.2	Indicative Labor Costs in the IT Industry in Sri Lanka, 2003	75
4.3	Potential Revenues for Sri Lanka's Software and IT-Enabled Services Industry under Different Growth Scenarios	82
5.1	Programs under the ICT Capacity-Building and Industry Promotion Fund	103
5.2	Objectives and Outcome Indicators for the ICT Capacity-Building and Industry Promotion Fund	111
6.1	Design and Outcomes of Universal Access Programs in Selected Countries	122
7.1	Key Institutions for Implementing the Telecenter Program	136
7.2	Common Objectives of the Community Development and Livelihood Improvement Program and the Telecenter Program	144
7.3	Typical Categories of Telecenter Information	155
7.4	Applying the Design Principles to the Tasks in the First Phase of the Telecenter Program	160
A7.1	Household Poverty Rate and Population by Location in Sri Lanka, Various Years	162

A7.2	Household Poverty Rate by Sector of Employment of Principal Income Earner in Sri Lanka, 1995/96	162
8.1	Key Determinants of Telecenter Profits and the Effect of an Urban or Rural Setting	167
8.2	Prototype Cash Flow—Four-Computer Telecenter	169
8.3	Causes of Rural Poverty and Potential Impact of Services Delivered through Telecenters in Sri Lanka	172

Foreword

This is the first of two volumes on moving e-Sri Lanka from a vision to a full-fledged program design and to early implementation. E-Sri Lanka is an integrated, client-driven program and the first of its kind to be funded by the World Bank. It is about investing in the necessary policies, institutions, capabilities, infrastructures, and information technology applications for Sri Lanka to join the global knowledge economy, transform government services, and empower local communities.

This publication is responsive to the strong demand from policy makers and development practitioners for “how to” literature. It moves beyond the dominant static analysis of knowledge and e-readiness assessments and shares best practices in designing integrated e-development lending operations. It should also resonate with program designers in developing countries who are translating their visions of information technology-enabled development into sound strategies and investment programs. Academic researchers too may benefit from this literature in an emerging field.

This volume captures the rich knowledge generated while designing holistic e-development programs and building knowledge partnerships with our client countries. It opens up the design process and the influence of stakeholders to examination and reflection so as to search

for lessons that can be learned, in the tradition of Albert Hirschman's *Development Projects Observed* (1994). Because the e-Sri Lanka program is at the early stages of implementation, this volume focuses on preparation and design issues, not on implementation. The lessons from preparation are rich enough, and the dissemination of experience in designing such integrated programs urgent enough, to warrant publishing this volume sooner rather than later. I hope we come back in due time and draw on the expected rich lessons of implementation.



Praful C. Patel
Vice President of the South Asia Region
World Bank

Acknowledgments

This book represents the collective work of many people over several years. It focuses on the design of the e-Sri Lanka development program and thus first acknowledges those who initiated the program. The e-Sri Lanka program owes much debt to early Sri Lankan champions and visionaries: the Honorable Milinda Moragoda, then minister of economic reform, science, and technology; Eran Wickremaratne, chief executive officer (CEO) of Sri Lanka's National Development Bank; and Charita Ratwatte, then secretary of the Ministry of Finance. Champions also include the founding directors of Sri Lanka's newly created Information and Communication Technology (ICT) Agency, particularly Professor Rohan Samarajiva and Dr. Hans Wijesuriya.

Ongoing implementation of the program owes much to the current government of Sri Lanka, particularly to the championship of H. E. The President of Sri Lanka, Mahinda Rajapakse; Lalith Weeratunga, secretary to the president of Sri Lanka and a passionate advocate of a connected government; and Professor Tissa Vitharana, minister of science and technology. It is this bipartisan ownership that has ensured the continued evolution of the program. Much credit must go to Manju Haththotuwa, current CEO of the ICT Agency, who has spanned the phases of design and implementation so far and ably led the ICT Agency from its

inception, in the process shaping and reshaping the program. Professor V. K. Samaranyake, current chairman of the ICT Agency, helped shape some of the ideas of promoting the human resource program for a vibrant software industry while chairman of the Computing Department at the University of Colombo.

On the World Bank side, several champions enabled me and the rest of the e-Sri Lanka team to partner with our Sri Lankan counterparts in preparing the e-Sri Lanka program and to navigate the Bank's rigorous requirements while lacking a clear home. Mohamed Muhsin, former chief information officer of the Bank, was the earliest champion. Peter Harrold, the Bank's country director for Sri Lanka, was the primary regional anchor and lead sponsor. Simon Bell, finance and private sector manager, coached the team through project approval and sponsored the publication of this volume. I am most grateful to Praful Patel, vice president of the South Asia Region of the Bank, for his clear support to this new field of development assistance and for his encouragement to disseminate the lessons learned from this partnership.

The ideas of the e-Sri Lanka program were developed collaboratively with colleagues, of whom there are too many to mention individually. Chapters 1 and 2 of this volume underline the collaborative nature of the design of the program and the roles of key actors. Each of the following chapters draws on contributions of principal authors of underlying studies as well as collaborative work with members of the Sri Lankan and World Bank e-Sri Lanka teams.

The Sri Lankan team, led by Manju Haththotuwa, included the following core preparation team members from the ICT Agency: Reshan Dewapura, Lalith Weeratunga, Jayantha Fernando, Reeza Zarook, Dinesh Amarasekera, Helani Galpaya, Wasantha Deshapriya, Dilanthe Withanage, Shoban Rainford, and Patrick Canagasingham.

The World Bank team, which I led, included the following identification-to-appraisal core team members: Ritin Singh, senior telecommunications specialist; Sandra Sargent, monitoring and evaluation specialist; Eduardo Talero, e-government consultant; and Francisco Proenza, ICT-for-rural-development specialist. Many others contributed to early exploration or specific aspects: Anil Srivastava, on partnerships with the diaspora; Srivastava Krishna, on e-government in Andhra Pradesh; Rosita Van Meel, on higher education programs; Erich Vogt, on community radio and creative industries; Avron Barr, Shirley Tessler, and Raja Mitra, on the software industry; Roger Harris and Motoo Kusakabe, on telecenters; Robert Schware and Louise Chamberlain, on e-society; G. Gongireddy and

Shashank Ojha, on pilots; Dr. Ajith Madurapperuma, on institutional issues; Oleg Petrov, on strategic communications; and Vikram Raghavan, on legal aspects.

Chapter 3, on the overall program design, draws on the collaborative work of the two teams. Chapter 4, on the proposed strategy for the software and information technology-enabled services sector, draws on interviews with industry and government that were carried out by Raja Mitra in the context of program design, with financing from the Swiss Trust Fund. It draws heavily on work by Sri Lanka's ICT Agency and its stakeholder group, including the Software Export Association, Sri Lanka Association for the Software Industry, the Association of Computer Training Organizations, the Sri Lanka Information and Communication Technology Association, and the ICT Cluster Initiative financed by the U.S. Agency for International Development (USAID). It also draws on the contributions of Avron Barr and Shirley Tessler of Aldo Consulting, in Silicon Valley, and Reeza Zarook, who was a staff member of Sri Lanka's ICT Agency. Christopher Smith, consultant to the ICT Agency; Reeza Zarook, ICT Agency manager; and Lalith Gamage, director of the Sri Lanka Institute of Technology, contributed to chapter 5, on the design of the ICT capacity-building and industry promotion fund. Fund design has also been shaped by a focus group representing software industry associations and training and academic institutions, among others.

Chapter 6 draws primarily on the contribution of Rohan Samarajiva, then team leader of the Public Interest Unit of the Ministry of Science and Technology responsible for telecommunications reform, together with Ritin Singh, a member of the Bank's e-Sri Lanka team. Other contributors to the formative stage include Luxman Siriwardene, Harsha de Silva, and Redley Dissanayake, then members of the Public Interest Unit. The development of connectivity solutions during the implementation stage has since been led by Reshan Dewapura, infrastructure program director of the ICT Agency.

Chapters 7 and 8, on the telecenter program, are again the product of the collaborative design work of many contributors. Chapter 7, focusing on the strategic partnership to use telecenters for poverty reduction, benefits from contributions by Richard Harris, independent consultant and early member of the e-Sri Lanka design team. Chapter 8 draws on the contributions of Francisco Proenza, a staff member of the Food and Agriculture Organization and a member of the Bank's e-Sri Lanka team. Other key contributors to chapters 7 and 8 include Reshan Dewapura,

Harsha de Silva, Harsha Liyanage, and Galin Kora, all consultants to the ICT Agency, and Motoo Kusakabe, former vice president of the Bank and an early e-Sri Lanka team member.

I benefited greatly from conversations with and reviews by many colleagues. I would like to acknowledge in particular Peter Knight and Peter Scherer, former World Bank managers; Professors Ernest Wilson and Sandor Boyson of the University of Maryland; Juan Belt, director, USAID; and John Daly, former adviser on science and technology, USAID. Among World Bank colleagues, I would like to acknowledge the reviews of Peter Harrold, Sri Lanka country director; Philippe Dongier, manager, Global Information and Communications Technology; Samia Melhem, senior operations officer, infoDev; and Ismail Radwan, senior private sector development specialist. Finally, I wish to express my appreciation to Pat Daly for editing early drafts, to Alison Strong for the final editing, to Marjorie Espiritu, and to the production team in the Office of the Publisher—Denise Bergeron, Patricia Katayama, and Dina Towbin.

Nagy K. Hanna

Abbreviations

ADSL	asymmetric digital subscriber line
BPO	business process outsourcing
CBO	community-based organization
CDMA	code-division multiple access
CEO	chief executive officer
CINTEC	Council for Information Technology
CIO	chief information officer
GDP	gross domestic product
ICBF	ICT capacity-building and industry promotion fund
ICT	information and communication technology
ISP	Internet service provider
IT	information technology
NGO	nongovernmental organization
OECD	Organisation for Economic Co-operation and Development
PC	personal computer
PDA	personal digital assistant
R&D	research and development

RKC	rural knowledge center
RTC	Record of Rights, Tenancy, and Crops
SAPAP	South Asia Poverty Alleviation Programme
SLICTA	Sri Lankan Information and Communication Technology Association
SLT	Sri Lanka Telecom
SWOT	strengths, weaknesses, opportunities, and threats
TRC	Telecommunications Regulatory Commission
UNDP	United Nations Development Programme
USAID	U. S. Agency for International Development
USL	universal service levy
VoIP	voice over Internet protocol
VSAT	very small aperture terminal

CHAPTER 1

Introduction

In today's global economy, countries at all income levels face a growing imperative to leverage information and communication technology (ICT) in support of their economic development and competitiveness. Developing countries especially aspire to harness the ICT revolution to improve public services, share local and global knowledge, and participate in the promising global software and information technology (IT)-enabled services industries. And they aspire to leapfrog generations of technology to catch up with a connected global economy.

Yet many developing countries confront multiple constraints to the effective use of ICT for development—or e-development. How can these countries bridge the gap between their aspirations and the successful implementation of e-development strategies to join the knowledge economy and information society?

In the face of the growing need for practical guidance, the literature on ICT for development leaves a serious gap. It has been too narrowly focused on the technology, the ICT industry, and the pilot ICT applications. Recently, it has paid attention to some sectorwide applications like e-education or to cross-cutting areas like e-government. The recent literature has also described some e-strategies, though these have focused on one aspect of e-development or another. But it has neglected to

document the processes of designing and implementing comprehensive e-development strategies at the country level.

This book aims to help fill that gap. Focusing on the e-Sri Lanka program, it identifies the potential benefits of a holistic, cross-sectoral, development-driven approach to ICT use that can capture the synergies and economies of scale involved. By examining the process of moving from vision to program design to the pilot phase of implementation, the book also identifies the challenges in realizing that potential.

The book fits into the “new realist” approach to understanding successes and failures in ICT for development and the outcomes that arise from the tugging and pushing by disparate stakeholders over time. Much of the literature of the 1990s was marked by rhetoric about why ICT is good for development. By the late 1990s, there was a shift to e-readiness studies and analysis of ICT investments and diffusion. That shift remains the dominant conceptual approach today: static, apolitical, and highly aggregated indices of e-readiness and knowledge assessments. The emerging new realism is aware of process and sensitive to the institutional and political dynamics that shape e-development programs and projects.

This book is aimed at practitioners. Practitioners are interested in opening up the process of policy formulation and program design—and the institutions and stakeholders involved—to analysis, reflection, and learning. As practitioners go from vision to implementation, they are probing their way toward turning ICT potential into development results and seeking best practices in “how to”—in how programs are conceived, debated, designed, launched, and adjusted.

Practitioners want to read real stories about dealing with the challenges of weak institutions and entrenched constituencies and managing the interactions among ministries, entrepreneurs, nongovernmental organizations (NGOs), and aid agency officials. They know that the process—what has been examined, what has been neglected or rejected, how stakeholders have interacted—is the soft underbelly of development. The book attempts to capture this process of negotiation and mutual learning among local stakeholders and multilateral aid agencies—a process with no guarantees of reaching consensus or success.¹

Challenges Facing Developing Countries

The ICT sector can no longer be treated in isolation by emerging economies or development practitioners. Telecommunications, a well-established

sector in development, has remained a stand-alone sector. By contrast, ICT applications in development are both new and increasingly central to all sectors of the economy, driving productivity and powering social and institutional transformations. That is the challenge of ICT. How should ICT-enabled development strategies, or e-strategies, be designed and implemented?

ICT is the general-purpose technology of our age, much like the technologies responsible for the industrial revolution.² Yet ICT is changing and being adopted at a pace unmatched by any earlier general-purpose technology. Information and communications play a critical part in all kinds of economic transactions, development processes, and learning activities. Thus, e-strategies must be integrated across all sectors. Used creatively, e-strategies may even open up new options for development strategies, just as they have helped create new business strategies in the private sector.

Inspired by the hype and excitement of many international conferences and the United Nations–sponsored World Summits on the Information Society in 2003 and 2005, almost all countries now have an e-strategy or a vision of how ICT can solve many old and new problems of development and competitiveness. These strategies are expected to support and enable broader national development and poverty reduction strategies. But most are merely a list of aspirations. They have little grounding in an integrated and practical framework that would exploit synergies and interdependencies among the different elements of e-development—e-policies, institutions, human resources, ICT industries, communication infrastructure, and e-government, e-business, and e-society applications.

The challenge goes beyond creating visions and strategies for e-development to designing actionable, executable, bankable, and adaptable programs. National e-strategies often lack realistic assessments of the country's assets and competitive advantage, its place in regional and global markets, and its core development challenges. Most do not elaborate implementation mechanisms for managing e-development programs. Nor do most e-strategies pay sufficient attention to institutional design and capacity building.³

Broad-based e-development is not easy. It demands new paradigms of thinking, behavior, interaction, and accountability. It requires difficult policy reforms and institutional transformations to realize the benefits from ICT investments, which are far from assured. Applying ICT to development problems demands coordination, collaboration, change

management, and institutional learning. ICT use in the public sector in particular has been fraught with difficulties and disappointments (Heeks 2003). Harnessing ICT for development requires a holistic approach and effective implementation of policies, institutions, ICT skill development, and strategic investment in information infrastructure.

Another part of the challenge is to scale up successes. Much of the attention over the past decade—among policy makers, aid agencies, and ICT suppliers—has been on piloting single ICT applications and examining the successes and failures of isolated ICT projects. Scaling up pilots to affordable, sustainable, and synergistic programs poses formidable challenges. New approaches are needed to create and learn from pilots and to place pilots within strategic frameworks at national and regional levels.

Learning from e-Sri Lanka

This book responds to these needs and challenges by presenting a concrete case in bridging the gap between vision and actionable programs. It captures how Sri Lankans worked with local stakeholders and aid agency counterparts in moving from developing a shared vision of comprehensive e-development, to designing a multiyear investment program, to creating a national ICT agency, to piloting, and to early implementation and adaptation. The book also shares the lessons learned in preparing the strategy and designing the implementation mechanisms.

E-Sri Lanka is a rich case study that illuminates key aspects of e-development:

- The coalition building and institutional development involved in moving from e-vision to e-strategy to e-program implementation.
- The dynamics of partnership among country stakeholders and aid agencies involved in designing a cross-sectoral e-development program.
- Innovative mechanisms to promote the software industry, diffuse ICT among small enterprises, and invest in appropriate human resources for the information society.
- Public-private partnerships and incentives to bridge the digital divide, accelerate rural connectivity, and create sustainable telecenters.
- The process to reach national consensus on an e-government strategy and to prioritize investment in e-government services and process change initiatives.

- The mechanisms to balance top-down strategies and bottom-up initiatives, including mechanisms to support bottom-up innovations, to raise awareness and build the capacity of communities, and to use ICT for solving local development problems.

When complex and innovative projects like e-Sri Lanka are designed, the process generates substantial practical knowledge, but this knowledge is seldom codified. Yet the lessons of e-Sri Lanka are broadly applicable. Indeed, they apply to all countries that aspire to formulate and manage coherent strategies for transforming the public sector, empowering communities, and joining the information services economy. Although e-development strategies must be tailored to a country's size, capabilities, and initial conditions, most of the issues addressed in designing the e-Sri Lanka program and institutions are generic.

Several challenges facing e-Sri Lanka give the case study broad relevance that transcends the country's size and income level. First, Sri Lanka presents among the most difficult initial conditions and political environments. Sri Lanka is a poor country (with gross national income per capita of about US\$1,000 in 2004). It has frequent elections, weak coalition government, and still-unresolved civil conflict. That a coherent ICT-enabled strategy could be forged for Sri Lanka, and a national consensus reached on that strategy, therefore raises hope that similar achievements are possible in other difficult environments.

Second, although Sri Lanka had one of the world's highest ratios of civil service to population, it lacked a focal point or ministry—and the minimal understanding needed in the Cabinet or Parliament—to lead the e-development partnership with international aid agencies. The existing body for national ICT policy was politicized, dysfunctional, and marginal. It had to be dismantled, and new coordinating institutions created. A dysfunctional civil service and low awareness of ICT as an enabler of development are common challenges among developing countries, but Sri Lanka may represent a worst-case scenario.

Third, with its small population (20 million), Sri Lanka presents a relevant case not only for countries of similar size but also for poor states within large countries—even middle- or high-income economies—that face a growing digital divide. Advances in e-development in large countries like China and India have attracted much attention, but their highly aggregated e-readiness and knowledge assessments conceal the diversity among their regions.

More and more countries are asking for international development assistance to support an integrated approach to ICT for development—including Armenia, Costa Rica, Ghana, India, Rwanda, Romania, Tunisia, and Vietnam. Thus, the substantial investment in research and development (R&D) by the World Bank and the government of Sri Lanka in this pioneering effort should be valuable to other practitioners. This R&D can provide the basis for much-needed awareness raising and training for aid agencies, developing-country policy makers, and academic institutions. It should also be helpful to multinational companies providing technical assistance or marketing information technology products and services.

Focus of the Book

This volume, the first of two about moving e-Sri Lanka from vision to implementation, focuses on the design of the elements of the strategy aimed at enabling Sri Lanka to join the global information services economy. The volume first provides an overview of why and how the e-Sri Lanka strategy was designed, the nature of this strategy, and how World Bank funding was secured. It then looks at the potential of the software and information services sector and at the mechanisms to develop the human resources and local and export markets for a thriving sector. Finally, it examines why and how to extend affordable information infrastructure to all, particularly those in the country's rural and impoverished areas. The second volume will cover key elements of the strategy intended to transform government and empower communities.

The case study is about the design of an integrated e-development strategy, not about the results of its implementation. Those results will become clear only several years from now. In a fast-moving field like ICT, however, documenting lessons from design is just as important as documenting lessons from implementation and ultimate impact. Capturing lessons learned in design can guide program preparation and financing for other countries. Moreover, because the design process is concerned with issues of implementability, examining this process is critical to understanding implementation challenges and thus determining the impact.

Ultimately, the success or failure of the e-Sri Lanka program will depend not only on its design but also on local capacity for implementation and on the changing political environment. Some risks lie outside the domain of design, while others can be mitigated through the design and the process. The most critical factors for successful implementation

are likely to be sustained government commitment, mobilized local talent, and empowered e-leaders. To a lesser though still significant extent, the ability of aid agencies to provide relevant know-how and timely support to implementation also matters.

Although the program designers can help strengthen implementing institutions and local capabilities, they have little influence on the environment for the program. Deterioration of the political environment, political interference in the workings of the ICT Agency, or a breakdown in peace negotiations and resumption of hostility could derail the entire program in Sri Lanka or its implementation in the North and East. But the country and the World Bank have both reached the judgment that the likely benefits substantially outweigh the costs and risks involved.

Notes

1. This book follows Albert Hirschman's classic *Development Projects Observed* (1994). Nagy Hanna was the task team leader for the World Bank on the e-Sri Lanka program. In partnership with the Sri Lankan team, he led the process from vision to program design to the pilot phase of implementation. During this process, various studies and research and development activities were carried out. Taken together, these studies and activities provide a comprehensive view of the overall e-development program and, at the same time, reflect in some depth the issues, learning dynamics, and design options that confronted the team.
2. For the definition, role, and impact of general-purpose technology, see Perez (2001) and Hanna (2003).
3. The short shrift given to implementation mechanisms, institutional design, and capacity building is reflected in the literature on e-strategies and e-development. Some notable exceptions may be the Asia-Pacific Development Information Programme's *ICT Policies and E-strategies in the Asia-Pacific* (UNDP-APDIP 2004) and the World Bank's "E-development: From Excitement to Execution" (2005a). But even these by necessity focused on broad generalities of the *what* rather than the *how*. They did not have to deal with the pragmatic constraints of time and resources faced in real country cases.

PART 1

Designing the Program and Managing the Process

CHAPTER 2

Designing e–Sri Lanka: Process, Principles, Lessons

The process of designing the e–Sri Lanka program was as critical as the product, the aid-financed e–Sri Lanka project. The process not only produced a coherent program design and priorities but also generated local understanding, political commitment, broad ownership, and initial implementation capacity.

This chapter analyzes the process that motivated the design of e–Sri Lanka and came to guide its continuing evolution. It examines the dynamics of the donor-country relationship, the efforts to bridge the gap between local aspirations and capabilities, and the iterative process of moving from initial entry points to a holistic vision and integrated program of ICT-enabled development. The chapter opens up the internal process to examination, covering the problems faced and mistakes made, as well as challenges overcome and lessons learned.

The next chapter outlines the program design. Presenting the final design first would have given the impression of a highly controlled, deductive, linear planning exercise, starting from a comprehensive analysis and ending with a comprehensive blueprint.¹ The reality is quite different. Like all comprehensive strategies, those related to e-development seldom emerge full blown.

The e-Sri Lanka program is still at an early stage of implementation, and no one can claim success or sustainable impact yet. What success may be claimed so far has been in initiating a program from difficult initial conditions within the country and the World Bank, creating a new and dynamic model of a national ICT agency, generating national consensus on the broad program, initiating many pilots and actions on the ground, creating options and resolving many design issues, and getting the buy-in of stakeholders on critical decisions. The process has already transformed many perceptions and conditions, including producing greater awareness within the country of the need to integrate ICT into development and greater acceptance within the Bank of its role in supporting integrated e-development.

Origins of e-Sri Lanka

The idea of e-Sri Lanka originated in the private sector, primarily in the National Chamber of Commerce and among local software industry leaders. The chamber prepared an early version of a national ICT road map, focusing mainly on developing the software industry. In parallel, local software associations worked with the U.S. Agency for International Development (USAID) to promote the ICT cluster.

Inspired by the success of the Indian software export industry over the previous decade, a report by USAID consultants, completed in 2002, proposed building a US\$1 billion, export-focused software industry in five years (ICT Cluster Initiative 2002). The goal was to be achieved primarily by developing digital parks and other government-supported initiatives. This strategy, the report suggested, would take advantage of local talent in software development, create employment, and diversify exports. And the ICT cluster would help spur vigorous growth in an economy where the traditional export industries of tea and textiles were facing stiff competition or losing global market share.

Sri Lanka's minister of science and technology was responsive. He took the proposal to the president of the World Bank, who in turn asked the Bank's chief information officer (CIO) to respond. These were unusual steps. They were prompted by the lack of a contact point within the Bank's mainstream lending operations. The client country was unsure about where to seek assistance for such an unusual, cross-sectoral project within the Bank's complex bureaucracy. The global unit responsible for providing operational assistance to client countries in information and communication

technology was then focused on telecommunications and skeptical about venturing beyond its traditional strengths and mandate.² But the CIO's office lacked the experience to move into operational assistance and lending and had no precedent or mandate for doing so.

Taking the First Mission to Sri Lanka

Informally testing the proposal on the Bank's stakeholders, the CIO found much skepticism about Sri Lanka's aspiration to emulate India's export drive in software. Given Sri Lanka's development challenges, the proposal was deemed unrealistic and perhaps irrelevant.

The CIO turned to an ICT champion to take up the challenge, acknowledging that earlier attempts to develop comprehensive ICT strategies had been stymied. Such strategies were viewed as a high-risk venture in an area where the Bank had no precedent or demonstrated competencies. The Bank's regional management agreed to a first reconnaissance visit (mission) to Sri Lanka but with the proviso that further assistance would be unlikely. The regional management viewed the mission as a one-shot advisory service in response to a high-level request.

A team was quickly formed to visit the country. The recruiting put a premium on diverse perspectives and core skills. Some in this initial five-member team came from Silicon Valley (for software industry expertise) or from the Indian state of Andhra Pradesh (for e-government expertise). The team was expected to carry credibility with the client but knew little about the Bank's procedures and bureaucratic constraints.

In Sri Lanka, the mission came under intense pressure from key political and private sector leaders to promise visible and immediate actions and extensive funding for an ambitious but still undefined program. The private sector, having driven the original proposal, lobbied for a large share of funding. Within the government, however, the sense of ownership seemed thin among senior civil servants. A few chief executive officers (CEOs) were engaged, including those of the Colombo Chamber of Commerce, the Software Export Association, and a major telecommunications company. Thus, the original ICT road map and the early engagement of these stakeholders were consistent with the political leadership's vision of private sector–led, services-based growth.

The mission's return with findings and recommendations opened a debate on e-development within the Bank and provided the first opportunity to form a position on a client's request for funding for this purpose. The initial reaction was consistent with the skepticism then

prevailing in the Bank about the relevance of ICT to development. Some raised valid questions about whether it was appropriate for government to support a private industry like ICT. Some claimed that the team was advocating a “discredited” industrial policy approach of intervening selectively and picking winners. Others felt that e-government should be pursued sector by sector or ministry by ministry, thus fitting in with the Bank’s sector-based lending.³ Some saw a free-standing lending operation in the new field of ICT as competing with their sectorally allocated budgets. Many questioned the feasibility of a comprehensive strategy for ICT in view of Sri Lanka’s weak record in implementing projects; they suggested starting (if at all) with a small pilot.

Generally, launching the mission in quick response to a government request—without first including the project in the Bank’s assistance strategy and lending program and conducting sector reviews, analyses, or even research—was seen as imprudent. Entering such a new field of assistance called for substantial sector analyses. The initiative might reflect client priorities and international best practices, but how did it fit with the disciplined, conventional, sector-based reviews? How could management apply quality control reviews to a high-profile project outside the Bank’s traditional competencies?

This initial response was not unusual. ICT had not yet been mainstreamed into development cooperation. Other aid agencies working in established sectors—including the two major funding agencies in the region, the Asian Development Bank and the Japan Bank for International Cooperation—had similar responses. USAID viewed its role solely as promoting the ICT industry cluster and its private sector associations. Other bilateral donors could not see the connection between ICT and achieving the Millennium Development Goals. A few aid agencies, though sympathetic to Sri Lanka’s aspirations, were skeptical of its ability to implement the program. A narrow definition of ICT’s role in development and a rigid division of labor among donors in Sri Lanka did not help much.

Gaining Traction, Changing Minds

Forging an alliance with the Bank’s country management for Sri Lanka proved critical. New management, arriving in Colombo in July 2002, soon after the first mission, sensed an unusually strong interest at the highest levels of government and business in seeking Bank assistance for this new and untested area. On its recommendation, the Bank’s regional management allowed the project team a chance to visit Sri Lanka again—as long as it came back with a simpler and much smaller

program, perhaps even a pilot for a first phase, and as long as it addressed many of the constraints on ICT mainstreaming and practice in the Bank.

This challenge provided an opportunity to build a strong team, this time with staff drawn from across the Bank—which proved critical in building ownership and alliances within the institution—as well as consultants spanning different areas of expertise. The overall vision, the strong client interest, and the initial resistance within the Bank—all this helped cement bonds among the new team members. Those factors also helped motivate and focus the team’s efforts in mobilizing counterparts in Sri Lanka’s private sector and the country’s political leadership and among leading authorities in the emerging field of ICT. Despite diverse backgrounds and disciplines, the local Sri Lankan team too was shaped into a highly motivated group, both by the challenges it faced and by the window of opportunity created by the start of a peace process and political interest in a new theme for unifying the country.

E-Sri Lanka also offered a unique opportunity to move Bank assistance in this area to a higher plane and to integrate best practices in leveraging ICT to accelerate national development, boost competitiveness, and alleviate information poverty.⁴ Evidence of the high payoffs from adopting national strategies to build competencies in ICT production and use has been accumulating, particularly in East Asia.⁵ A strategic role for governments, in partnership with the private sector, has been increasingly acknowledged and practiced in these strategies. Even the most advanced Organisation for Economic Co-operation and Development (OECD) countries are supporting national programs to promote innovation in and diffusion of ICT among their small and medium-size enterprises (see Hanna, Guy, and Arnold 1995).

Yet the opportunities came with tough options. The e-Sri Lanka program was tentatively estimated at US\$500 million, with US\$300 million to come from the private sector and, it was hoped, US\$100 million from the Bank. Despite the apparent funding constraint, the client ruled out the option of starting with a pilot and only later moving to a full-blown program. That decision led to some tough decisions on priorities: What should the minimal core elements of the program be? Which areas might interest other aid agencies for cofinancing and export credit? What should be piloted first, or phased in over time? How should the claims of different stakeholders be balanced?

A key decision at this point was to focus on connectivity and e-government programs, which can require lumpy investments for critical infrastructure, platforms, and systems. For connectivity, having a regional

focus within Sri Lanka (as with regional telecommunications and telecenter networks) was deemed necessary, as it would have the dual advantage of accommodating funding constraints and deepening the focus on poorer regions of the country. Similarly, for e-government, focusing on shared platforms (like the country portal and government intranet) would help both to meet funding constraints and to avoid premature involvement in large ICT applications in specific sectors. Another critical decision was to focus on the human resources and training considered essential to implement the first phase of the program, leaving the vast area of ICT in education (and education in ICT) primarily to the Ministry of Education.⁶

As the ICT champions spent more time communicating with colleagues in other sectors, as feedback from the client reinforced the team's findings, and as the program design gained credibility, it became easier for the new regional leadership to support a project that already had some traction. The turnaround in the Bank was neither instant nor dramatic, however. It takes time to persuade people to adopt new ideas and for these ideas to filter down through a bureaucracy—particularly in large aid bureaucracies, where errors of commission count far more than errors of omission.

Building Local Capacity and Ownership

The next phase was to build local capacity and to manage political pressures and changing expectations. The Bank's team lacked full-time counterparts in Sri Lanka. Nor was there an established ministry or agency to follow up on mission findings and recommendations. Thus, the first priority was to look at the options for developing local capacity and organizational arrangements. When relying on an existing body or authority proved unpromising, the challenge became to establish an ICT agency and its governance mechanism (see the chapter on the agency's design in the forthcoming book on the Sri Lanka experience).

The low level of ICT awareness and literacy among parliamentarians made gaining parliamentary approval for creating a new agency a challenge, but the effort eventually succeeded (Moragoda 2002). Once the Parliament passed the ICT law in 2003, recruiting the CEO and key program managers was the next pressing step. Creating and staffing the ICT Agency was key to localizing project preparation and building a true partnership between local stakeholders and the Bank.

The newly created ICT Agency faced daunting challenges. Its staff had no experience with preparing a program of this size or with meeting

Bank requirements for project preparation. The CEO came from the private sector, and that was an asset because he brought a business culture to this public agency. But it also meant that he lacked knowledge of the rest of the government and of aid agencies. He had to acquire this knowledge fast, even while recruiting and building up his team, piloting quick-impact projects, and preparing the e-Sri Lanka program for Bank financing.

The Bank's team had developed a project management tool, laying out the many steps needed to prepare the program, to impress on the new agency the Bank's rigorous requirements for financing, and to overcome skepticism among local partners and aid agencies. Luckily, many of the new staff were familiar with project management methodology, and they quickly internalized the steps, adapting and improving on them.

The next big turning point occurred in the months surrounding the April 2004 national election in Sri Lanka, which the opposition unexpectedly called for and won. In the months before the election, the e-Sri Lanka program and the ICT Agency, the lead implementing agency, were subjected to relentless rumors and attacks.⁷ But discreet efforts before the election to reach out to the opposition and address both misunderstandings and legitimate concerns paid off when the opposition won the election. Moreover, strategic pilots carried out during early preparation, targeting the ICT needs of the Parliament, president, and Cabinet, helped raise awareness and promote ownership of e-Sri Lanka among key political officials.

Experience during this period showed how important demonstration projects, coalition building, and strategic communications are in building the *authorizing environment*—the mandate of an organization and its political and legal support (for detailed discussion of this concept, see Moore 1998). It also suggested that the authorizing environment demands continuous attention and maintenance, particularly in a turbulent political environment like Sri Lanka's.

Once the new government was in place, a bureaucratic fight ensued over where the ICT Agency should be sited within the administration. The Bank could only keep its ears to the ground. It continued to emphasize the need to ensure autonomy and authority for the ICT Agency, maintain the integrity of the program, and provide it the flexibility to address the new government's priorities of rural development and poverty reduction.

By then the siting situation was mainly a local game, however, and luckily the ICT Agency was agile enough to influence the outcome. And

the newly elected government clearly attached significance to the e-Sri Lanka program, holding negotiations with the Bank for the first time in the prime minister's office. The new government positioned the ICT Agency to report to the prime minister's office, reflecting a growing understanding of the program's cross-cutting nature.

Thus, the design of the e-Sri Lanka program survived a major political shift almost intact.

Growing Ownership in the World Bank

At the Bank, having the new lending operation led from outside the South Asia regional unit presented its own difficulties. Free-standing lending operations are seldom led from outside the Bank's regional units, where most of the expertise in traditional sectors is located. (Telecommunications has been the exception, viewed as a highly specialized technical area that needs little coordination or integration with other sectors within the Bank's regional structure.) With no regional or central home in the Bank, this new type of assistance had to be processed from the CIO's office, though this office was not positioned to do so nor to seek approval of such support functions as procurement and disbursement within the regional structure.

The innovation represented by the e-Sri Lanka program was unlikely to sprout from within the regional structure, given the prevailing skill mix and the substantial up-front investment required in operational R&D. But it could not survive and grow in the long run without a home in that structure.

As negotiations between the Bank and the Sri Lankan government proceeded and the project's presentation to the Bank's Board of Executive Directors for approval approached, changes were afoot to absorb the ICT sector into the South Asia regional structure. The senior regional management for South Asia declared its support for ICT as key infrastructure for Asia's economies. This commitment was confirmed after other South Asian client countries requested Bank assistance similar to that requested for e-Sri Lanka. Several other aid agencies expressed greater interest in collaboration and financing as the e-Sri Lanka program began to provide a common framework for investment and technical assistance in ICT. All this interest helped reinforce ownership of the e-Sri Lanka program by the Bank's South Asia regional unit.

When e-Sri Lanka was presented to the Bank's Board of Executive Directors, in September 2004, members endorsed the program despite

concerns about its ambitious scope and about the untested ICT Agency. Indeed, they asked that a similar approach be adopted for the countries they represented, advanced and poor alike. The regional management team committed itself to providing a home and the staff to mainstream this innovation and to respond to growing demand from clients.

Guiding Principles

Several principles guided the process of preparing the e–Sri Lanka program. These principles draw on lessons from more than 50 years of development assistance, evaluation of the effectiveness of this assistance, and the growing literature of “new development economics” (see Hanna and Picciotto 2002; Jomo and Fine 2006)⁸:

- *Taking a holistic, long-term, and development-driven view* to ensure that national ICT strategy is driven by the overall national development strategy and development outcomes, not ICT investments, and to tap complementarities with other development programs, as well as synergies within the e-development program.
- *Securing broad local ownership among key stakeholders* to create and implement a sustainable, cross-cutting program.
- *Adopting a knowledge-based partnership* to ensure ownership, knowledge transfer, capacity building, local innovation, sustainable institutional change, and a good fit with local conditions.
- *Ensuring programmatic flexibility* to accommodate limited up-front information, an uncertain political environment, untested capabilities, and adaptation during implementation.
- *Promoting bottom-up initiatives* to accommodate complexity and diversity, to stimulate innovation, to build local partnerships for social learning, and to complement top-down strategic directions.
- *Funding quick-results pilots* to nurture political commitment and social learning.
- *Building multiple feedback mechanisms* to support just-in-time learning and local innovation, as well as institutionalize monitoring and evaluation.

Underlying all these principles is perhaps the most basic one: understanding the local situation, the stakeholders, the political economy, and the broader context of development. For example, securing local ownership and developing a coalition of stakeholders require knowing who the

stakeholders are. There is never a clear or static “list” of stakeholders. It often changes as the program develops—and in response to that development. Similarly, developing a knowledge-based partnership requires appreciation of local sources of knowledge and of think tanks with which to partner. Funding quick-results pilots requires initial knowledge of local capabilities and learning, as well as appreciation of which pilots are most likely to influence key stakeholders.

Prior sector and situational analysis and knowledge of country institutions matter. Even more important is getting close to the client and ultimate beneficiaries and developing ways to capture knowledge as it emerges from interactions with different actors, from political dynamics, from early pilots, and from multiple feedback mechanisms.

Taking a Holistic, Long-Term, and Development-Driven View

Political leaders in the governing coalition viewed ICT as a potential source for a compelling and unifying vision that could help overcome a sense of missed opportunities, including two decades of development lost through civil war. They were well aware of the threats of globalization—including the stiff competition facing the textile industry from China—as well as the opportunities—such as the prospect of Sri Lanka emerging as a modern trading nation and a regional logistics and services center. And as the government pursued peace with the rebels, it saw e-Sri Lanka as a theme that would help energize and unify the country, particularly if the initiative produced dividends for social inclusion and for the poorest regions of the North and South.

This political view fit well with the pervasive roles ICT can play in development.⁹ But to create a unifying force, it was critical to shift from a vision driven by the ICT industry to one centered on leveraging the ICT revolution to transform the entire economy—a vision in which the national development strategy would define the e-strategy.

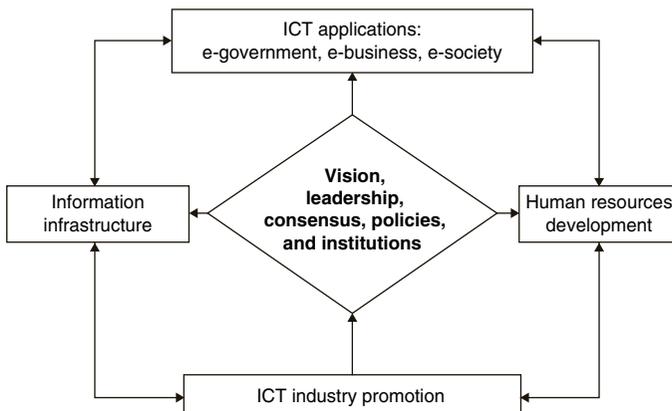
An analysis of the recently established national development strategy, outlining how ICT could aid in achieving this strategy, helped build consensus on a national vision of ICT-enabled development. The analysis sought to identify the competitive advantages of Sri Lanka that ICT could best leverage and the development programs that ICT could best complement. It also aimed to link Sri Lanka’s aspirations as a regional services hub with what ICT might offer as an enabler. The emerging outline of a development-driven ICT vision was immediately adopted by the political leadership, as it resonated with deeply felt aspirations: national unity, dynamic growth, and poverty reduction.¹⁰

This demand-driven, development-focused view broadened ownership of the e-Sri Lanka project. Presenting the project as an enabler of established sectors and ministries, not a competitor, helped in gaining support within the country and the Bank. At the Bank, presentations emphasized how the project would complement Bank-assisted sectoral projects—for example, providing telecenter networks as delivery channels for agricultural, education, and health services (see chapter 7).¹¹

The holistic vision shaping the e-Sri Lanka program stresses the synergy among key elements of e-development: an enabling policy and institutional environment, a competitive and affordable information infrastructure, a dynamic and competitive ICT industry, broad ICT literacy and education, a coherent investment program to apply ICT to modernizing the public sector, and incentives to promote the use of ICT in developing the private sector and empowering civil society (figure 2.1).¹² Creating opportunities for such synergy accelerates and maximizes the development impact of ICT investments and helps realize the network externalities that occur only after a critical mass of ICT users has been reached.

Potential synergies were discovered along the way, confirming the holistic approach (see chapter 3). For example, e-government services would not go far without adequate connectivity, delivery channels, and shared and affordable access to ICT through telecenters. Conversely, telecenters were unlikely to be financially sustainable without local content and income from delivery of e-government services.

Figure 2.1 Synergies among Key Elements of e-Development



Experience suggests that the benefits of tapping such synergies and securing complementary investments outweigh the costs of coordination (see, for example, Hanna and Boyson 1993; Heeks 2003):

- *Moving beyond technology.* The potential payoffs of investment in information technology are much higher when the investment package also includes skills upgrading, process reengineering, and the like.
- *Moving beyond pilots.* Development impact and sustainability require scaling up and diffusing best practices beyond privileged pilots, and that in turn requires attention to enabling environments, development strategy, shared learning, and sustainable business models.
- *Moving beyond sectoral and ministerial silos.* Shared infrastructure, common policy frameworks, coherent ICT governance, and citizen-centered process transformation across ministries can reduce the substantial investments needed to transform and modernize the public sector.

Pursuing a holistic approach demands building partnerships across sectors and disciplines. Establishing synergies requires creating and retaining a cross-sectoral team that can address all the elements of e-development simultaneously. In the Bank, this meant creating a virtual team comprised of specialists in different aspects of ICT and development disciplines from across several units, and then protecting the team from turf battles. The new ICT Agency faced similar challenges of partnership and team building. It had to struggle to build bridges across agencies and constituencies whose turfs were long established and interests narrowly defined.

Achieving a holistic strategy also requires a long-term vision to keep the focus on the development outcomes of ICT and to phase the steps needed to realize these outcomes over time. The vision of e-Sri Lanka is one of transforming public services, user industries, rural communities, and even the structure of the economy. Transformation is energizing, but it cannot be achieved in the short term. E-government programs in leading countries, for example, are expected to reach a real transformational stage only after decades. This is no different from any large-scale structural and institutional transformation. But the hype and potential of ICT have raised expectations for instant ICT-driven solutions. Moreover, political uncertainties, the election cycle, the project cycle, and incentives in the civil service and aid agencies all favor a short-term orientation.

Thus, establishing and communicating a long-term perspective was critical to maintaining a holistic vision while still allowing disciplined

phasing and progressive integration of an otherwise unmanageably complex program. This long-term view encouraged the sequencing of projects to keep complexity in line with e-readiness, stakeholders' commitment, and local capacity for coordination and integration. It was also critical that the first phase, the donor-assisted five-year program, lay the foundation for many future activities. Building the capacity of the ICT Agency, establishing its track record, and developing national ICT governance and architecture were all expected to prepare the way for future scaled-up e-government programs.

A long-term vision also must encompass human resources, critical to an information society. But the Ministries of Education and Higher Education were unprepared to coordinate with the e-Sri Lanka program. A division of labor among donors, with the Asian Development Bank the lead agency for education, also made coordination difficult. Moreover, Sri Lanka lacked locally proven approaches to reforming the education sector with the help of ICT.

Adding a comprehensive component on ICT as an enabler of education reform to the e-Sri Lanka program would have introduced premature complexity. Yet ignoring human resources would have put binding constraints on other parts of the program. A tradeoff was to address immediate constraints in capabilities tied to specific steps in implementation and to establish a fund for demand-driven education pilots that could lay the foundation for full-scale programs for human resource development and ICT in education.

Securing Broad Local Ownership

To secure broad ownership, the ICT Agency invited focus groups of key stakeholders to work with it in shaping the design of each component of the e-Sri Lanka program. Engaging stakeholders was also necessary to enable the new agency to function and to contain its size and its dependence on expensive international consultants. Stakeholders participated voluntarily, often because of their interest and ability to contribute rather than just their position. While the Bank and ICT Agency teams worked out the overall design and analyses, the focus groups made many refinements, at times challenging and revising even the fundamental assumptions.

In addition, several town hall meetings were organized to hear views from the general public. The agency led these presentations from early on, which helped build confidence and ownership by emphasizing that e-Sri Lanka is not a donor-driven program but a framework for partnership for all.

Securing broad ownership of a national program is always a challenge, but particularly so in a conflict-ridden society under a coalition government (see Hanna and Picciotto 2002, 290–91). Some stakeholders held strong and uncompromising views about how to realize the vision. Some insisted that only the public sector should own and operate the telecenters that were to provide shared, affordable access to ICT—while others insisted that only the private sector should do so. Representatives of the ICT industry at times felt that the program’s design had neglected their original vision or had tilted too much toward the needs of the public sector. And NGOs representing the rural areas at times felt that it was favoring urban elites. Balancing the program in response to different stakeholders and securing broad ownership continued to be a challenge.

The need to keep key constituencies engaged as partners in shaping and implementing the program influenced the final scope of e-Sri Lanka and the balance among its components. There was growing pressure, for example, to drop funding for promotion of the ICT industry so as to simplify the donor-financed project and increase funding for the under-resourced e-government program. But these changes were resisted because they risked losing the ICT industry and the broader private sector, as well as the potential to mobilize the resources of the Sri Lankan diaspora and ICT multinationals. Similar balancing was continually attempted between already-connected urban centers and rural and underserved areas.

Local ownership was sometimes threatened by the internal demands of the Bank, including its project cycle, its Board schedule, and its budgetary limitations. Speed often compromises ownership, particularly when programs involve many stakeholders and the pace is imposed from outside (see Hanna and Picciotto 2002, 290). The problem can be worse for innovative and contentious lending operations, which fit poorly with the internal dynamics and rigorous schedules of large funding organizations.

Tension between securing ownership within the Bank and securing it within Sri Lanka arose in several cases. First, pilots to provide political payoffs and demonstration effects mattered more to the government than preparing the large program for funding by the Bank and other aid agencies. These pilots appeared essential to ensuring the ICT Agency’s legitimacy and immediate survival. But they also diverted its resources and attention away from meeting the aid agencies’ appraisal requirements.

Second, building a new agency to lead the e-Sri Lanka program was necessary to secure local ownership, develop homegrown solutions, and continually adapt the program. Institution building is an espoused core

objective of aid agencies. But it is also an intangible and long-term one. The incentives and accountabilities facing the Bank's team centered primarily on meeting internal deadlines for project appraisal and Board approval. Just as with the pilots, institution building competed for resources and attention at a time that the team had to meet the Bank's deadlines for preparation and Board presentation. The risks were high; delays could have discredited the team and undermined the legitimacy of a new type of operation.

Finally, the unexpected call for a national election made it tempting to advance project negotiations to before the election to avoid the risk of a new government revising the program's design and the consequent delays in Board approval. But securing ownership of e-Sri Lanka by the new government was judged more important than meeting the Bank's schedule. That decision proved to be beneficial. It led not only to ownership by the new coalition government but also to the refinement of several components of the program to reinforce the program's rural development focus, in line with the new government's constituency. It remained essential that the e-Sri Lanka program be perceived as a homegrown initiative. The pace of processing and approval by the external financiers and partners could not be allowed to undermine this perception.

Adopting a Knowledge-Based Partnership

The program was designed as a knowledge-based partnership between the Bank and the client—a partnership that emphasizes sharing knowledge in a way that adds value to the client's decision making and capabilities.¹³ The Bank was providing professional services for which the mode of delivery would be as critical to development outcomes as the final design of the program (see Hanna and Picciotto 2002, 135–58). The Bank lacked any recipe or standard model to follow in this new area. Advisory services had not been codified or commodified by the consulting industry. A black box approach would not have worked, since both the expertise and its delivery required collaborative solutions.

A knowledge-based partnership would bring together the unique capabilities of aid professionals and local counterparts—and combine global and local knowledge. Moreover, such a relationship was increasingly demanded given the client institution's growing sophistication, the political visibility of the program, and the highly motivated counterpart staff.

Knowledge-based partnerships have their own dynamics, depending on the strength of each partner and the maturity of the relationship. In the early stages, when the ICT Agency was still being established, the

Bank team had no choice but to take the lead in developing the overall conceptual design of e-Sri Lanka, in line with the aspirations of key stakeholders. But the agency caught up, progressively integrating, detailing, and advancing the program design to fit local experiences and stakeholder preferences.¹⁴

Knowledge-based partnerships are not easy to build and are seldom used except by the best professional services organizations (Dawson 2005). The budgetary process and pressures of the project cycle in aid agencies do not always encourage or account for the time or resources needed for sharing information, building knowledge tools, developing communities of practice, and nurturing professional dialogue. Moreover, playing the roles of coach, adviser, and facilitator does not permit aid agency staff to take credit for client actions or even to justify lending to a project. For the Bank's e-Sri Lanka team, empowering the local team to appropriate new tools and frameworks and giving it credit for the hard work and nascent program was a challenge—especially as both teams felt embattled and had to demonstrate the value they added to the joint design process.

The ICT Agency's lack of experience in preparing programs for external financing also tested the partnership. Once staffed, the agency moved quickly to propose more than 100 projects, exceeding any possible donor financing and implementation capacity. These local initiatives, striving to exceed donor expectations, led to tensions and debates. But they also led to new ideas that were later disciplined by and integrated into the program strategy. Similarly, the agency was impatient with what it perceived as the Bank's slow and cumbersome procurement processes. It wanted shortcuts so that it could keep up with fast-moving technology cycles and respond to political pressures to produce results. That preference too led to creative tensions and at times to adaptations in Bank procedures.

As program preparation advanced, a stronger professional partnership grew. Both the need for new local solutions and the risks to individuals on both sides further cemented the partnership. That evolution, in turn, inspired more local innovation and spurred the search for emerging international best practices that could be adapted locally, leading to a better fit of the strategy to local conditions.

Ensuring Programmatic Flexibility

At the time of project design, there were many uncertainties and no precedents. The Bank was used to funding specific ICT project components, applications, or systems defined according to a blueprint. But programmatic or sectorwide approaches, though increasingly used in established sectors

such as roads and education, had yet to be used in the ICT field.¹⁵ During program preparation, however, it became clear that a rigid, top-down investment plan would be infeasible and perhaps counter-productive.

Given the skepticism about the Bank's entry into this new area of assistance, it seemed impossible to get management approval without greater precision about the design, costs, and funding for such elements as e-government systems and telecenters. Yet these were exactly the programs that demanded continuous flexibility and adaptation during implementation, because community receptivity, institutional response, political commitment, and local capabilities had yet to be tested. Moreover, independent evaluations of integrated and comprehensive projects suggest that those that relied on blueprints, discrete investments, and Bank-controlled project implementation units—rather than building flexibility, local capacity, and incentives for coordination—often failed (Hanna and Picciotto 2002, 295–98).

Getting the broad directions right seemed more important than defining the detailed design, which would evolve during implementation. Despite pressures to reduce uncertainties for funding agencies, the design team therefore tried to strike a balance between up-front commitment to clear priorities and accountabilities, and openness to change and learning during implementation. Emphasis was put on securing programmatic flexibility and building local capacity to adapt the program.¹⁶

This approach paid off when unexpected changes occurred in the program environment, such as the change in government in April 2004 and the tsunami of December 2004. After the tsunami, programmatic flexibility and the institutional agility of the ICT Agency made it possible to place computers in refugee camps for children with no schools but ample time to learn. Similarly, the e-government program established priorities, pilots, and sequenced actions, but when ministries changed leadership or failed to live up to key accountabilities, the program resequenced their applications or dropped them altogether. And when donor funding became available for specific components, the flexible design permitted and even encouraged redeployment of funds within and across programs—as long as this did not jeopardize the fundamental strategy and development objectives.

Promoting Bottom-Up Initiatives

As the initial program preparation unfolded, different stakeholders demanded resources to meet *their* urgent need for ICT investments or to promote *their* segment of the ICT industry. Proposals were springing up

from the private sector, civil society, and academic and training institutions. The government lacked a mechanism for aggregating and prioritizing these demands and for engaging as a partner in the many local initiatives, let alone for facilitating learning from them. The ICT Agency had to focus on large, complex, strategic investments and overall program management; it could not dissipate its limited capacity on appraising and promoting many small grassroots initiatives.

A search for appropriate mechanisms to aggregate and prioritize these demands, simplify program design and management, and maximize learning all at the same time led to the idea of creating two national funds. One, the ICT capacity-building fund, would promote innovations to meet the ICT industry's human resource development needs, to develop the domestic market, and to promote the country as an ICT service exporter. The other, the e-society fund, would promote grassroots innovation and community capacity to use ICT for poverty reduction and social development.¹⁷

Mechanisms like these to support bottom-up initiatives also aim to promote innovative partnerships within society. Thus, the two funds have also been established to enable otherwise separate public, business, academic, and civil society sectors to partner in promoting innovative ways to upgrade ICT skills and to use ICT for poverty reduction. Such cross-sectoral partnerships are also critical to promote policy reforms, social learning, and sustainable institutional change (see Wilson 2004a).

Funding Quick-Results Pilots

Proceeding with pilots even as the e-Sri Lanka program was being designed was an unusual aspect of program preparation. The bias for action was imperative. The client, particularly the program's political champions, perceived the Bank's requirements for rigorous design and appraisal as too slow and onerous. And the skepticism within the Bank meant that the design team could not afford to proceed with internal Bank reviews without a relatively developed program design. Pilots were therefore critical—both to support the legitimacy of the program by producing rapid results and demonstration effects and to help refine the program design.

Pilots also provided a learning opportunity for the ICT Agency, allowing it to test its capabilities and moderate its ambitions (the pilots were not intended for basic research or intensive data gathering). The agency set ambitious targets for itself, inviting proposals for pilots that exceeded its funding resources and initial supervision and learning capabilities. The

competitive process enriched the set of proposed pilots, though it also raised expectations and led inevitably to disappointment when worthwhile proposals failed to win resources.

But proceeding with the pilots during program preparation posed a challenge for the ICT Agency: balancing the immediate pressures of implementing pilots with attention to the long-term, strategic activity of preparing the overall program for the Bank and other aid agencies. Sometimes a tradeoff was made in favor of the short-term, politically visible pilots. At times, the balancing act became difficult for the leadership of the ICT Agency, and the Bank's team had to mediate with political leaders to rebalance the pressures. Even so, the pilots created an exciting learning environment for the ICT Agency, helped shape the overall program, and prepared the new agency for the hard task of partnering with others for implementation.

Building Multiple Feedback Mechanisms

Aid agencies normally expect clients to undertake a rigorous process of preparing a strategy and detailed program design—through research, surveys, prior pilots, independent evaluations, and sector studies. For the e-Sri Lanka program, doubts about this new area of development assistance and the cross-cutting approach being adopted reinforced the need for an up-front blueprint. But political pressure to launch the program was strong.

What could be done to reconcile these conflicting demands for speed and rigorous analysis during project preparation? Invest in a credible, empowered, learning-oriented organization. The ICT Act No. 27 of 2003 that created the ICT Agency empowered it to implement a nationally driven e-Sri Lanka strategy. Thus, the agency is not a mere project implementation unit like those often created to implement a specific donor-funded program while following the donor's rules of accountability. The ICT Agency is built to be an agile, innovative, e-leadership institution.

The ICT Agency had to develop knowledge management and evaluation systems to compensate for limited information and program preparation. But building formal knowledge management and rigorous monitoring and evaluation systems would take time and external technical assistance. While these systems were being put into place, the agency had to rely on informal, just-in-time feedback mechanisms—such as learning partnerships with NGOs and participatory evaluations through focus groups and pilots.

Multiple feedback mechanisms were also incorporated into the design of the two funds created to finance proposals. These feedback

mechanisms include testing demand through cost-sharing arrangements and a competitive proposal process, engaging stakeholders through focus groups and fund committees, and creating results-based monitoring and evaluation processes. The aim was to develop credible local institutions to continually create and manage programs well beyond donor approval of funding—rather than designing and appraising such programs up-front.

This approach emphasizing institutional and technological learning is consistent with the new development economics literature (see, for example, Jomo and Fine 2006). For example, the early development (and neoclassical) literature assumed that information relating to the use of a technology is readily available to all potential users in the form of a blueprint. Assimilating new technologies in developing countries was assumed to be easy and relatively risk free, with the cost limited to the purchase of the technology. Empirical evidence suggests otherwise: blueprints transfer little of the tacit knowledge needed to adapt and effectively use new technologies, and technological change in developing countries involves incremental innovation, costly learning, and investment in the necessary skills and capabilities.

Deliberate active learning is an essential ingredient in competitiveness and technological dynamism. Similar literature that has emerged in institution building and strategic planning confirms that the premium should be put on building learning organizations and adaptive planning processes—forgoing the comfort of buying comprehensive blueprints (see, for example, Hanna and Picciotto 2002; Jomo and Fine 2006; Scott 1998).

Lessons Learned

Engaging with client countries provides important learning experiences and tacit understandings. These typically are not documented in the final appraisal, blueprint design, and legal documents of the funding agencies.¹⁸ Yet narratives describing how unusual situations have been handled can convey substantial expertise (Denning 2005). Some of the lessons learned during the design of the e-Sri Lanka program are embedded in the development experience and principles discussed in the previous section. Five more key lessons are summarized here. Some of these lessons are not unique to ICT-enabled development, and several are contrary to conventional wisdom.

- *Capturing, then moving beyond entry points.* Flexibility is necessary to allow the design process to start with the most accessible entry points, then move toward and test the feasibility of a holistic e-development framework within which interdependencies and tradeoffs can be secured.
- *Securing effective local leadership and institutions.* Leaders and institutions are needed throughout the process to integrate ICT into development strategies, to manage process and skill transformations, and to exploit the potential synergies among the pillars of e-development.
- *Integrating pilots into strategies.* Pilots should be an integral part of program design, strategically selected and managed to foster political support and maximize early learning.
- *Learning from regional examples.* Successful neighbors exert a more powerful influence on developing countries than abstract international best practices, particularly in fields where knowledge is not yet codified.
- *Integrating innovation and ICT into development assistance.* Innovations involve risks and learning costs for both individuals and institutions. Integrating ICT into development assistance and strategies poses organizational challenges as much for aid agencies as for countries, and both sides should learn to assess and manage the risks and uncertainties.

Capturing, Then Moving Beyond Entry Points

An e-development program is unlikely to be comprehensive and well integrated from inception, despite the strong interdependence among elements of such programs. Proposals for initiatives are likely to come from isolated constituencies representing one pillar or another of the knowledge economy or e-development. National ICT ministries typically are newly created or are dominated by the ministry of telecommunications through historical association and thus tend to focus solely on infrastructure or connectivity. Many other interdependent elements of e-development are the domain of several ministries, fragmented business associations, or NGOs. Meanwhile, the ICT-user sectors such as education are typically represented by large, long-established ministries, and these ministries are unlikely to work with other players like the ICT industry to develop complementary actions for integrating ICT into education or improving the local software industry.

Countries usually lack coordinating agencies or mechanisms to bring all these perspectives into a coherent strategy. Further reinforcing the tendency toward partial and segmented approaches are the established sectoral structures of aid agencies.

Although it is often better to start with a comprehensive analysis, then strategically select the most critical entry points, it is rare that a full program is ready-made and merely in need of external funding. For e-Sri Lanka the original proposal initiated by the software industry could have been dismissed as too narrow and too irrelevant to concerns about poverty reduction (indeed, that was the initial reaction of many aid agencies' reviewers). But it was important to be opportunistic and to go through the door that was open.

Once key Sri Lankan policy makers and stakeholders were engaged with the World Bank team to generate an inspiring vision of ICT-enabled development, it was possible to bring in other constituencies to shape the big picture. They began to see the payoffs from complementary investments in policies, institutions, business processes, change management, and human resources as well as ICT applications and information infrastructure. The vision and the underlying holistic framework allowed selective interventions and strategic choices to be made and investments phased—without losing sight of key interdependencies.

Entry points are critical to open dialogue and initiate partnerships; comprehensive or integrated approaches to ICT for development cannot be imposed from outside. An open learning model of development assistance starts from where the client is: "helpers" have to design their assistance based on the starting point of the "doers," not on an imaginary clean slate (see Ellerman, Denning, and Hanna 2001, 105–33). In Sri Lanka, this was good practice for reasons not only of psychology and pedagogy but also of political economy, because the pro-business government in office at the time would naturally be responsive to the concerns of the software industry.

All this does not mean that helpers and doers should be locked into bureaucratic silos, sectoral boundaries, or the perspectives of a single constituency. Instead, it means that entry points should be the start of a journey to explore, to develop a vision, to engage other key constituencies, and to learn from past experience and best practices.

The design of the e-Sri Lanka program was far more comprehensive than the original proposal of the software industry (see chapter 3). Yet it did not encompass all possible elements of a holistic, full-scale e-development program. It was recognized that this five-year donor-assisted program would be a first phase in a rather long journey.

How comprehensive should the program have attempted to be? The answer may come only in retrospect, as implementation unfolds. Pursuing comprehensiveness to capture synergies and interdependencies can lead to excessive complexity, beyond local capacity for implementation and coordination.¹⁹ Yet narrowing the scope to isolated interventions has often reinforced bureaucratic silos, neglected prerequisites and critical bottlenecks, and led to investments in unsustainable components. Striking the right balance continues to be a key strategic decision in development assistance, one that should be guided by the local context and a clear vision of the development goals.

The scope and complexity of the e-Sri Lanka program were determined on the basis of the aspirations of the client, key interdependencies, and desired development outcomes—and the client’s commitment, political economy, learning curve, and implementation capacity. To reduce the risks from comprehensive coverage and management of multiple interdependencies, e-Sri Lanka took a flexible programmatic approach, focused on a coherent set of subprograms, developed clear governance frameworks, built on the ICT Agency’s capabilities as facilitator and partnership shaper, and encouraged maximum outsourcing to the private sector and NGOs.

Did the preparation team strike the right balance? In hindsight, it may have underestimated the challenge of designing and implementing such a variety of novel and interdependent programs in a country with weak implementation capacity. It should have spent more time on securing robust governance mechanisms for the newly created ICT Agency. It should have invested more in building bridges with the Ministry of Education and its primary aid partner, the Asian Development Bank.²⁰ It should have sought more dialogue and knowledge-based partnership with the Sri Lankan Telecommunications Ministry and Regulatory Commission. All this, however, reflects the team’s need to strategically allocate its attention—balancing the demands of competing stakeholders on its scarce time and resources.

The e-Sri Lanka program itself can serve as an entry point for even more comprehensive ICT-enabled development, and aid agencies should complement local efforts to build on the program. Early in program preparation, the Bank team perhaps did not fully appreciate the opportunity to leverage the ICT infrastructure and telecenters as delivery channels for information and services for all sectors. Later, the team explored how the telecenters program could complement efforts in community development and livelihood improvement, how the e-government

program could complement civil service reform, and so on (see chapter 7). Opportunities for such complementarities became clearer as the program took shape.

Starting with key entry points, then striving for synergies with aid agencies' ongoing and planned projects can help limit a project's scope to manageable complexity, build alliances with other sector teams, and fully exploit the new information and communication platform for the entire economy. Capturing the complementarities requires leadership within aid agencies and the country and a holistic vision of ICT in development.

Securing Effective Local Leadership and Institutions

At least as important as preparing plans for an e-development strategy is building local capacity to learn and act strategically and to manage risk and uncertainty. In Sri Lanka, the public sector's lack of a focal point to lead or partner with the private sector and other stakeholders provided an opportunity to search for new institutional options. It was tempting to assume that general ownership of the e-Sri Lanka program by a few top political leaders, combined with rigorous technical preparation by the Bank's team or international consultants, would be an adequate substitute. Moreover, given the fragile political environment, there were strong local pressures to deliver visible results without having to nurture new institutions or broad local ownership. But investing the time and resources needed to create an autonomous ICT Agency turned out to be critical in supporting an integrated e-development strategy.

Later events—including the frequent changes in government and in the Bank's team and the inevitable decline in the Bank's support for implementation once the project was approved—confirmed the importance of the early investments in institution building. The ICT Agency proved to be adaptable and resilient to changes in the authorizing environment. It was able to adjust the program design to new opportunities and challenges and to convince the Bank of the need for such changes. But the short existence of the agency leaves no room for complacency nor assurance of its survival.²¹

The leadership such an agency provides is the key to translating an e-development vision into reality. Experience suggests that leadership is just as essential to integrating ICT into national development strategies as it has proved to be to integrating ICT into business strategies.²² Leaders must integrate ICT investments into broader processes of change—to transform skills, business processes, and institutional relationships. They

need to build partnerships across business, the public sector, and civil society organizations—to innovate new ways of doing business, identify knowledge and competencies, and induce sustainable institutional change. Leadership is also critical to integrating cross-sectoral components of a holistic strategy while maintaining focus and exercising selectivity in the face of competing demands from powerful stakeholders.

Although the decision to create the ICT Agency came early, recognizing the need to build a new cadre of e-leaders in the government and other stakeholders took time. During program preparation, some progress was made in engaging mainstream policy makers by appointing chief innovation officers. Not surprisingly, however, most top policy makers did not yet appreciate how central ICT can become in transforming sectors, industries, and institutions. This remained a challenge, particularly as e–Sri Lanka began to promote ICT investments to transform core processes and services within government.

Securing the synergies among the pillars of e-development also continued to be a challenge for the ICT Agency. Some key actors like the Ministry of Education pursued critical but parallel programs. But without leadership at the Cabinet level, the potential synergies between ICT literacy, ICT use in schools, technical education, and other elements of e-development remained elusive. Tapping such synergies takes time, champions, and perseverance. A pilot e-leadership training program tailored to the Cabinet and agency heads was launched in 2006 to address this challenge.

Integrating Pilots into Strategies

Pilots, strategically selected and managed, proved critical in securing and sustaining political interest in and support for e–Sri Lanka. These pilots also proved vital in establishing the legitimacy and autonomy of the newly created ICT Agency. Some pilots were designed to bring visible benefits to key political constituencies like the Parliament. Still others were designed to test first steps toward working across government agencies in difficult areas of collaboration, such as developing and sharing a national database on citizens. The challenge was to avoid viewing these pilots as ends in themselves—a common practice of political sponsors and donors.

Beyond being politically necessary, pilots enable learning and innovation. They deserve more emphasis as applied research to explore hypotheses, test capacities and social responses, accelerate learning about mainstreaming ICT in priority areas, and provide timely information

before scaling up programs. They should be standard features of innovative programs like e-Sri Lanka.

Multiple, rapid-results pilots are consistent with a learning process approach to program development that emphasizes evolutionary, participatory, and demand-driven methods of design and implementation. Pilots proved critical to shaping the e-Sri Lanka strategy by managing expectations, identifying institutional constraints, and providing timely and practical experience. For example, pilots to develop new telecenters or expand the services of existing ones helped identify the key factors in their sustainability and the multiple partnerships needed for success.

Pilots also speed learning by the ICT Agency. The agency is expected not only to make the independent evaluations of such pilots available to the public but also to internalize the findings and institutionalize the lessons in its practices and in the program. And with its partners—consultants, service providers, and other implementing agencies—it is expected to discuss what lessons can be learned and how to incorporate them into the evolving program.

The ICT and innovation literature suggests that most innovative ICT pilots fail in the narrow sense of fully meeting sponsors' expectations about costs, benefits, and delivery time. Yet over time ICT can transform large organizations and perhaps entire governments. The apparent disconnect can be bridged by viewing ICT projects as embedded in an organizational learning process. Even failed pilots and projects leave a legacy in a learning organization. The sequence of pilots has a cumulative effect in learning and transformation.

This learning process also occurs at the societal level. Some of the e-Sri Lanka pilots helped advance the learning process, such as the early telecenters. Others proved to be a poor fit in the emerging e-Sri Lanka strategy, such as the distance learning centers.²³ But even in this case, “failures” and subsequent adaptations have provided important lessons for the emerging national e-learning strategy.

Learning from Regional Examples

Successful regional models exerted a powerful influence on Sri Lanka. The experience of Andhra Pradesh inspired the e-government program. India's visible achievements motivated the original proposal by the software industry. The integrated e-strategies and commitment of top leadership in Andhra Pradesh, the Republic of Korea, Malaysia, and Singapore also provided inspiring models and best practices. Such role models are more motivational and effective than abstract arguments, conceptual

frameworks, or even empirical research on the contributions of ICT and the merits of integrated e-development.

But using regional models as blueprints may be limiting or misguided. Adaptation is critical, and expectations must be managed. Singapore invested more than two decades to transform government services with ICT, and its success was made possible by a relatively stable and activist government and a strong public–private coalition. Similarly, India’s success in the software industry is attributable in part to an advantage that Sri Lanka lacks—a huge cadre of highly trained engineers. Sri Lanka must seek its own niches and build on its own strengths. Even so, a deeper understanding of the regional models proved critical in assessing the options for Sri Lanka’s software and IT-enabled services (see chapter 4).

By building on its own strengths, Sri Lanka too can become a regional or even an international model in using ICT for social development, especially for other low-income countries. Sri Lanka has relatively high literacy rates and human development indicators and strong grassroots development movements. It can leverage these strengths to innovate ICT applications appropriate for poor and rural areas, such as applications for local NGOs and microcredit. This vision of serving as a regional laboratory inspired the development of the e-society fund.

Integrating Innovation and ICT into Development Assistance

Integrating a new dimension like ICT into development practice calls for both process and product innovation. The business and innovation literature shows that innovation often comes out of engaging with demanding situations and clients.²⁴ And business-driven organizations have learned that clients often are the source of much innovation and learning. But the conventional wisdom that dominates the logic of development assistance—focusing on knowledge transfer, blueprint design, universal standards, and best practices—misses these opportunities for learning and creating with clients.

In the case of e–Sri Lanka, creating the ICT Agency and organizing the focus groups unleashed a great deal of creative energy. Simple concepts relating to pilots, proposals for human resources, and grants for communities were soon transformed into rich sets of content and programs. This energy was particularly evident when the ICT Agency and the Bank team engaged small enterprises, associations, and NGOs in cocreating key parts of the program (see chapter 3 on the e-society fund and chapter 5 on the ICT capacity-building fund, for example).

Yet innovations involve high risks and learning costs for both institutions and individuals. They require substantial research and development to create new models that can be scaled up nationally. These investments are seldom anticipated or acknowledged by aid agencies. In the World Bank, budgets for project preparation do not allow for such critical yet practical R&D. Budgets for project supervision (implementation assistance) are even tighter—precluding investment in learning during implementation—because the Bank typically deals with blueprint designs rather than innovations that require intensive process-oriented supervision and learning (see Hanna and Picciotto 2002, chapter 13).²⁵

The challenges of dealing with new, cross-sectoral dimensions of development are magnified when there is no clear home to protect the proposed venture. Both developing countries and their counterpart aid agencies lack a home or locus for e-development. As noted, the Bank had to launch the e-Sri Lanka program outside its regional structure, in a unit that lacked the authorizing environment, reporting structure, and operational routines available to the regional units. As a result, the project team had to devote substantial time and resources to nurturing legitimacy, learning internal routines, building bridges and alliances with the South Asia regional unit, and managing bureaucratic politics. That was time taken away from clients and from a complex and challenging innovation. Similarly, the ICT Agency had to struggle for access, influence, and credibility to get its programs initiated. At times this struggle may have diverted its attention away from helping established ministries mainstream ICT into their own business strategies.

Aid agencies need to create an intellectual and operational home for leading and deepening e-development.²⁶ At times, groups focusing on technology or a single element of this cross-cutting sector dominate. That domination poses barriers to mainstreaming ICT into development assistance. It can also lead to serious distortions, such as when ICT specialists lead assistance for ICT-enabled public sector reform with no leadership or engagement from experts in governance or public sector management. A key issue in integrating ICT into development programs is whether to build a critical mass of core competencies across sectors in a central location or to embed ICT expertise in each sector. A related issue is whether to develop hybrid experts with knowledge of both ICT and an established sector. Aid agencies need to develop new ways for ICT experts to work with substantive sector experts in such key fields as education, governance, and private sector development.

ICT-enabled development is not easy, and success is far from assured.²⁷ An integrated approach to e-development is likely to enhance its sustainability and impact, but such an approach adds to complexity and the challenges of coordination. In Sri Lanka the risks are magnified by political uncertainties, continuing conflict, and severe constraints in implementation. The e-Sri Lanka program demands a quantum leap in performance. It needs champions and visionaries, as well as effective program managers, knowledgeable local consultants, and competent partners. Achieving success will also require sustained commitment to a comprehensive vision—a vision that underscores the promises, which are plentiful, but also acknowledges the critical choices that need to be made, the potential pitfalls to be overcome, and the coalitions to be nurtured and sustained along the way.

Champions of innovative and cross-sectoral programs like e-Sri Lanka face unusual risks in their careers. In risk-averse environments like aid agencies and the Sri Lankan civil service, the pioneers bear most of the risks of innovation. Organizational solutions are not enough. Leadership matters. It is essential to reduce the costs for innovators and to harness institutional learning. And both leaders and champions are needed to accelerate learning, share the burden, and ease the journey.

Notes

1. For relevant discussion of the project cycle and its limits for nonengineering investment projects, see World Bank, Operations Evaluation Department (1998) and Hanna and Picciotto (2002).
2. The World Bank had just issued *Information and Communications Technologies: A World Bank Group Strategy* (2002a). This strategy focused on policies and investments to increase access to the information infrastructure (telecommunications); it left out the challenges of investing in the human resources and the applications to integrate the infrastructure into other sectors. Meeting these challenges was delegated to the regional units of the Bank.
3. This is a key issue: which aspects of ICT should be integrated into sectoral programs like education or rural development, and which treated as a coherent and independent program to build an ICT governance framework, shared applications and infrastructure, and a common platform for enabling all sectors of the economy?
4. An early attempt in 1993 to help Sri Lanka harness ICT for national development was rejected by World Bank management. Similar attempts to broaden the role of ICT in development for India in 1991–92 were also thwarted. See

- Hanna (1994). On how ICT can increase competitiveness and alleviate information poverty, see Hanna (1991) and Mody and Dahlman (1992).
5. See Hanna (1996). For earlier studies, see Wade (1990). For more recent studies, see Yusuf (2003).
 6. The Ministry of Education and public universities were judged to be slow to change, the minister was from a rival party, and major aid agencies worked with the ministry rather independently. Because of those factors, keeping the Ministry of Education's programs out of e-Sri Lanka was judged to conserve on coordination efforts as well.
 7. Some of the rumors were that the telecenters were to serve only members of certain religious groups. Some attacks focused on the lack of immediate results on the ground, even though World Bank funding for the program had not yet been approved. Others focused on perceptions that e-Sri Lanka catered to the concerns of the private sector rather than poverty reduction. Questions were raised about the composition of the agency staff (education, class, ethnicity, and religious affiliations) and about whether staffing and salaries suggested an elitist organization, inconsistent with the ideology of the main opposition party at the time.
 8. Most broadly, these lessons of experience suggest the importance of holistic approaches and long-term visions (Stiglitz 1998, 2000), of broad local ownership and country-donor partnerships (Stiglitz 1998, 2000), and of the role of knowledge in development (World Bank 1999). They also show a need to understand development as a process of structural change and institutional transformation (Fukuyama 2004; Rodrik 2004a), of joint human resource and technological capacity building (Lall 1999; Perez 2001; Wade 1990), of learning and innovation (Rodrik 2004a), and of unpredictability and uncertainty demanding extensive feedback and experimentation (Adelman 2000; Rodrik 2004a, 2004b; Scott 1998).
 9. For a comprehensive view of the role of ICT in development, see Hanna (2003). See also ILO (2001) and UNDP (2001).
 10. The e-Sri Lanka initiative was intended to "take the dividends of ICT to every village, to every citizen, to every business and to transform the way Government works . . . to develop Sri Lanka's economy, alleviate poverty, and improve the quality of life and the opportunities of all our people" (Sri Lanka, Ministry of Science and Technology 2002).
 11. The broad vision had an unexpected payoff: it signaled the government's commitment to donors and international investors, creating the brand name of "e-Sri Lanka" that helped attract investments from ICT multinationals and initiate business process outsourcing in Sri Lanka.
 12. This does not mean that a comprehensive e-development project is always the best way to bundle ICT investments and capture the synergies involved. But it provides a powerful lens for understanding potential synergies.

13. For an excellent treatment of such partnerships in professional services, see Dawson (2005).
14. Except for the overall conceptual design of the e-government strategy, contracted out to a Singapore consulting firm (National Computer Service [NCS]), almost all aspects of the program were developed by the ICT Agency in collaboration with the focus groups.
15. Programmatic aid is aid for broad public expenditure programs rather than specific projects. See Hanna and Picciotto (2002, chapters 8 and 9) for a discussion of programmatic approaches.
16. No amount of central planning or international consulting would suffice, nor could it substitute for able and empowered local leaders, adaptive organizations, and social learning.
17. The design of these funds drew on the experience of *infoDev*, a global grant-making program for pilots in ICT for development, and on that of the World Bank's education sector in establishing competitive funds to promote proposals for upgrading educational institutions.
18. Some of the leading management consulting firms like McKinsey & Company have learned to capture the lessons of these engagements in their knowledge management systems. But such systems often fail to capture the richness of such engagements and their context. They are no substitute for in-depth case studies.
19. Several attempts by the World Bank to design and implement knowledge economy projects may have suffered from an indiscriminate imposition of a framework encompassing all pillars of the knowledge economy.
20. With recent changes in government (in 2006), the ICT Agency has begun to collaborate with the Ministry of Education to facilitate the mainstreaming of ICT skills training and infuse ICT into learning in other subject areas. The sectoral division of labor among donors, however, remains a challenge for building such cross-sectoral collaboration.
21. New institutions are fragile. Moreover, political patronage is a double-edged sword: the new agency could have been politicized, leading to a progressive loss of its accountability to its many stakeholders. The World Bank's role in coaching and advising the agency—even while allowing it to grow and to rely on local know-how and accountability—continued to be critical.
22. See Broadbent and Kitzis (2005). Many recent books address this topic, but only for the business sector. In a June 2005 global forum on e-leadership for the public sector, cosponsored by the University of Maryland and the World Bank, participants from about 20 countries reached a consensus that a critical gap in e-leadership is emerging and that, if not addressed, this gap could lead to a strategic misalignment of national ICT strategies with development strategies and to continuing high levels of failure of e-government and e-development projects.

23. Distance learning centers appeared to be attractive pilots at the start. But they did not develop within a national e-learning vision or strategy. Moreover, they demanded substantial attention from the ICT Agency at a time that it was fighting for credibility and survival. They also attempted to solve too many problems at once: lack of local content, partnership with universities and other content providers, and a need to build the capacity of the implementing agency.
24. The business and innovation literature is rich with lessons and techniques that are also relevant for international development assistance, to promote innovation and manage the associated risks in developing countries. See, for example, Kotter (1996), Peters and Waterman (1982), Porter (1990), Prahalad (2005), and Tushman and O'Reilly (1997).
25. To overcome some of these constraints to learning, the Bank team has been experimenting with a new learning model of connecting the Sri Lankan team with peers in other countries through a series of videoconferences.
26. In 2003 the World Bank founded an e-development thematic group, with membership extending to many aid agencies and developing countries. But this informal network can only complement, not substitute for, formal organizational strategies and structures.
27. Firm-level data show much variation in the returns on investments in ICT: some firms do well, but many do not (Dedrick, Gurbaxani, and Kraemer 2002). There is also a substantial body of evidence documenting government failures in ICT investments. The more important increases in productivity arising from ICT investments come about because of parallel investments in organizational and process changes. These parallel investments usually require substantial changes in work flows and take a long time to bear fruit (Brynjolfsson and Hitt 2000).

CHAPTER 3

The e–Sri Lanka Program Design

In *E–Sri Lanka: An ICT Development Road Map*, the government of Sri Lanka identified information and communication technology as a key to achieving growth, equity, and peace—through technological and institutional transformation of all sectors in the economy and development of the ICT industry (Sri Lanka, Ministry of Science and Technology 2002). E–Sri Lanka, the outcome of the process described in the previous chapter, is a comprehensive program of leveraging ICT to improve the delivery of public services, increase the competitiveness of the private sector, promote new sources of growth, accelerate social development, bridge the digital divide, and support peace.¹ It aims to support the country’s growth and poverty reduction strategy. It takes account of the key challenges and opportunities in using ICT for development. And it builds on the synergies and interdependencies in e-development.

The program is continually evolving through an adaptive learning process led by the newly established ICT Agency. As an innovative program led by a newly created institution, it is bound to change in response to a highly fluid political environment, shifting expectations, and the learning gained through implementation.

Strategic Context: Sri Lanka's e-Readiness

The challenge for Sri Lanka is to harness the power of ICT to compete in the global knowledge economy. How well positioned is the country to do so? The reality is that access to the tools for knowledge and wealth creation is still scarce and inequitably distributed. Sri Lanka lacks the widespread digital literacy and the ICT applications that have enabled other countries to exploit emerging technologies. Per capita, OECD countries have roughly 11 times the income of Sri Lanka on average, 40 times the computers, 146 times the mobile phones, and 1,036 times the Internet hosts.

Sri Lanka has fared poorly on major e-development rankings. It ranked 66th, for example, on the 2003–04 Networked Readiness Index, which measures an economy's preparedness to participate in and benefit from ICT developments (table 3.1). Sri Lanka lagged particularly in ICT use. A big factor in that ranking, however, was its lack of a coherent national strategy and policy leadership to address the special needs of the dynamic ICT industry and the barriers to the diffusion of ICT in the economy.

Sri Lanka has also ranked low on e-readiness and, especially, e-government capacity. In the International Telecommunication Union's global Digital Access Index for 2002, Sri Lanka ranked 106th among 178 economies (table 3.2). Even so, Sri Lanka is more ready for a comprehensive e-transformation than most of its South Asian neighbors. Indeed, it compares well with India in aggregate e-readiness, though it compares less well with some of India's leading states.

Table 3.1 Networked Readiness Index Rankings for Selected Asian Countries, 2003–04

<i>Country</i>	<i>Environment index rank</i>	<i>Readiness index rank</i>	<i>Usage index rank</i>	<i>Networked readiness index rank</i>
Singapore	2	4	2	2
India	44	50	44	45
Sri Lanka	66	64	71	66
Pakistan	76	78	62	76

Source: Extracted from World Economic Forum 2004.

Note: The environment index measures the conduciveness of the environment to developing and using ICT. The readiness index measures the capability of the principal agents of an economy—citizens, businesses, and governments—to leverage the potential of ICT. The usage index measures their use of ICT. The Networked Readiness Index is a composite of these three indices. The top-ranked country is ranked number 1.

Table 3.2 Digital Access Index for Selected Asian Countries, 2002

Country	Global rank	Access level	Score
Korea, Rep. of	4	High	0.82
Sri Lanka	106	Medium	0.38
India	119	Medium	0.32
Pakistan	129	Low	0.24
Bangladesh	138	Low	0.18

Source: Extracted from World Economic Forum 2004.

Note: The Digital Access Index covers 178 economies and combines eight variables in five areas: availability of infrastructure, affordability of access, education level, quality of ICT services, and Internet use.

Key Challenges

As the government began work on designing the e-Sri Lanka program, it had to confront several challenges to Sri Lanka's e-development:

- *Politicized, highly fragmented, and poorly managed civil service.* Sri Lanka has a poor record of civil service reform, with failed attempts in 1987, 1991, and 1996. The main problems include extraordinary over-staffing, a fragmented structure (with more than 50 ministries in 2005), a weak public service commission (with no competitive recruitment for the administrative service), a patronage-oriented bureaucracy, political interference in civil service management, and a highly unionized lower-government staff.
- *Weak leadership and coordination.* A government agency established in 1981, the Council for Information Technology held much promise for promoting an enabling policy environment. But it lacked a coherent strategy, sufficient financial resources, and incentives to attract and retain scarce technical talent. Political interference progressively diminished its early promise.
- *Low level of ICT use in public agencies.* Only a small number of civil servants had e-mail and Internet access, and ICT management skills were in short supply.² Use of ICT in government work was limited and sporadic.
- *Low digital literacy.* A large part of the population, especially in rural areas, lacks computer skills and the capacity to use modern ICT-enabled business and government tools and services. Public universities produce relatively high-quality software engineers, but the output has been small and unresponsive to the industry's changing needs. Digital literacy is not mainstreamed at any level of education.

- *Uneven access to information infrastructure.* Access and connectivity remain low and restricted mostly to Greater Colombo and Western Province. Colombo's teledensity (telephones per capita) is 10 times that in rural areas. Western Province has 70 percent of all telephones, and Colombo 90 percent of Internet access. Some large rural areas have virtually no telecommunications services.
- *Software industry with little institutional support.* The software industry, mainly small enterprises, had limited resources and no institutional support for marketing overseas, upgrading skills and standards, acquiring venture capital, or developing shared R&D. By contrast, competitor nations had developed such programs and institutions through public-private partnerships.³
- *Poor donor coordination.* Many international donors were financing ICT for isolated applications and pilots in Sri Lanka. But lack of effective coordination among the donors prevented efficient use of resources and scaling-up of best practices. And complementary investments in institutions and human resources were often lacking.

Key Opportunities

Yet Sri Lanka also has key strengths that it can leverage to capture opportunities to harness ICT for development:

- A high literacy rate (90 percent), high enrollment ratios, and a relatively high ranking on the United Nations Development Programme's Human Development Index (UNDP 2003)
- Proximity to major ICT centers in India and East Asia
- An emerging base of ICT professionals, a promising ICT industry, and an attractive destination for business process outsourcing
- Growing dissatisfaction with the performance of the public sector, particularly with the quality and reach of public services
- Growing awareness of the promise of ICT among the highest levels of government

The telecommunications sector has seen steady growth, with several competing providers emerging. The fixed-line operators provide almost one million lines, and the four private mobile operators serve an equal number of subscribers. The network has expanded rapidly, with fixed lines growing by about 30 percent annually in recent years. In addition, 37 other operators provide data and Internet services.

The software services sector is one of Sri Lanka's few industries with substantial promise for growth and exports. Although small, the software industry is by no means negligible. Annual exports are in the range of US\$50 million to US\$100 million, the starting point a little over a decade ago for India. Sri Lanka's software sector is still modest compared with India's, but it is concentrating on medium and higher value-added segments (for analysis of the sector and its prospects, see chapter 4).

Software and IT-enabled services are labor intensive, and barriers to entry relatively low. With a stable investment climate and the appropriate policies, institutions, and human resources, Sri Lanka's ICT sector could potentially produce exports rivaling those of the garment industry within a decade. With healthy development, this sector could also help deploy ICT to enhance the productivity of local services and industries as well as the public sector.

Also promising is the booming global industry of IT-enabled services as OECD countries outsource more and more back-office and business process functions to well-positioned developing countries. The window of opportunity for participating in offshoring may not be open for long, as early adopters build their competitive positions and reputations and move to higher value-added professional services. But Sri Lanka, with its high literacy rate and business-friendly environment, can still compete in this dynamic area. To capture this opportunity, however, Sri Lanka must adopt a coherent policy and strategy to strengthen competition in telecommunications, improve the flexibility of its labor market, brand itself to potential markets, and partner with foreign and domestic investors in focused training programs.

The Vision and Program of e-Sri Lanka

The government of Sri Lanka, through extensive public dialogue with stakeholders, developed an e-Sri Lanka road map to foster growth and social integration—a vision that matches the aspirations of both policy makers and the private sector. At the heart of this vision is applying ICT solutions to solve urgent societal problems, equipping the workforce with ICT skills that will enhance their productivity, empowering grass-roots organizations, and integrating the communities of the North and the East with the rest of the country. The vision also reflects Sri Lanka's aspiration to join the region's emerging ICT-enabled commercial and logistics centers.

Table 3.3 Development Objectives and Outcome Indicators for e-Sri Lanka

<i>Objective</i>	<i>Outcome indicator</i>
Greater access to and use of information and communication tools	<ul style="list-style-type: none"> • 5,000 beneficiaries in each targeted community regularly using telecenters to improve communication and access to services (health, education, employment, and government services) with a 70 percent satisfaction rate in four years • A percentage increase over baseline in use of and satisfaction with services established as a result of e-society fund grants (to be specified after a baseline is established by the new monitoring and evaluation agent)
Greater access to and use of public services online by businesses and citizens	<ul style="list-style-type: none"> • 10 percent of target beneficiaries (citizens and businesses) conducting transactions with the central government online
Greater competitiveness of the private sector, particularly the knowledge industry and small and medium-size enterprises	<ul style="list-style-type: none"> • Reaching a 4.2 score on the business usage subindex of the Networked Readiness Index in four years • 10,000 jobs created in software services and ICT-enabled services industry in four years

Source: Author.

The vision has been translated into a strategic action plan covering five years, 2005–09. The plan targets several key development outcomes: a more effective, citizen-centered, and business-friendly government; empowerment of the rural poor, women, and youth through greater and more affordable access to information and communication tools; skills and leadership in ICT; and the creation of employment through the ICT industry, outsourcing, and greater competitiveness of user industries (such as garments) and services (such as tourism). Indicators to measure progress toward these outcomes were selected through a participatory process involving stakeholders (table 3.3).⁴

E-Sri Lanka consists of the following six component programs:

- *ICT policy, leadership, and institutional development*—to create an enabling environment for the knowledge economy and develop the local institutional capacity to lead and implement an ambitious ICT program
- *ICT human resource development and industry promotion*—to build ICT human resource capacity and create jobs through a dynamic ICT sector, foreign and local investment in the sector, and diffusion of ICT among small and medium-size enterprises
- *Regional telecommunications network development*—to extend the information infrastructure to serve poor and rural areas

- *Telecenter development*—to develop ICT skills and literacy for implementing and benefiting from e-Sri Lanka
- *Reengineering government*—to deliver faster, more efficient, and more transparent government services to all citizens and businesses
- *E-society*—to use ICT for social development and grassroots participation, toward promoting peace, social capital, mutual understanding, and equitable access to knowledge

Synergy among these programs is critical to realizing the e-Sri Lanka vision (Hanna 2004). Extending the information infrastructure through telecommunications networks and telecenters provides channels for delivering e-government services, supports broad-based digital literacy, enables business process outsourcing services, and facilitates ICT use for social and community development. Conversely, e-government and e-society applications create pressure to get information infrastructure into place and enhance the commercial viability of investments in rural telecenters and telecommunications.

Meanwhile, promoting the ICT sector and digital literacy increases the demand for ICT and for its diffusion among small and medium-size enterprises and also lowers the cost of developing and maintaining the new infrastructure and applications, contributing to a virtuous cycle. E-society applications provide the content and services for a dynamic, self-sustaining network of telecenters. And e-leadership and enabling policies are critical for catalyzing and orchestrating all the other elements.

Most of the investment in support of e-Sri Lanka is allocated to modernizing government services and improving access to information infrastructure (table 3.4). Other programs provide technical assistance to build capacity for e-leadership; improve policies for ICT diffusion; promote ICT literacy, education, and exports; stimulate ICT-enabled exports; and mobilize resources and innovation in ICT applications to meet priority social needs.

Program 1: ICT Policy, Leadership, and Institutional Development

The ICT policy, leadership, and institutional development program is aimed at creating a policy, regulatory, and institutional environment supportive of e-development; developing the e-leadership and institutional capacity among key stakeholders necessary to implement the e-Sri Lanka program; and communicating these policies and programs to the wider community of stakeholders and facilitating partnerships around e-Sri Lanka.

Table 3.4 World Bank Financing of e-Sri Lanka Components*US\$ millions*

<i>Program</i>	<i>Indicative costs</i>	<i>World Bank financing^a</i>
1. ICT policy, leadership, and institutional development	8	6
2. ICT human resource development and industry promotion	6	5
3. Regional telecommunications network development	19	19
4. Telecenter development	7	6
5. Reengineering government ^b	35	11
6. E-society	4	3
Project preparation facility	4	3
Total	83	53

Source: World Bank 2004b.

a. The World Bank financing is provided through an International Development Association (IDA) credit.

b. The IDA funding is being supplemented by other sources, such as a US\$15 million export credit from the Republic of Korea.

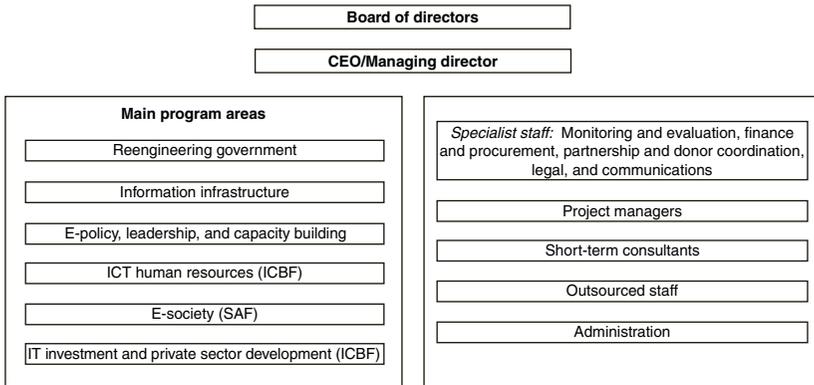
The program is expected to produce these outcomes:

- An enabling policy and institutional environment for ICT use in the public and private sectors
- Capable e-leadership among top government officials and business and civil society leaders, including a coherent network of stakeholder partnerships for e-development
- Effective national coordination of ICT programs and projects
- Digitally empowered public and private institutions implementing e-transformation strategies within a framework of strengthened governance and enforced standards and architecture for interoperability
- Broad awareness of the critical role of ICTs in government, business, and society
- An enhanced country brand for Sri Lanka's ICT capabilities

To achieve these outcomes, the government set up the independent ICT Agency and empowered it to oversee the e-Sri Lanka program. The agency is legally structured as a company to ensure responsiveness and an operating approach similar to that of a private enterprise. Its organizational structure emphasizes lean staffing and an operational strategy based on project management, outsourcing, and reliance on implementation partners for all projects (figure 3.1).

The e-leadership at the heart of this program is located primarily in the ICT Agency, which serves as the core of a national institutional framework for e-transformation. The program is developing the capacity

Figure 3.1 Structure of Sri Lanka’s ICT Agency



Source: ICT Agency, Sri Lanka.

Note: This is a simplified chart, omitting the advisory boards, focus groups, and other mechanisms for accountability, outsourcing, and partnerships. See the chapter in volume 2 on these institutional design issues. ICBF is the ICT capacity-building and industry promotion fund; SAF is the societal applications fund, or e-society program.

of the agency to become a leading change agent and catalyst for facilitating e-leadership and the formulation of e-strategy throughout government, business, and communities.

Drawing on public and private expertise, the agency identifies policy and strategic directions and institutionalizes and disseminates best practices. It produces technology standards and policy and implementation guidelines, facilitates the development of a legal and regulatory framework conducive to attracting foreign investment in ICT, and oversees monitoring and evaluation of the e-development process. Through a strategic partnership program, the agency also promotes public–private partnerships and mobilizes resources from aid agencies and the private sector.

Developing Standards and Institutions. The program provides technical assistance to develop standards and institutions in support of the emerging digital economy, including policy and technology frameworks, architectures, and security and privacy policies. A technical advisory panel advises the ICT Agency on technical issues and reviews the architectures and standards. A special fund mobilizes strategic advisory services on demand to develop e-strategies in support of sector-driven transformation efforts.

The program also funds the operational costs of the ICT Agency on a declining scale over the life of the project. In addition, it funds

training through workshops, short courses, technical assistance, and national and international conferences. The agency has prepared a comprehensive capacity-building program to meet its own needs and, to the extent possible, those of its key partners. This program is driven by an annual corporate planning exercise and an evolving human-resource strategy.

Developing a Legal and Regulatory Framework. The program provides technical assistance and capacity building to develop the legal and regulatory framework for e-Sri Lanka. This initiative fast-tracks laws and regulations relating to privacy, cybersecurity, ICT crimes,⁵ data protection,⁶ electronic transactions, and intellectual property rights protection.⁷ The program also provides ICT legal training for judges, lawyers, enforcement personnel, and others. Over time it will address many other elements of the enabling legal and regulatory environment, such as consumer protection.

Monitoring and Evaluating Results. The monitoring and evaluation system plays a critical part in the e-Sri Lanka program, measuring performance, evaluating progress, assessing impact, and ensuring public accountability. The system promotes institutional learning by the ICT Agency, aids it in understanding the perspectives of stakeholders, and provides timely feedback that supports adaptation of the program, both to redesign initiatives and to implement new ones. It also serves as a key tool for ensuring accountability for results, not only for the ICT Agency's board but also for such stakeholders as the Ministry of Finance, the Ministry of Plan Implementation, and participating aid agencies.

The ICT Agency has outsourced monitoring and evaluation of progress while retaining the roles of oversight, integration, and dissemination. This allows it to capitalize on economies of scale by outsourcing common activities and to ensure compatibility and consistency in approach across all program areas.

Developing e-Leadership. To empower efforts to transform organizations with the help of ICT, the program funds training, awareness raising, and other support for top leaders of government, business, and civil society. A big part of this initiative focuses on the approximately 600 chief innovation officers who have been appointed in public agencies (this designation, rather than chief information officers, is used to emphasize their role as innovators of processes and services).

The ICT Agency has identified four key competencies for chief innovation officers: change management, strategic ICT planning, business process reengineering, and essential knowledge of e-government, e-commerce, and e-laws. These critical skills are developed and delivered through a logical series of workshops conducted by international experts on e-government, both from reputable international consulting firms and from the public sector of other countries.

Tailored programs are also required for policy makers, government secretaries, and business leaders. These are the e-leaders who define the still-evolving role of chief innovation officers and shape their enabling environments. They are also responsible for ensuring that coherent ICT strategies effectively support and even transform their national and sectoral strategies. The program supports the development of this high-level e-leadership by offering innovative, tailor-made workshops and by nurturing communities of practice among local leaders.

Building Strategic Partnerships and Communications. A partnership framework has been developed around e-Sri Lanka, focusing on three areas:

- *Donor coordination.* To ensure that donor funding is targeted to the highest national priorities, the ICT Agency channels the funding for all strategic initiatives relating to e-Sri Lanka. Through an online database, the agency also monitors and coordinates all ICT-related programs and projects to ensure consistency with the e-Sri Lanka vision and national priorities. And with the Ministry of Finance, the agency facilitates roundtable meetings to discuss coordination issues with stakeholders.
- *Fund-raising.* In collaboration with other stakeholders, the ICT Agency engages consultants to develop project proposals for consideration by aid agencies and private investors. In addition, the agency holds fund-raising events both locally and internationally.
- *Public-private partnerships.* Throughout implementation of the e-Sri Lanka program, the ICT Agency is facilitating partnerships between aid agencies and representatives of government, the private sector, and civil society. Partnerships are also sought with Sri Lankans abroad, who represent a large pool of knowledge.

In addition, a strategic communication program has been designed to ensure broad-based awareness, participation, and ownership by local and international stakeholders. The program has two primary aims: to communicate locally the benefits of ICT and the results of the e-Sri Lanka

initiative and to communicate to the international community that Sri Lanka is a destination for ICT investment. Communication is considered a core activity, with managing expectations and obtaining buy-in from the wider group of stakeholders still critical (see chapter 2).

Program 2: Human Resource Development and Industry Promotion

Aimed at developing national competitiveness, the human resource development and industry promotion program seeks to upgrade Sri Lanka's ICT capabilities and to promote innovation in leveraging ICT for competitiveness and exports. Its target groups are the ICT industry, related training institutions and professional associations, and current and potential adopters of ICT among small and medium-size enterprises. The program may also extend to attracting ICT multinationals and global outsourcers to invest in Sri Lanka and facilitating their partnerships with local ICT enterprises.

The program is expected to achieve four main outcomes:

- Greater employment in the ICT sector
- Improved competitiveness of local ICT-user industries
- Higher quality of ICT industry professionals
- Greater foreign investment in the local software and IT-enabled services industry and in local ICT-training institutions

An ICT capacity-building fund has been established to provide incentives to achieve these outcomes. The fund uses competitive grants and fee-for-service contracting to finance and pilot a wide range of initiatives (see chapter 5).

Program 3: Regional Telecommunications Network Development

The regional telecommunications network development program is designed to promote competitive and affordable telecommunications services in the regions with the poorest populations, in those with low connectivity, and in those affected by conflict—the deep South, the North, and the East. The program is also aimed at integrating communities throughout the country by providing appropriate channels for e-government, e-commerce, and e-learning services. The program is expected to achieve the following goals:

- Increase connectivity and the affordability of communication and Internet services

- Reduce transaction costs for citizens and businesses throughout the economy
- Expand private investment in information infrastructure and associated services, increasing economic activity in connected areas

To encourage private participation, and recognizing that service provision in some areas might not produce attractive financial returns, the government will provide subsidies, financed by a market mechanism, for private telecommunications operators in the targeted regions. The subsidies are to be awarded through international competitive bidding, a least-cost subsidy scheme aimed at efficient allocation of the limited public resources for catalyzing private investment and rural service provision (see chapter 6).

The program is closely coordinated with the telecenter program, with which there are strong interdependencies. The coordination is aimed at ensuring high-quality connectivity for the newly established telecenters while also enhancing demand for the services of the newly created telecommunications networks. By 2007, when fully developed, the regional networks are expected to provide broadband connections for at least the 200 telecenters selected for the first phase of the telecenter program.⁸ The location of the telecenters and the demand they generate are critical to the design and economic sustainability of the networks as well as to the sustainability of the telecenters. And joint design and coordinated implementation of the two programs are expected to reduce the subsidies and enhance the viability of both.

Program 4: Telecenter Development

The telecenter development program aims to empower the population in poor rural areas of the South, North, and East through affordable community access to ICTs. Telecenters are being progressively established in rural areas, with the first phase covering at least 200 telecenters in the poorest regions. Voucher schemes will enhance demand from the target population (youth, women, farmers, students, marginalized groups, and small and medium-size enterprises).

The program also includes community outreach activities—distance learning for the target population, computer literacy training for teachers in rural areas, and use of telecenter facilities by rural secondary schools in support of their academic programs. Grassroots initiatives funded under the e-society program generate local content and services delivered through the telecenters.

The telecenter program is expected to produce the following benefits:

- Availability of affordable basic communication services (voice, fax, e-mail, and Internet access) and office services and community information in rural and disadvantaged areas
- Enhanced access to social services (public services and distance education) and to private sector services
- E-commerce services and support to local industry development, leading to higher employment and entrepreneurship in rural areas
- Mobilization of local knowledge and empowerment of target groups through community-driven development

The program follows a sequence of steps to select telecenter locations for optimal impact, to select and prepare local entrepreneurs to operate the telecenters, to promote community involvement, and to build institutional support for sustainability and scaling up (for more on the program, see chapters 7 and 8).

Program 5: Reengineering Government

The reengineering government, or e-government, program pursues major improvements in the government's efficiency, transparency, effectiveness, and quality of services. It also supports fundamental reforms under way in governance and public management by applying new technology and reengineering work processes. The program will have countrywide impact, providing network, e-mail, and Internet access in all government agencies and reaching a quarter of the population as directly targeted beneficiaries.

The e-government program emphasizes the following advantages:

- Client-focused services—making public services truly citizen-centric and ensuring equity in access to services regardless of geography
- Transparency in government operations and accountability for service standards—bringing about a new governance framework enabled by ICT
- Interconnection of government agencies—securing electronic sharing of information across agencies and achieving higher productivity through improved interaction
- Public-private partnerships—introducing selective participation of the private sector in public service delivery where that sector can perform more efficiently and effectively than the public sector

The program is flexibly designed to allow project activities to be scaled up or down on the basis of an annual review of results and a midterm progress assessment.

Developing a Guiding Framework of Policies and Standards. An ICT governance framework is being developed to guide the use of new technology in the public sector. Among the key policies are the following:

- Requirement for cost-benefit analyses of major proposed ICT investments
- Policy preference for outsourcing data processing, system development, system operation, and network management services to the private sector
- Requirement for strategic information systems plans by agencies
- Mandatory adherence to governmentwide standards guided by governmentwide architectures. Technical architectures (information, application, technology, communication, security, and service architectures) provide the conceptual map for designing and using ICT applications in ways that support the robust and flexible evolution of e-government.

Deploying an Information Technology Infrastructure for Government. Specialized service-processing software and Web portals are linking all government agencies, information, and services. Lankanet, a government-wide data communication network, comprises initial and future workstations of government. Once the first phase is completed, Lankanet will connect around 5,000 fully networked workstations with e-mail, office services, printing services, data management services, and access to the Internet. Operation and technical support are provided by the private sector under a renewable, multiyear service contract.

E-Gate, combining specialized middleware (software connecting different applications) and hardware, enables single window delivery of services, provides a growing number of common services (authentication, payment, and gateway), and supports the use and integration of legacy applications during their remaining useful life. This system operates in a high-security, state-of-the-art data center hosted by a private company under a multiyear service contract.

The country portal, the third key part of the government's technology infrastructure, is conceptually a single, highly refined Web site offering a consistent, client-oriented interface for information and services from

the government. It is the host application for integrated delivery of groups of services ranging from utility payments to the issuance of permits, licenses, certificates, and identification documents to citizens and businesses. It also hosts the common front-end of government-to-business applications such as e-procurement. The country portal will probably be operated and hosted by a private firm under a multiyear service contract.

Providing Large-Scale Training. More than 6,000 government staff, 3,500 managers, 600 chief innovation officers, and 1,200 network specialists are receiving training aimed at creating the skilled human resources needed for electronic governance. Given the scale, risk, and cost, the training services are procured through multiple contracts with different firms. Special attention is being given to building a cadre of e-leaders to help bridge the gap between policy makers and public managers on the one hand and ICT managers and specialists on the other.

Reengineering Public Sector Work Processes. Before the training program in each government agency, a business process reengineering study is carried out to inform the design of applications and the timing and content of the training. The reengineering program also includes developing and deploying major applications aimed at benefiting more than 2 million citizens and businesses—10 percent of the population. The areas representing immediate priorities, identified through a prioritization process (see the forthcoming book on the Sri Lanka experience), include motoring, employment, pension, and procurement systems (box 3.1).

Program 6: e-Society

The e-society program promotes the innovative use of ICT to meet the economic and social needs of the most vulnerable groups in Sri Lanka and to empower civil society through affordable access to information, communication, and local content. It also increases awareness among the rural and urban poor of how ICT can benefit their lives. The program targets a range of outcomes:

- Better access to agricultural extension, education, and health services
- ICT services tailored to the priority needs of specific communities
- Enriched local content and local radio programs
- Better access to global knowledge in local languages
- Training opportunities for youth and women

Box 3.1**What e-Government Services Are Priorities?**

The following e-government services represent immediate priorities:

- *E-motoring*—to ensure prompt issuance of driver's licenses, create and maintain a motor vehicle registry, and ensure efficient transfer of vehicle ownership.
- *E-employment*—to provide access to information and services for Sri Lankans seeking work overseas, for local recruitment agencies seeking job order approvals, and for overseas recruitment agencies seeking to connect to the Sri Lankan labor market through local agencies.
- *E-pensions*—to ensure prompt processing of applications for public and private pensions, permit verification of pension savings and submission of appeals, allow easy changes in personal information and pension payment arrangements, and generate pension statistics.
- *E-procurement*—to disseminate up-to-date information on all public business opportunities and contract awards, the timetable for pending transactions, and related legal, regulatory, and procedural information. During a second phase the system will incorporate electronic payments and procurement transactions.
- *E-citizen ID*—to register all Sri Lankans in a single database and issue a unique national citizen identification card. The system adheres to the strict security and confidentiality policies developed under the ICT policy, leadership, and institutional development program.
- *E-leadership pilots*—to provide electronic support systems for the political leadership so as to improve effectiveness, efficiency, transparency, and information sharing in key governance functions. Initiated during program preparation, these pilots include e-Parliament, e-president, and e-Cabinet systems.

Source: ICT Agency, Sri Lanka.

- Better communication services for migrant workers (mostly women)
- A communication platform to promote cultural dialogue and mutual understanding (PeaceNet)

The program also seeks to empower communities and grassroots organizations to innovate new ways to improve rural livelihoods. It uses a bottom-up approach to solicit innovative solutions for the use of ICT by women, the rural poor, and those displaced by conflict or living in conflict-affected areas. It develops partnerships and financing schemes to scale up successful pilots and promising innovations.

The program awards grants for pilot projects on a competitive basis to local community organizations, NGOs, private companies, or public social sector institutions. These pilots may be scaled up if evaluation suggests that expansion or replication in other locations will provide greater benefits.

Through the grants and capacity-building initiatives, the e-society program builds and fosters community networks and community partnerships with government, the private sector, and local NGOs. This should help strengthen local capacity and social capital. It should also contribute to peace and equity by connecting and empowering the country's most vulnerable poor groups. In addition, balanced access to information and equitable representation of societal groups promotes growth, aids in narrowing gaps between urban and rural areas, and helps integrate postconflict regions.

An Evolving Program Design

The design of the e-Sri Lanka program engendered a strong knowledge-based partnership with the World Bank, the primary funding agent, and the emergence of the newly created ICT Agency as a learning organization. That design has made all the difference in ensuring that it serves as a guiding framework for the program—allowing further creation and adaptation—not a blueprint that would become outdated with the changing environment in Sri Lanka.

But the ICT Agency operates in a highly charged political environment, and the success of the program inevitably depends on political leadership and stakeholder support. As with many visible programs, some aspects of e-Sri Lanka have become politicized, such as the telecenter program and telecommunications reforms. Support for peace, a key theme of e-Sri Lanka, appears to have been marginalized. The board of the ICT Agency, its effectiveness as a governance mechanism, and the voice of the private sector have been weakened. But despite growing political demands, the ICT Agency has continued to strike a balance in the e-Sri Lanka program, remaining responsive to changes in the authorizing environment while maintaining the coherence of the program.

The early implementation of pilots and the changes in the governing coalition have called for continued evolution and faster learning. Lessons from pilots (in e-government, distance learning, and other areas) have been integrated into the program. Other changes in the program design reflect growing demands on the ICT Agency to respond to urgent needs, new political realities, and national emergencies. Following are examples

of design adaptations one year (as of January 2006) after implementation of the full-scale program began.⁹

Refinements in e-Leadership and ICT Policy

With growing awareness that e-leadership is at the heart of the e-Sri Lanka program, the government plans to amend the ICT Act to remove the sunset clause for the ICT Agency. This clause was a necessary compromise given early political opposition to creating a relatively autonomous agency and early skepticism in the World Bank. Now there is sufficient political consensus that the ICT Agency has proved to be indispensable to program implementation and an awareness that the program should grow beyond the time frame of a Bank-financed project. There is also a changing perception of e-leadership. It is now viewed as a shared responsibility among a cadre of top leaders and chief innovation officers throughout the government, and training programs and communities of practice are evolving accordingly.

In the ICT Agency there is increasing awareness that implementing the program requires further development of policies and institutional measures to secure the authorizing environment for itself and the program. Establishing such an environment is not a one-shot affair, particularly in a turbulent political setting. New measures are continually proposed. One is to establish a governmentwide approach to ICT investment, to be implemented by the Ministry of Finance through the annual budget and with the ICT Agency serving as technical adviser. A second is to initiate a national process for formulating ICT policy. The process, to be consultative and inclusive, should deepen ownership across all ministries. A third is to further develop the role of chief innovation officers as a national network of change agents and to refine their mode of interaction with the ICT Agency.

Meanwhile, a world-class framework of e-laws has been developed or presented for consideration by the Parliament, including laws relating to electronic transactions and data protection. New laws continue to be proposed. The ICT Agency has become a champion of the legal reforms needed to build a secure environment for e-government, e-commerce, IT-enabled services, and investments in business process outsourcing—and has learned to strategize to move these reforms through the labyrinth of concerned institutions.

Strategic communications has emerged as a vital activity of the e-leadership program. Responding to the challenge of an uncertain authorizing environment and to the opportunity to leverage the e-Sri Lanka *brand*, the ICT Agency has diversified its communication channels. By

January 2006, these channels included a weekly TV program, a quarterly newsletter, local carnivals, targeted awareness campaigns, training for journalists, radio programs and newspaper articles in local languages, the ICT Agency Web site and discussion forum, presentations at regional and international forums, and invited presentations by CEOs of leading ICT multinationals.

Delays and Experiments in Information Infrastructure

On the telecommunications front, the most critical developments are the slowdown of the reform agenda and the opposition of incumbent telecommunications operators to the use of the least-cost subsidy scheme to build the regional network. Delays attributable to legal challenges by the operators and changes in market conditions point to a need to continually review and possibly revise the infrastructure strategy.

In the telecenter program, an important deviation occurred from the original design. The elected governments of 2004 and 2005 have given rural development high priority, and political instability has put an even greater premium on quick results. Thus, the ICT Agency has faced intense pressure to show visible results in rural areas by adopting an alternative to the business-based model developed under e-Sri Lanka. Though likely to be developmentally superior and more financially sustainable, the original model takes time to implement. It sets challenging conditions (to achieve financial sustainability within two or three years, even in poor areas of the country), and the process laid out for competitive bidding and transparent subsidies has been demanding.

The complementary model, a scaled-down investment called e-library—an ICT service center, or *nanasala*—is commonly hosted in temples. This model is driven by a vision of the temple as a traditional seat of learning. It is also driven by political branding. When hosted in the larger temples, e-libraries would have the support and financial backing of powerful institutions and would probably be visited by large numbers of people. But e-libraries follow no clear business model, and operators have no market incentives to serve their community.

Challenges in Reengineering Government

E-government has proved to be the most challenging program given the weak incentives in the civil service and the silo mentality of ministries. Political changes have continued to weaken the incentives for public accountability and for deep institutional and process changes. The procurement processes of the government and the Bank are at times too

slow to cope with fast-moving technologies and too frustrating for the business-like ICT Agency. Process reengineering, systems development, and rigorous requirements for international competitive bidding all take time. Yet the government is eager to show early results so as to foster ownership and sustain political commitment to the program.

These conflicting demands are leading to mission creep, with the ICT Agency taking on new and less strategic activities under the e-government program. Still, the pressure for early results may generate less demanding but quick-win projects. One possible example is the government's commitment to developing information centers to provide citizens access to basic public information on ministries. But even these technically easy projects may pose challenges in developing content and securing collaboration among government agencies.

New Grassroots Initiatives

The two national funds, for ICT capacity building and industry promotion and for e-society initiatives, have generated the greatest interest at the grassroots, prompting a response from civil society and private sector organizations far beyond expectations. The strong response to calls for proposals suggests that the government will inevitably need to mobilize donor and other sources of funding to sustain (if not scale up) the program. The focus groups have been refining and adapting the fund designs, and their flexibility has allowed new and innovative features to continually be added. The funds are also stimulating initiatives to engage the ICT Agency as a catalyst in creating an enabling environment for private sector promotion and innovation, though these initiatives do not depend on the funds for financing.

Because the rigorous mechanisms and contractual arrangements for the two funds have taken time to establish, the ICT Agency launched a series of its own initiatives to lay the groundwork for the funds. These initiatives aim to develop local content and promote the ICT industry in partnership with NGOs, professional associations, the private sector, and ICT multinationals. The agency also identified local initiatives initiated by grassroots organizations and partnered with others to adapt and scale up these homegrown innovations.

Notes

1. The description of the program in this chapter is close to that prepared by the author and the joint World Bank-ICT Agency team in the Bank's appraisal

- document on the e-Sri Lanka project, then negotiated with the government team and presented to the Bank's Board for approval in September 2004.
2. At the design stage for e-Sri Lanka more than 200 members of Parliament shared a single Internet terminal.
 3. See UNDP (2001) on making new technologies work for development, and Hanna, Guy, and Arnold (1995) on the diffusion of information technology in industrial countries.
 4. Outcome indicators for each component program are detailed and managed by the ICT Agency in partnership with a specialized monitoring and evaluation agent.
 5. Addressing ICT crimes requires examining the criminal implications of spamming and e-surveillance and reviewing procedural measures in the Code of Criminal Procedure Act of 1979 to ensure the proper investigation of computer crimes. It also requires facilitating the establishment of a specialized Cybercrime Unit at the Police Department.
 6. The lack of a framework for data protection prevents the free flow of personal data and information from the European Union (EU) for data center and call center operations. Required are legislative or other measures such as the adoption of safe harbor principles, technical advice on negotiating with the EU Legal Office in Brussels to ensure that Sri Lanka meets the requirements of the EU Directive on Data Protection, and institutional development relating to data protection and privacy issues.
 7. Protection of intellectual property rights requires examining the implications of the World Intellectual Property Organization (WIPO) Copyright Treaty and WIPO Performance and Phonograms Treaty, and introducing amendments to the Intellectual Property Code, in consultation with the National Intellectual Property Office of Sri Lanka, to give effect to these treaties.
 8. In the interim, these telecenters are served through a very small aperture terminal, or VSAT (satellite), connectivity contract with a regional operator.
 9. This is not a formal evaluation of implementation or results. Such an evaluation will be carried out only after project implementation is complete, projected to be in 2009.

PART 2

Developing the ICT Industry and Human Resources

CHAPTER 4

A Strategy for the Software and Information Services Industry

Advances in information and communication technology have created a global, Web-enabled playing field that allows the sharing of knowledge and work in real time, regardless of distance or geography. This transformation and flattening of the global competitive playing field has opened vast opportunities for developing countries as businesses in industrial (and developing) countries have increasingly outsourced information and professional services.¹ These include primarily software products and services and IT-enabled information services—call centers, data entry, data processing centers, business process outsourcing (BPO), and business support services.²

The opportunities are not only vast but expanding rapidly. The global market for outsourcing is projected to grow 30 percent annually, far outpacing the rate for global trade (McKinsey Global Institute 2005, 19). By 2008, BPO and software offshoring together are projected to reach US\$300 billion. This is a sunrise industry. Low entry barriers, labor intensity, and large multipliers make it especially attractive to developing countries. Developing trade in services can enable these countries to transform the structure of their economies, leapfrog stages of industrial development, and diversify into new and dynamic sources of growth.

These developments have implications beyond the potential for growth in ICT sector exports and profitability. They affect productivity and competitiveness throughout the economy. ICT is a general-purpose technology with a broad range of uses across sectors and strong complementarities with other technologies (Hanna 2003). It is an enabling technology that opens up new opportunities and catalyzes innovation. ICT is particularly important for small and medium-size enterprises because it provides access to global knowledge, market information, and supply chains. ICT can help create new opportunities by extending the reach of an enterprise's products and services, enabling the creation of new ones, and disaggregating value chains so that relatively high-value work can migrate to developing countries.

These developments also pose risks for developing countries. They empower global corporations and other new competitors to challenge local enterprises. They further reward fast movers—the knowledge-based and innovation-driven firms. Moreover, ICT solutions are not automatic; they require coinnovation and investment in institutional changes, new management practices, and complementary skills. Small and medium-size enterprises face special risks and challenges as they adopt these new technologies and transform the way they do business (Hanna, Guy, and Arnold 1995). Governments too face risks. They may be tempted to invest in white elephant projects to support the industry, with little impact on job growth. And most governments of developing countries lack the experience and competencies required to manage the complexities of the public-private partnerships necessary to promote this dynamic industry.

Globalization, the spread of ICT everywhere, and the correspondingly substantial opportunities and threats mean that local competencies in ICT (particularly software development services, IT support services, and IT-enabled outsourcing) are increasingly critical to national competitiveness in all kinds of industries (Hanna, Tessler, and Barr 2003). Yet technological learning in software development and ICT use has its own dynamics and requirements that are seldom addressed by general-purpose research institutions. For example, ICT-specific technological learning demands intensive interactions between software suppliers and users; partnerships between research institutions, universities, and the ICT industry; and collaboration between venture capitalists and ICT-enabled entrepreneurs.

Sri Lanka has focused for some time on becoming a regional hub for such services as logistics and tourism, only recently adding software

and IT-enabled services. Both public and private sector representatives have put great weight on fostering growth in the industry. National plans have provided an inspiring vision of the country's future in the globally networked knowledge economy—a vision in which rapid expansion of the ICT sector offers great hope for Sri Lanka and the quality of its growth.

Achieving such a vision poses a big challenge. It requires key stakeholders to build on strengths, tackle weaknesses, take advantage of opportunities, and mitigate threats. All this implies a need to raise awareness, to develop broad consensus on promoting certain segments of the ICT sector, and to undertake timely and focused efforts to develop and implement strategies and action plans in support of these segments.

International experience points to the benefits of coherent public policies and national, sectoral, and firm-level strategies and action plans for developing the ICT industry. As India's experience shows, such efforts entail gathering information and building consensus among stakeholders around action programs and their implementation. That typically requires building local capacity and developing a sense of ownership among stakeholders who can help raise awareness domestically and brand the country internationally. These sector-specific policies and strategies should be complemented by public policies to promote entrepreneurship, innovation, technical education, lifelong learning, and support to small and medium-size enterprises.

Potential for Growth

Events of the past few years have raised hopes that Sri Lanka can quickly establish a significant IT and IT-enabled services industry. The peace process begun in 2001 has provided some cessation of hostilities and a real sense of economic stability. Added to this is the hypergrowth of India's software and business process outsourcing industry, seen as the benchmark for global outsourcing and a regional trend setter.

Compared with India, Sri Lanka is a small economy and a late starter in developing the industry. Even so, the country has significant potential in niche markets for software products, software development, and high-end IT-enabled services (accounting and legal services).

Sri Lanka possesses some key advantages for ICT development. It has a comparatively open economy, attractive fiscal incentives, and a talented (though small) labor pool. Education standards are relatively high. Literacy rates are significantly higher than in other South Asian countries.

Table 4.1 Employment and Value Added in Selected Industries in Sri Lanka, 2003

<i>Industry</i>	<i>Number employed</i>	<i>Total revenue (US\$ millions)</i>	<i>Revenue per employee (US\$)</i>
Software development and data entry	5,000	108	21,600
Telecommunications	11,884	376	31,639
Tourism	87,600	252	2,877
Garments	330,000	2,723	8,252
Tea	600,000	701	1,168

Sources: For software development and data entry exports, Sri Lanka, Board of Investment (2003); for telecommunications, International Telecommunication Union database (2003); for tea, Ministry of Plantation Industries (2003); for all other data, Central Bank of Sri Lanka (2003).

Labor costs are low. The capacity to educate IT professionals has increased significantly from the 1990s, though the availability of semiskilled and highly skilled workers with strong English language capabilities, technical expertise, and managerial skills is still limited.

Sri Lanka has missed several opportunities to boost the development of an IT industry, mainly because of deterioration in the political environment since the early 1980s. As a result, and unlike India, it missed out on the surge in global demand for onsite and offshore outsourcing of software product development and services in the 1990s.

Still, Sri Lankan ICT firms have been growing rapidly since the mid 1990s. And foreign firms have been showing growing interest in Sri Lanka, both for direct investment and for strategic alliances with local software product and services companies. Moreover, the surge in global outsourcing of IT-enabled services since around 2001 has opened up new opportunities.

Industry experts believe that software and IT-enabled services have the potential to generate substantial export revenue, wealth, and employment in Sri Lanka. Although the industry would account for only a small share of total employment, earnings per employee would be much higher than in tourism, garments, or tea (table 4.1). Thus, development of the industry offers new opportunities to reduce poverty.

The Industry and Its Environment: Constraints and Opportunities

Analysis of the software and IT-enabled services industry and the environment in which it operates—the infrastructure and labor market, the policy

and institutional environment, the regional setting—revealed a range of strengths, weaknesses, opportunities, and threats, or SWOT (see annex 4.1).

The dynamism of the sector, with its fast-changing supply chains, products, and services, means that this SWOT picture changes over time. Windows of opportunity may close quickly, staying open only long enough for first movers and agile followers. The competitive advantages of countries are constantly changing as new, lower-priced labor markets move up the value chain and price other countries out of their niche markets or push those countries further up the value chain.

A Nascent Industry

Sri Lanka's software and IT-enabled services industry is heterogeneous, ranging from low-end data entry to higher-end software products and services and business process outsourcing. In 2003, according to data from the Sri Lanka Board of Investment, the country had about 60 software and data entry firms with new commercial operations and 25 or more employees. These companies employed nearly 6,000 people. Investments in 1998–2003 totaled US\$20 million for foreign firms and US\$13 million for local firms.³

The industry consists of small and medium-size Sri Lankan firms and foreign firms, with no major state-owned enterprises. Foreign firms have small operations and investments in Sri Lanka compared with their typical operations in larger Asian economies. In the 1990s, multinational corporations had limited interest in investing in Sri Lanka, and much of the growth in the industry took place through the expansion of domestic firms. But foreign firms have expanded their operations in Sri Lanka, especially in 2002–04 and in response to improved prospects for peace and the expectations raised by e-Sri Lanka.

Most multinational software product companies, however, may continue to do without subsidiaries or liaison offices in the country. Even if they do establish such offices, they may not provide much direct local employment.⁴ But multinationals, even those without subsidiaries in Sri Lanka, can have a significant impact in transferring technology, developing strategic alliances with local firms, and branding the country as a destination for offshoring of software and business processing services. International firms seeking strategic alliances are targeting mainly the export potential of software and IT-enabled services.

Domestic Software Market. The public sector is the largest client for software and services in Sri Lanka. The government has typically used

computers for traditional stand-alone workstation applications or for applications within a single department. But some government institutions have networked systems: the judiciary, border control (by the Immigration Department), and real-time settlement systems linking commercial banks with the Central Bank.

The private sector (mainly in the Colombo area) has typically been quicker to apply modern ICT. Almost all private sector banks are fully computerized and offer online services. Major business houses, and most medium-size companies in Colombo, use IT for daily business record-keeping functions. The Colombo Stock Exchange is fully computerized and allows online bidding.

Still, the use of software applications in the private sector is spotty. Although some financial institutions have made major investments in IT, other sectors lag far behind. Even the firms that have invested in IT often do so in limited ways that are poorly integrated into their overall business activities. The same is true of Internet use.

Export Software Market. As in other developing countries, in Sri Lanka the software industry is composed mainly of small firms with resources too limited to support the R&D, marketing, and capital needed to compete in the global software product market. Even so, a recent survey showed that 25 percent of software companies' revenues came from exports in 2003, up from 5 percent in 2001 (World Bank and Asian Development Bank 2005). And the share continues to rise.

A noteworthy part of the exports is medium and higher value-added products and services. Several Sri Lankan-based firms have been able to develop software products for niche markets, often thanks to strategic alliances with larger international firms. These products typically were first developed for the local market and then launched internationally. This process contributed to the perception that Sri Lanka had a special aptitude for developing an IT industry focusing on software products, while the scope in services appeared to be limited.⁵

IT-Enabled Services. IT-enabled services, including BPO, are recent in Sri Lanka. Among the services offered are digitization, creation of digital videos, and development and hosting of Web sites. The volume of business in these ventures is still small, however. IT-related consulting services are also at an early stage, though international management consulting firms

with operations in Colombo have begun to work in such areas as IT strategy preparation, business process reengineering, postimplementation reviews, and business contingency plans. BPO firms in Colombo have traditionally focused on a few simple operations such as data entry. More recently, offshore call centers have begun to develop.

Hardware Manufacturing and Assembly. Sri Lanka has developed little manufacturing of hardware such as hard disks and memory chips. But local assembly of personal computers (PCs) is widespread. Colombo alone has an estimated 300 small-scale PC manufacturers. Sri Lanka also has a small but growing electronic product industry. This industry, however, offers much lower average wages than the software industry.

Constraints in Infrastructure and Labor

Investment climate surveys show that telecommunications and education remain the biggest constraints for the software and IT-enabled services industry in Sri Lanka (World Bank and Asian Development Bank 2005). Given the industry's heavy reliance on telecommunications and skilled labor, this result is not surprising.

Physical Infrastructure. The physical infrastructure needed for ICT development is deficient in many parts of Sri Lanka, especially outside metropolitan Colombo. Sri Lankan businesses pay some of the highest electricity prices in the world (World Bank and Asian Development Bank 2005). Unreliable supply adds to the costs. Transportation is another weakness, with public transportation unreliable and most roads in poor condition. But average commercial rents in Colombo are low compared with those in other major Asian cities.⁶

Serviced land and infrastructure for the ICT industry is scarce, particularly outside Colombo. Industrial parks established especially for the ICT industry—including the World Trade Center, the IT Park at Malabe (Millennium Information Technology), and the TeleCity—are all in Colombo. Plans for expansion at Malabe have been on hold for many years. Sri Lanka has no equivalent to India's software technology parks or China's IT parks and incubators (Hanna 1994; International Trade Center 2000).

Telecommunications and Internet. Telecommunications and Internet access charges in Sri Lanka have fallen but remain high by international standards.⁷ A three-minute, fixed-line telephone call costs almost twice

as much in Sri Lanka as in India (Radwan and Fernando 2006). The lack of international bandwidth has been a major issue. The poor quality of telecommunications facilities is another limiting factor.⁸

Sri Lanka began telecommunications reform years ahead of neighboring countries, but the process has stalled. Today, Sri Lanka lags behind, with a backlog of reforms yet to be enacted to promote greater competition and resolve interconnection problems (see chapter 6).

The country has many Internet service providers (ISPs), with Sri Lanka Telecom (SLT) being the largest. In 2004, there were 17 active providers and another 10 holding licenses. Most of these players are quite small. The vast majority of subscribers are in the Colombo area, though there are points of presence in several other urban centers. SLT offers Internet access as a local call from anywhere on the island, though only to customers using SLT local loops for voice service.

Sri Lanka has greater penetration of ICTs than neighboring economies.⁹ But most PC and Internet users are in Colombo and Western Province.

Education and Training Infrastructure. Sri Lanka ranks far ahead of most competing developing countries in literacy. Moreover, it has a cultural affinity for English, a large English-speaking middle class, and a strong legal and accounting profession based on the British system (Radwan and Fernando 2006). Over the past two decades, however, English has been neglected as a medium of instruction.

Among the fundamental policy objectives of the government is to provide universal access to primary and secondary education (World Bank 2005b, 1–2). But higher education, despite recent expansions, remains limited and elitist. Tertiary education is particularly limited in engineering and the sciences.¹⁰ The government invests less in education as a share of total expenditure than some neighbors, including India.

Technical education has been neglected. The need to revitalize IT education and the use of IT in universities is well known. Still, the country has seven universities that produce graduates in electronics, engineering, and computer studies. All seven offer bachelor's degrees in IT, and the University of Colombo has an excellent postgraduate program in the subject. In addition, four institutes provide training in electronics.

The private software training industry is booming. All of India's popular IT-training houses, such as the National Institute for Information Technology, have established branches in Sri Lanka. And local institutes,

notably the Sri Lanka Institute of Information Technology, have partnerships with Singapore and other countries.

The quality of training is mixed, however, and there are many unresolved issues in standardization and certification. Several excellent basic software courses are available. But most computer training institutes offer courses in outdated skills or software or in areas where market demand and salaries are low. Few courses are available in Web-based technology, multimedia computing, database management, object-oriented technology, networking technology, and systems administration. Limited admissions to state universities, which provide free education, have led to many people entering training programs of suspect quality.

Labor Costs, Quality, and Availability. Given Sri Lanka's size, its competitive advantage should be in the quality of its labor force, not its quantity. Providing professional services requires educated workers with English-speaking ability. Software services require highly specialized technical skills as well. This suggests that a successful software export and outsourcing strategy for Sri Lanka would be one focusing on niche markets rather than trying to compete directly with generic services.

Sri Lanka's labor force has a competitive advantage based on good mathematical training for students, competitive labor costs in the IT and BPO sector (table 4.2), high productivity and creativity, and such qualities as precision, manual dexterity, and hand-eye coordination. In addition, general wages are significantly lower than in most other Asian countries (Economist.com 2004). The most significant labor costs arise from relatively rigid labor regulations.

A significant weakness, however, is lack of IT professionals, a recurrent theme in reports on Sri Lanka's software industry (Sida 2002). Top-level

Table 4.2 Indicative Labor Costs in the IT Industry in Sri Lanka, 2003

<i>Category</i>	<i>Monthly wage (US\$)</i>
Systems manager	300–850
Systems analyst or engineer	250–650
Systems operator or hardware engineer	200–600
Programmer	150–300
Computer operator	100–250
Data entry operator	70–200
Trainee	60–150

Source: Sri Lanka, Board of Investment 2003.

technical skills are in short supply. So are middle- and upper-level managers (those with more than five years' relevant experience), a shortage felt strongly in software design, project management, and network design and management.

To match India's production of ICT graduates on a per capita basis, Sri Lanka would need to produce some 5,000 a year. But its universities produce fewer than 700 a year. The severely limited number of places in state-funded universities means that only about 6 percent of secondary school graduates (12,000 of 200,000) are admitted.

Brain Drain and the Diaspora. A depressed national labor market, two decades of civil unrest, and higher salaries abroad have prompted many professional Sri Lankans to seek careers outside the country. Many emigrants are working in unskilled or semiskilled jobs in the Middle East—and in Australia, Canada, Europe, and the United States, where there are significant numbers of Sri Lankan professionals, including doctors, accountants, engineers, university teachers, and research scientists.¹¹ Indeed, it has been estimated that about one in three qualified university teachers has left the country since the 1990s. A significant number of students seeking master's and doctorate degrees also go abroad. In 2004, about 40,000 Sri Lankan students were studying abroad.

Moreover, at least half those who were educated in IT in Sri Lanka live abroad, and many members of the diaspora have acquired ICT skills or business process and management training while overseas. But the diaspora has begun to play a central role in developing the industry. Many managers and technical experts are Sri Lankans who have studied or lived outside the country. Thus, there is both a challenge to retain people trained in ICT in Sri Lanka and an opportunity to convince those who have emigrated to return.

A Mixed Policy and Institutional Environment

In contrast with neighboring countries, Sri Lanka has created a business environment that is free from red tape. The economy is open, and trade and other liberalizing reforms have helped transform the industrial base (World Bank and Asian Development Bank 2005). But the low-intensity civil war has discouraged international investors, restricted regional commerce, led to brain drain, and diverted scarce resources away from infrastructure investment.

Government policy has a significant influence on the software and IT-enabled services industry. Because the industry is so globalized, it is perhaps

among the most susceptible to macroeconomic policy uncertainty and instability.¹² And because the ICT industry is so reliant on the public sector for domestic revenues, public procurement practices, including corruption, have more influence on its development than any other factor. Indeed, in a recent investment climate survey corruption ranked as the third most severe obstacle to business development in the ICT sector, while it ranked eighth for manufacturing (World Bank and Asian Development Bank 2005).

The government can create an environment that will promote ICT development and thereby benefit the entire country—by providing e-leadership, devising incentives for industry development, developing a supportive legal and regulatory framework, and investing in education and research, among other actions.¹³ The private sector also has a role in providing e-leadership and investment.

Public e-Leadership Institutions. Operating relatively independently but within the structure of the government, three organizations have been involved in developing the ICT sector: the Council for Information Technology (CINTEC), the Board of Investment, and the Export Development Board.

CINTEC, created in 1981 to oversee ICT policy and coordinate tasks with the private and education sectors, suffered from weaknesses in its enabling framework and financial resources. It became increasingly marginalized and politicized, and its staff deteriorated or was lost to the more dynamic private sector. Its facilitating functions were assumed by the ICT Agency when that entity was formed in 2003.

The Board of Investment is charged with attracting foreign investment to Sri Lanka in ICT and other sectors. In ICT, it could not keep up with the dynamism of the private sector and, with some notable exceptions, merely acted as a marketing body for existing local firms.

The Export Development Board is charged with promoting the country and specific industries (including IT and IT-enabled services) internationally by participating in trade shows, conducting industrial missions to other countries, and tackling bottlenecks and promoting industry development with other government agencies. An interagency ICT advisory committee meets regularly under the aegis of the board.

Private e-Leadership Institutions. ICT industry associations in Sri Lanka are underdeveloped and fragmented. The Sri Lanka Association for the Software Industry was formed in 1992 as the national representative

for the software industry with the support of CINTEC and the Export Development Board. In 1996, it joined with the Sri Lanka Computer Vendor Association and the Association of Computer Training Organizations to form the Federation of the Information Technology Industry, Sri Lanka. There are also associations for the telecommunications sector, including the Licensed Internet Service Providers Association.

In 1999, the Software Export Association was formed under the patronage of the Board of Investment and Export Development Board to market software and services, attract new investments, and increase export earnings. In 2003, with assistance from USAID, efforts to better promote the industry's interests led to the formation of the Sri Lankan Information and Communication Technology Association (SLICTA), with representatives from all the ICT industry associations mentioned here. But SLICTA remains a weak federation, with the Software Export Association its most promising part.

Financing and the Venture Capital Industry. Many local IT companies grow by reinvesting profits or by accepting financing from external investors, including venture capital firms demanding equity. Local investment capital has been scarce for several years, and interest rates for traditional bank loans have been high. Foreign currency loans are available at close to international corporate rates, but to be eligible a business must have foreign currency earnings. A business with an overseas presence and seeking international debt financing can find cheaper capital but must bear the exchange rate risks.

The venture capital industry in Sri Lanka is at an early stage of development. Still, it has had several achievements: creating two primary Sri Lankan-owned venture capital firms, successfully incubating at least one local firm, and attracting some overseas Sri Lankans in leveraging global capital for locally funded firms.

But Sri Lankan venture capitalists face substantial obstacles, including the lack of automatic registration for overseas capital investment by Sri Lankan firms, unequal tax treatment of venture capital funds (some have tax holidays), and a lack of investment by the Sri Lankan diaspora. Although returning Sri Lankans have been instrumental in forming software-related export companies, there have been few initiatives linking Sri Lankans working overseas with opportunities to invest their capital, marketing contacts, and technical know-how in building the local ICT industry (ICT Cluster Initiative 2002).

Promotion and Fiscal Incentives. The Board of Investment has identified IT and IT services as high-priority sectors, and today a number of fiscal incentives exist for the industry and related training institutes.¹⁴ The board has also made special efforts to promote foreign investment in the electronics industry. Electronics was identified as a *thrust industry* in 1995, qualifying companies investing in the industry for attractive incentives and concessions.

Legal and Regulatory Framework. Sri Lanka started on a path of legal reform in 1987 with the establishment of the CINTEC Committee on Law and Computers. Several laws have been passed relating to software protection, intellectual property rights, and the admissibility of computer records in legal proceedings. In addition, enactment of Intellectual Property Act No. 36 of 2003 enhances protection for software and other digitized products, including databases and integrated circuits.

This early momentum was lost because of weak financial support, a lack of legal professionals with ICT-related expertise, and insufficient government commitment to quickly developing and implementing reforms. Legislative reforms in Sri Lanka, as in many other countries, take years to be enacted by Parliament. Exacerbating this problem are the diffuse coalitions in Sri Lanka and the requirements for translating newly enacted laws into multiple languages.

With the establishment of the ICT Agency and the promise of e-Sri Lanka, however, the e-laws reform process has moved to a faster track (see chapter 3). Under the e-Sri Lanka program, e-laws are expected to be in place within two to three years from 2005. By June 2006, Sri Lanka had adopted a series of laws promising a world-class framework for e-commerce, offshoring, and ICT sector development.¹⁵

The ICT Agency has been tasked with recommending policies and legal and regulatory frameworks for ICT sector development. In playing this catalytic role, the ICT Agency has been able to accelerate approval and enactment of a significant set of policies and regulations, including for e-transactions and data protection. These regulations are given the force of law under the ICT Act of 2003, which established the ICT Agency. The private sector and concerned government agencies have been participating as key stakeholders. This process should be encouraged and institutionalized.

Recent Government and Partnership Initiatives. Although recognizing its resource limitations, the government is committed to playing a

policy-setting and catalytic role to promote the development of the ICT industry. As part of this, it has expressed interest in developing partnerships with the private sector in Sri Lanka and in attracting investment and other forms of collaboration from foreign firms. In addition, Sri Lanka has entered into official collaborative agreements with India, Malaysia, Singapore, and other countries focusing on IT industry development. And the government has actively developed multilateral and bilateral technical assistance in ICT.

The India Effect

Developing the economic relationship with India offers many opportunities. Sri Lanka should not attempt to compete with its giant and more experienced neighbor, nor does it need to. Instead, it should work with the world's information services superpower by offering complementary services in such areas as disaster recovery and business continuity solutions or by providing niche-market services that India cannot provide. And Sri Lanka may benefit from the need for alternative destinations to meet the full range of global outsourcing needs, particularly those of small and medium-size firms.

Sri Lanka could also benefit from piggybacking on India's reputation in software services and BPO. The two countries have comparable cost structures and productivity, and foreign firms are interested in expanding their operations in both. Special incentives resulting from the free trade agreement between the two nations could expand the scope for collaborating with India in such areas as education and training. Moreover, Sri Lanka's proximity to India could allow it to draw on India's large pool of labor, its ICT training institutions, and complementarities through partnerships with its large firms.

Prospects for the Industry

Sri Lanka has so far tapped only a fraction of its ICT development potential. The potential growth of its export market is almost infinite relative to that of its domestic market. Despite strong competition from India, the Philippines, and other countries, Sri Lankan exports of software and IT-enabled services grew by an estimated 60 percent annually in 1995–2003. Indeed, Sri Lanka's export potential and recent progress surpass those of many economies in Latin America, the Middle East, Eastern Europe, Central Asia, and South Asia (Bangladesh,

Pakistan, and some Indian states) that also aim to develop a major IT and IT-enabled services industry.

Domestic market growth is also likely to be strong for several decades. The local market has been growing steadily for the past three decades, and the current use of software products and services in both the public and the private sectors suggests scope for continued growth. But the domestic market has a different role than the export market: to provide firms with learning opportunities and demonstration sites before they scale up for export and to foster other local industries and services through ICT-enabled competitiveness, entrepreneurship, and private sector development.

Sri Lanka may not become a major software exporter like India. But projections suggest that the earnings of the software and IT-enabled services industry could outstrip those of the garment sector and other traditional leading sectors such as tea and tourism. Matching the size of India's industry is not feasible, largely because of India's much larger base of skilled labor. But with rapid growth, Sri Lanka's IT and IT-enabled services industry could rival those of many Indian states as well as those of countries with populations or per capita incomes comparable to Sri Lanka's.

Scenarios for Growth

To project the potential growth of Sri Lanka's software and IT-enabled services industry, three hypothetical scenarios were prepared:

- *A high-growth scenario*, in which the prospects for software products and services and IT-enabled services are highly favorable and the country's investment climate improves rapidly
- *A low-growth scenario*, in which the prospects for exports are weak and the investment climate unfavorable
- *A baseline scenario*, in which the prospects for steady growth are good, the investment climate is positive, and gradual progress is made in implementing most of the actions outlined in the following section

A lasting domestic peace, a conducive investment climate, and growth in opportunities for global outsourcing suggest a midpoint scenario—the baseline scenario, which appeared to be the most likely at the time the strategy for the ICT industry was developed (2004–05). In this scenario, the domestic and export revenues of software products and services and IT-enabled services

Table 4.3 Potential Revenues for Sri Lanka's Software and IT-Enabled Services Industry under Different Growth Scenarios*US\$ millions, except where otherwise specified*

Revenues	Actual ^a 1998	Actual ^a 2003	Low- growth scenario 2014	Baseline scenario 2014	High- growth scenario 2014
Export					
Software products and services	18	125	500	1,000	1,200
IT-enabled services	3	30	400	800	1,500
Total export revenues	21	155	900	1,800	2,700
As a percentage of total exports (GNFS)	0.4	2.4	7.5	12.5	15.8
Domestic					
Software products and services	22	77	300	400	600
Total export and domestic revenues	43	232	1,200	2,200	3,300
As a percentage of GDP	0.3	1.3	—	6.0	—

Sources: Central Bank of Sri Lanka 2003; Sri Lanka, ITU 2003; Mitra 2004; Board of Investment 2003.

Note: Forecasting model is based on assumptions of average annual growth of 6 percent for gross domestic product (GDP) and 7 percent for total exports in 2004–14. GNFS is goods and nonfactor services.

— = Not available.

a. Estimated.

combined would reach US\$2.2 billion by around 2014, up from US\$232 million in 2003 (table 4.3). Exports would account for US\$1.8 billion (about 12.5 percent of total exports), up from US\$155 million in 2003.

Meanwhile, the domestic software products and services market and telecommunications revenue combined would grow to US\$1.4 billion by around 2014. That would mean a total for the ICT industry of US\$3.2 billion—about 9 percent of gross domestic product (GDP). The growth rates needed to achieve these levels are in line with the ICT sector's performance in 1998–2003.

Baseline Scenario for Software. The baseline scenario suggests that Sri Lanka's earnings from software products and services could reach US\$1.4 billion in 2014, with US\$400 million from the domestic market and US\$1 billion from exports (representing 7 percent of total exports). Revenues from software services are projected to grow faster than those from products. These projections assume rapid expansion in both export and domestic markets. Even so, the growth rate would be lower than in 1998–2003.

If Sri Lanka's exports of software products and services did reach US\$1 billion in 2014, they would still account for only about 0.1 percent of the global market. But even a marginal increase in Sri Lanka's global market share would have a big impact on the size of its industry.

The local market also offers growth and learning opportunities. As in other developing countries, the domestic market for software products and services can be expected to double in size every three to six years. Still, the domestic market is expected to remain smaller than the export market.

Baseline Scenario for IT-Enabled Services. If the climate for foreign investment in Sri Lanka is perceived as favorable, the IT-enabled services sector could well grow significantly faster than the software products and services sector; indeed, it could overtake the software sector in revenue and job creation. But the growth of IT-enabled services is especially difficult to forecast. This uncertainty is reflected in the big difference between the low- and high-growth scenarios.

According to the baseline scenario, export revenues (principally from business process outsourcing) would reach US\$800 million (6 percent of total exports) by 2014. Just as for software products and services, this suggests a global market share of about 0.1 percent.

Market Opportunities

Analysis suggests a range of opportunities in both domestic and export markets and especially in niche markets.

Domestic Market. Growth of the local market has been impeded by deficiencies in government procurement policies and practices (perceived by the private sector as unfavorable to local firms) and tax incentives favoring exports. Yet the domestic market offers opportunities for local firms in a wide range of public sector, private sector, and household business segments. Rapid development of fixed-line and wireless telephony and Internet connectivity, coupled with falling prices for computing power and greater access to user-friendly software solutions, is expected to contribute to a sharp rise in long-term demand for ICT applications.

While the local market is small and typically offers smaller profit margins than the export market, it can also serve as an important seedbed for exports. Development of the domestic market is also essential to attract foreign joint ventures and strategic alliances. And the domestic

market offers special opportunities for small or start-up firms in such areas as Web content development, custom software development, network infrastructure management, IT education and training, network management and security, open source and low-cost technology solutions, vertical applications in e-business and e-government, and hardware and software maintenance and support.

Domestic demand for telecommunications and Internet services is poised for rapid growth. Further development of these industries should have high priority, because they play an essential part in developing a competitive software and IT-enabled services industry.

Export Market. If Sri Lanka's IT and IT-enabled services exports continue to grow at the rates achieved in 1995–2003, the industry could emerge as one of the key engines of growth in the economy. To succeed in exports, Sri Lanka must attract foreign investment and develop firm-level strategic alliances and other forms of international collaboration. For small economies like Sri Lanka's, focusing on export-led development is often the key to attracting multinationals in developing the IT and IT-enabled services industry. Collaboration between foreign and domestic firms is crucial for expanding exports and also for developing the local ICT market.

Focusing on smaller firms, smaller markets, or industry niches could also benefit Sri Lanka, by helping to differentiate it from larger and more established players such as India—an increasingly important factor in developing exports. Given the scale of Sri Lanka's industry, it can afford to target medium-size companies and small European countries. Another approach is to build a clear expertise in such niches as financial software (box 4.1).

Which export market segments will grow fastest is hard to predict. But interviews with scholars and industry leaders suggest preliminary conclusions (figures 4.1 and 4.2): In IT and IT-enabled services, the greatest potential for growth will be in business process outsourcing. And in packaged software, embedded software and consumer applications are especially promising.

A strategic marketing exercise involving representatives from government agencies, industry associations, and other stakeholders concluded that Sri Lanka should focus on targeted markets and services. The exercise ranked the United Kingdom first (for IT-enabled services), followed by Scandinavia (software services), the Benelux nations (software products), and South Asia (complementary services).¹⁶

Box 4.1

Promising Niches for the Software and IT-Enabled Services Industry in Sri Lanka

Software development and services

Vertical niches

- Telecommunications software products and services (especially services relating to mobile telephony)
- Sector-specific software products, including both proprietary and open source software
- Education, training, broadcasting, and other media sectors, including distance learning and multimedia applications and content
- E-government development, including in-house government requirements, citizen applications, hardware, software products and services, and Web services
- Private industry markets for telecommunications, Internet, and software products and services, including the following:
 - Manufacturing (apparel industry)
 - Banking, financial, and postal services
 - Trading, retail and distribution, and transport and communications, including freight and land-based transport services
 - Leisure and travel industry, including international tourism
 - Agricultural and food industry, including plantation sector (tea)
 - Real estate and property management sector
 - Education and entertainment (broadcasting and animation) and other media and publishing services
 - Households (computer, mobile phone, personal digital assistant, audio, television, and other devices; Internet service; distance learning; games, e-mail, word processing, and other applications)

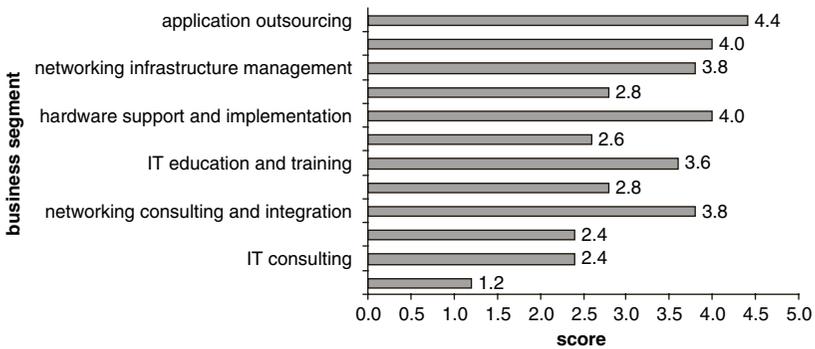
Horizontal niches

- E-government and e-business applications (including e-commerce) and IT-enabled services
- Web site-related services for domestic private and public sector users and foreign markets
- Back-up site for software firms operating in other countries, including multinationals in India
- IT security services such as security audit (including ethical hacking) and encryption

(Continued)

- Disaster recovery and data warehousing
 - Development and support of open source and local language applications and multimedia
- Business process outsourcing*
- Call centers
 - Accounting services
 - Legal services
 - Patent drafting services
 - Engineering and architectural design
 - Tourism, health, education, and other services
- Source: Author.*

Figure 4.1 Sri Lanka's Export Growth Potential in IT and IT-Enabled Services by Business Segment



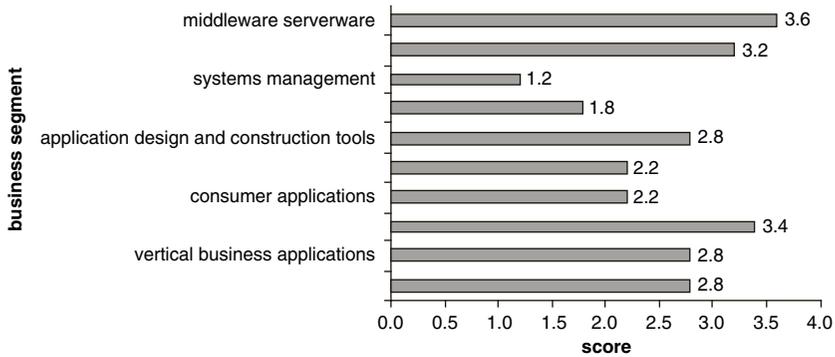
Source: Mitra 2004.

Note: Growth potential is rated from 1 (low) to 5 (high). The first bar in each segment is for IT and the second is for IT-enabled services.

The government of Sri Lanka has set a target of capturing 1 percent of the Indian market for IT-enabled services by 2008.¹⁷ The ICT Agency is targeting a local IT-enabled services industry that employs close to 30,000 people and produces export revenues of at least US\$600 million by 2008.

A Strategy for Developing the Industry

The proposed strategy for developing the ICT industry is not the product of a traditional donor-financed study carried out by an international consulting firm. Instead, it was developed over time through interactions

Figure 4.2 Sri Lanka's Export Growth Potential in Packaged Software by Business Segment

Source: Mitra 2004.

Note: Growth potential is rated from 1 (low) to 5 (high). The first bar in each segment is for IT and the second is for IT-enabled services.

and brainstorming sessions among Sri Lankan ICT industry associations (particularly the software export association), the ICT Agency, and the World Bank team. The strategy has two broad thrusts: developing markets and building capacity.

Developing Markets

The strategy calls for the software and IT-enabled services industry to intensify its efforts to develop markets by targeting the following elements:

- Domestic and foreign niche markets, including both larger and smaller industrial countries (the Nordic, Benelux, and other countries) and, in some instances developing countries as well
- Multiple horizontal and vertical industry niches at both the higher and the lower ends of the value added chain
- New technology development in advanced industrial nations and in nearby countries such as India and Singapore
- Different client segments, including the private, government, and household sectors, and small and larger projects

Market growth prospects suggest that the industry should emphasize—in order of potential—business process outsourcing, software services, and software products. Moreover, the industry should exploit both domestic and export markets, as well as potential links between the two. But there is limited scope for premature forcing of domestic market development.

Building Capacity

Strong efforts are needed in capacity building, innovation, and reforms, especially in the following areas:

- Developing human resources—language abilities, technical skills, and managerial and entrepreneurial expertise
- Building capacity in technology and research development
- Improving infrastructure, industrial parks, real estate, and living conditions
- Strengthening financial resources and management
- Building private sector business capacity, a business mind-set, corporate governance, and a client-focused service culture
- Enhancing e-government, overall governance, government policy, and the legal and regulatory environment
- Promoting the geographic spread of the IT industry domestically and taking advantage of international positioning

To achieve quick results in especially critical areas requires prioritizing and phasing these efforts.

Working within a Strategic Partnership

Sri Lanka's objectives for developing its ICT industry, along with the industry analysis and market growth prospects, point to a need for long-term, cohesive efforts by the government and the private sector. In this strategic partnership, the government's role is to foster growth of the IT and IT-enabled services industry by doing the following:

- Ensuring local participation in the e-government initiative and encouraging the outsourcing of government services to local ICT firms
- Ensuring transparent and competitive procurement of ICT services in the public sector
- Ensuring a favorable investment climate
- Promoting use of ICT in the private sector and specifically among small and medium-size enterprises
- Investing in ICT education, promoting partnerships between universities and the ICT industry, and providing incentives for ICT training for working professionals
- Providing incentives for the private sector to participate in providing ICT education and training at all levels
- Promoting local software products and services and IT-enabled services in global niche markets

- Promoting Sri Lanka as a destination for foreign investment
- Promoting centers of excellence for training and research in niche-market emerging technologies
- Fostering partnerships locally, including partnership between the government and the private sector in e-government and infrastructure development
- Fostering international links in such areas as investment, strategic alliances, and mobilization of the diaspora and links with international academia, consulting firms, financial institutions, and others
- Promoting the concept of Sri Lanka as a regional hub for ICT and other services

Meanwhile, the private sector needs to increase efforts to build capacity, strengthen quality, and promote business opportunities by focusing on the following approaches:

- Developing capacity in targeted market segments
- Promoting new business lines and markets for higher-end software products and services and business process outsourcing
- Cultivating foreign investment and strategic alliances between foreign and local firms and building networks with international technology and market intelligence institutions, consulting firms, and the diaspora
- Building indigenous entrepreneurship, including start-ups, so that Sri Lankan firms can expand in local and external markets
- Cultivating an entrepreneurial and innovative spirit that accepts risk taking and self-help rather than patronage
- Strengthening human resource management, including workforce education and training with special attention to top corporate management, chief information officers, project managers, and technical staff
- Strengthening strategic planning, technical and market intelligence, and awareness of opportunities and pitfalls in ICT development within the IT industry and among end users
- Invigorating links within the IT industry and with private sector end users
- Invigorating and consolidating industry associations

An Agenda for Action

The strategy for developing Sri Lanka's IT and IT-enabled services industry, and the industry's challenges and prospects, led to an action plan with two levels of cross-cutting, high-priority initiatives (box 4.2). Like the

Box 4.2

An Action Plan for Developing the Software and IT-Enabled Services Industry in Sri Lanka

First Level of High-Priority Initiatives

- *Foreign investment.* Develop the concept of Sri Lanka as a destination for investment by promoting the following:
 - Successful Sri Lankan companies
 - Opportunities for foreign firms to take advantage of Sri Lankan skills
 - Investment opportunities to foreign firms
- *IT industry.* Develop the industry by promoting the following:
 - Strategic alliances between foreign and local firms
 - Stronger marketing knowledge and skill sets
 - Reform of public procurement of ICT services
- *Education.* Help create the skills the industry needs by developing the following:
 - Indigenous entrepreneurship programs
 - Education and training programs to meet specific industry needs
 - Software engineering education

Second Level of High-Priority Initiatives

- *Industry promotion and market development.* Strengthen strategic planning, market intelligence, and awareness of opportunities and pitfalls in ICT development within the IT industry and among end users by doing the following:
 - Establishing local trade journals and high-quality Web sites with links to other sites
 - Establishing processes for publishing annual or biannual labor force surveys, reviews of the software and IT-enabled services industry, and brochures promoting the industry
 - Establishing effective processes to raise awareness of the potential of ICT among CEOs and board members of non-ICT firms and to foster links within and between sectors
 - Invigorating and consolidating industry associations
 - Developing mentoring programs
- *Infrastructure.* Improve physical infrastructure in Colombo and other parts of the country, including Internet services, power supply, and industrial park facilities.
- *Technology.* Achieve excellence in industry standards and quality assurance through certification and research labs.

- *Finance.* Expand scope for non-collateral-based financing of ICT assets for individuals and small and medium-size enterprises.
- *International links.* Make timely and effective use of opportunities to do the following:
 - Promote Colombo as a regional headquarters for foreign firms
 - Seize the opportunity to develop the concept of Sri Lanka as a regional hub for ICT and other services
 - Promote links with the diaspora to encourage Sri Lankans to serve as investors, advisers, educators, and strategic partners
- *Education.* Expand and strengthen ICT education in public and private institutions.

Source: Author.

strategy, the action plan was developed through an interactive process with the stakeholders. It is likely to be updated annually, taking into account experience and the results of analyses carried out under the ICT capacity-building and industry promotion fund (see chapter 5).

Implementing the Strategy

Implementing the strategy and action plan requires constant and complementary efforts to do the following:

- Build consensus among key stakeholders on the vision, objectives, strategy, and action plan and on the authority of institutions and leadership involved. Especially important is to build consensus around actions that are to be taken quickly.
- Develop management and institutional frameworks, including entrepreneurship and governance capacity for executing and monitoring policy.
- Create partnerships and knowledge networks with local and international stakeholders.
- Keep the implementation of the strategy aligned with local and international conditions, adapting it as technologies and markets change.

Engaging Stakeholders

To succeed, a strategy and action plan need to be endorsed at the highest levels and rooted in the realities of the local and global industry. Their formulation and implementation need to involve key stakeholders. The action plan must include clear objectives and a rationale for setting

priorities and assessments of the cost, requirements, and results of implementation. And the main objectives must ultimately be reflected in tangible results.

The rapid growth in global outsourcing has helped create an important window of opportunity for Sri Lanka to jump-start development of its IT and IT-enabled services industry. Seizing this opportunity requires strong and timely action by a range of stakeholders, both local and foreign.

Stakeholders may differ in their views and vested interests. Even so, ensuring strong representation from all major industry associations and government agencies is essential. An urgent need is to move away from old traditions of infighting and fragmentation toward a consensus around visions and action plans. Working in partnership with the ICT Agency, a strong private association like India's National Association of Software and Service Companies could help forge such a consensus.

Public Sector. The Sri Lankan government needs to address a wide range of long-standing issues, including the challenge of promoting exports and expanding domestic capacity to absorb ICT. In addition, the public sector could become an exemplary local client for the ICT industry.

Private ICT Sector. Managers and industry associations need to formulate and implement strategies and action plans for firms and the industry as a whole. ICT business associations should promote the industry and highlight its key challenges through industry surveys, research, and periodicals. Providing such publications would enable the industry to lead the dialogue with policy makers and promote targeted reforms. Although leadership for developing the ICT industry must remain in the private sector, effective partnerships and mutual support between the ICT Agency and ICT associations are critical at this stage of the industry's development.

End Users. Most important in determining ICT development are end users across the economy—the public sector, the education and research communities, agriculture and manufacturing, and the retail, financial, insurance, tourism, and transportation industries. These stakeholders also include households and the consumer electronics and telecommunications industries. Engaging current and potential end users is imperative to ensure that the IT industry develops technologies and market niches in line with current and future demand. End users also need to be effectively engaged to strengthen links within and across sectors. And organized consumer groups are critical to safeguard the interests of ICT users—for

example, to strengthen e-security and the service standards of Internet service providers.

Education, Training, and Research Communities. Collaboration between government, the private sector, and the education, training, and research communities is essential to promote local awareness and build research and industrial capacity. Prominent scholars could play key roles as mentors and champions. The ICT capacity-building and industry promotion fund is a versatile tool for promoting such collaboration (see chapter 5).

Nongovernmental Organizations. In Bangladesh, such NGOs as the Grameen Bank and Grameen Telecom have played an important role in promoting awareness of ICT and in spreading its use among the rural and urban poor. Sri Lanka too has vibrant NGOs. Through policy advocacy, grassroots innovation, and partnerships, NGOs could encourage the industry and government to harness ICT for poverty reduction and social development. They could use various channels to do so, including the private sector focus group working with the ICT Agency, the ICT capacity-building and industry promotion fund, and the e-society fund (see chapter 3).

International Parties and the Sri Lankan Diaspora. The ICT Agency, the Board of Investment, and the Export Development Board should collaborate to fully engage international parties—foreign firms, financiers, consulting firms, and education, training, and research institutions—and the diaspora. The private sector focus group or ICT industry associations could work with the ICT Agency to establish a registry of Sri Lankan ICT talent abroad, then harness this global network for strategic outsourcing and “brain gain.”

Adopting a Pragmatic Self-Help Philosophy

Although partnership and other forms of cooperation between the government and the private sector are important, entrepreneurs typically need a strong philosophy of self-reliance to succeed. The private sector needs to undertake persistent efforts to strengthen the human resources, technology, and management skills of individual firms. And firms need to undertake strong, continual in-house efforts to improve corporate processes, internal incentive structures, and cultures of management and work. Also essential is breaking with the tradition of patronage. There should be little room within firms for relying on government—nor for

blaming government, or competition from other countries, for problems in developing the ICT industry.

Annex 4.1 SWOT Analysis: Strengths, Weaknesses, Opportunities, and Threats

Analysis of strengths, weaknesses, opportunities, and threats (SWOT) serves as a basis for policy recommendations. Following are highlights from SWOT analyses of the economic and social context for development of Sri Lanka's ICT industry and its IT and IT-enabled services industry.

SWOT Analysis for the ICT Industry

Strengths

- Openness to foreign trade, investment, education, and other international links
- Investment-friendly regime: a single point of contact (the Board of Investment) for foreign investors, 100 percent foreign ownership guaranteed by the Constitution, equal treatment of foreign and local investors, flexible and liberalized trade policies compared with those in other South Asian countries, and low level of red tape
- High literacy rate at 90 percent
- High telephone and personal computer (PC) density per capita compared with other South Asian countries
- High potential for long-term growth in the ICT industry despite backlogs in economic development and in the diffusion of ICT applications in urban and rural areas

Weaknesses

- Poor infrastructure
- Legal, regulatory, and governance environments that are still developing
- Limited domestic market, with many parts of the social, economic, and governance fabric remaining underdeveloped or weak
- Low incomes and low telephone and PC density per capita compared with most East Asian countries
- Sharp geographic disparities in economic development
- An IT and IT-enabled services industry concentrated in Colombo, with other cities and rural areas lagging behind
- Narrow and shallow industrial base, and software and IT-enabled services sectors that are enclaves, with limited links with other sectors and even within sectors

- Limited capacity to scale up exports and compete internationally in manufacturing and knowledge-based services
- Limited number of people with higher education, English language skills, and substantive, up-to-date technical and managerial experience
- Low levels of trust, work ethic, and timeliness

Opportunities

- High growth potential for ICT services for the domestic and export markets
- Leapfrogging in social, economic, and technology development
- Development of links with the diaspora for investment, know-how, international contacts relating to ICT, and other knowledge economy activities
- Partnerships with India and piggybacking on its reputation in software and IT-enabled services

Threats

- Political divisions that undermine the consensus building needed for social and economic development and that affect perceptions of the investment climate, including risks of brain drain and adverse effects on foreign trade
- Risk of labor unrest and potential wage inflation among highly educated and managerial professionals
- Adverse world, regional, or national economic, political, or security situation

SWOT Analysis for the IT and IT-Enabled Services Industry

Strengths

- Demand-driven market for IT-enabled services with no industry-induced attrition, allowing new entrants to scale up
- Culture of creativity, out-of-the-box thinking, and attention to detail, enabling Sri Lankan companies to deliver custom-crafted solutions
- A relatively large educated workforce that is underutilized
- Geographic location enabling the industry to offer competitive and convenient disaster recovery and business continuity services to companies using Indian IT-enabled services operators at their primary site
- Attractive living and working conditions not found in other developing countries offering low-cost IT solutions

- An ICT-focused government agency and consequent government support for the industry's growth
- Strong private sector interest in developing the industry

Weaknesses

- Lack of exposure to international business and marketing channels
- Limited number of workers, forcing Sri Lanka to look at high-margin niche businesses rather than large-scale software development or call centers
- A population with good English language skills but limited verbal fluency for call center or voice-based services
- Only a small pool of experienced and highly skilled IT professionals and managers
- High charges for telecommunications and Internet services
- International connectivity limited to two undersea cables, each with only a single landing station
- High cost of electricity and serviced land
- Government procurement practices in IT projects that are uncompetitive and nontransparent
- Lack of access to venture capital funding and mentoring

Opportunities

EXPORT MARKET

- A wide range of export and outsourcing opportunities in software product development and services and IT-enabled services
- Multinational companies' need for disaster recovery locations
- Growing demand for offshoring from multinationals interested in diversifying locations to reduce risks associated with reliance on one country
- Shortages and high cost of skilled labor in many overseas markets
- Familiarity with the Western, Anglo-Saxon world and proximity to India and the Middle East

DOMESTIC MARKET

- Favorable circumstances for telecommunications products and services, IT hardware, and software products and services
- Potential for the domestic market to build competency and in some instances to serve as a seedbed for future exports
- Proximity to India, providing opportunities to partner with India and learn from its experience and perhaps to benefit from the cost advantage of its large pool of software professionals

Threats

EXPORT MARKET

- Possibility of being marginalized because of shifts in technology
- Multinationals unwilling to invest because of political risks
- Volatile international demand
- Competition from other developing countries

DOMESTIC MARKET

- Considerable time required to reach economies of scale in many business segments and risks of erratic growth in the domestic market
- Domination of foreign firms
- Local industry with limited technical competence and management experience for domestic projects

Notes

1. For a broad, popular treatment of the implications of this transformation, see Friedman (2005).
2. The strategy outlined in this chapter focuses on the most promising segments of the ICT industry in Sri Lanka: software products, software development services, IT support services, and IT-enabled information and BPO services. The strategy does not cover in any adequate detail the use of ICT in other industries and services or among small and medium-size enterprises.
3. These data have several limitations. For example, they exclude firms with fewer than 25 employees, and the investment data are not adjusted for disinvestments.
4. For example, the Microsoft subsidiary established in 2004 will have few employees of its own in Sri Lanka (as has been typical in most developing countries). It plans to operate through strategic alliances with Sri Lankan firms and other firms in the region.
5. In recent years, however, the scenario for exports has changed as prospects for software services and business process outsourcing from U.S. and European firms have improved. Some researchers suggest that Sri Lanka should not ignore the low-cost services, as this segment remains an important entry point for emerging software exporters and is a function of cluster size and maturity (see Carmel 2003; Hanna, Tessler, and Barr 2003).
6. Whereas the monthly cost per square meter averaged only US\$11.60 in Colombo in 2004, it ranged between US\$15.45 and US\$26.15 in New Delhi.
7. A typical Internet service charge (from Sri Lanka Telecom [SLT]) is US\$11 per month for 150 hours. To this must be added the telephone charge.

- The base charge for a telephone line is between US\$3 and US\$4 per month. But the cost per minute is high, particularly during weekday daylight hours (for SLT it is US\$1.80 per hour after the first 8 hours) (ESC 2003).
8. Although high-speed asymmetric digital subscriber line, or ADSL, (2 millibytes per second) and ISDN (64 kilobytes per second [kbps]) facilities are available in the city of Colombo and some suburbs, their high costs prevent wide use. Data transfer speeds on narrowband access typically range from 28 to 36 kbps. In rural areas, the speed is sometimes as low as 14.4 kbps.
 9. Computers per 1,000 people rose from 1.1 in 1995 to 7.1 in 2000, and to 7.9 in 2001. Telephone subscribers per 1,000 people increased from 7 in 1995 to 96 in 2002, with mobile subscriptions overtaking fixed-line ones in 2002. Radios per 1,000 people increased from 204 to 209, and television sets from 78 to 111. As in other countries, rapid growth in television and telephony has been a precursor to growth in the use of PCs and the Internet, followed by personal digital assistants and other devices.
 10. The overall tertiary enrollment ratio is 11 percent, slightly higher than the South Asian average of 10 percent but much lower than the East Asian average.
 11. Data on the diaspora and the brain drain are based on rough approximations. But estimates suggest that about 200,000 Sri Lankans, many with graduate-level education, have emigrated to Australia, for example.
 12. A survey of the software industry for an investment climate assessment confirms this susceptibility (World Bank and Asian Development Bank 2005).
 13. For the role of government in software development in industrial and developing countries, see Hanna, Tessler, and Barr (2003).
 14. A software company exporting more than 70 percent of its output receives an 8-year comprehensive tax holiday, followed by a 12-year, 15 percent concessionary tax holiday. A software company catering mainly to the local market gets a 5-year tax holiday (Gunawardene and Wattegama 2001).
 15. See <http://www.icta.lk> for a rich source of information on the ICT Agency and the current status of the e-Sri Lanka program.
 16. The industry agrees that the United States is not a target market given its lack of affinity with and consequent lack of knowledge of Sri Lanka, the distance, the cost of marketing in the United States, and the existence of other lucrative markets.
 17. A. T. Kearney (2003) estimates that the Indian market for IT-enabled services will reach a staggering US\$60 billion by 2008.

CHAPTER 5

A Fund for Building Capacity and Promoting the Industry

In industrial and knowledge-based economies, the ICT industry has been playing a leading role in boosting productivity and improving the ability of other industries to compete globally. The ICT industry and associated services also constitute one of the largest, fastest-growing, and most globalized sectors in the world economy. So, not surprisingly, where the ICT industry is concerned, industrial policy is alive and well in most OECD and East Asian countries (Rodrik 2004a).

As chapter 4 concludes, Sri Lanka has the potential to develop a competitive advantage in attractive niches of the ICT industry. That does not argue for protecting this industry nor for providing excessive support. But the market failures that abound in the ICT industry—as a result of externalities, scale economies, and information asymmetries—can make a strong case for promoting and selectively supporting the industry.

The private sector should play a key role as both an early adopter and a significant beneficiary of ICT. Yet businesses, especially small and medium-size enterprises, face barriers to adopting ICTs. Moreover, as a fast-changing, general-purpose technology, ICT demands continual technological learning by user firms of all sizes, a need particularly difficult for smaller firms to meet. These challenges have prompted many OECD countries to develop

programs to support adoption by small and medium-size enterprises of ICTs and other new technologies critical to competitiveness.

Yet the barriers are most severe in developing countries. These barriers include low awareness of the benefits of ICT among potential users, shortages in ICT skills, high risks and learning costs for small and medium-size enterprises, and high costs of Internet access and connectivity. They also include legal impediments and lack of trust in online business, lack of mechanisms for diffusing and sharing best practices, underdeveloped consulting and ICT support services, a disconnect between universities and the industry, and limited incentives to change business models and processes when the costs of adopting ICT are significant and the returns uncertain.

To avoid both market and government failures, what is needed is “strategic collaboration between the private sector and the government with the aim of uncovering where the most significant obstacles to restructuring lie and what type of interventions are most likely to remove them” (Rodrik 2004a, 3). Private initiative needs to be embedded in a framework of public action that encourages market discovery, diversification, innovation, institutional learning, and technological dynamism. Support should be guided by principles that include setting clear criteria for eligibility and for measuring success, holding beneficiaries accountable for their performance, and identifying and leveraging externalities and shared learning (Haque 2006; Lall 2001; Rodrik 2004a).

As part of such an effort, the e-Sri Lanka project includes the ICT capacity-building and industry promotion fund (ICBF), a mechanism for implementing the strategy outlined in chapter 4. The fund, with a US\$6 million budget for a four-year program, is aimed at strengthening the ICT industry in Sri Lanka, primarily through private sector-led initiatives; encouraging emerging ICT sectors and entrepreneurship to stimulate broad-based growth of the industry; and promoting international competitiveness. It is also designed to increase the capacity of the country’s workforce to harness the benefits of ICT for development across the economy.

The ICBF is intended to benefit stakeholders across the ICT industry—including the software industry, the IT-enabled services industry, IT users in manufacturing, IT training providers, and the IT consulting services industry. Support will also go to private sector ICT users, to foster greater use of ICT and to increase its integration into public and private sector business practices. The ICBF is expected to require significant matching funds from beneficiaries.

Besides benefiting stakeholders, investments funded under the ICBF are expected to contribute to social harmony, increase employment opportunities, and enhance equity across regions. They may expand employment in the ICT industry, in organizations that evolve to support the ICT industry, or in traditional industries and government as institutions in these sectors adopt more advanced computer systems. ICBF-supported activities—conferences, policy studies, promotion efforts, and technical assistance programs—are also expected to improve the overall business environment, attract anchor IT multinationals, induce collaboration between IT suppliers and users to solve strategic problems, and create innovation and incubation ecosystems for the ICT sector.

Rationale for the Funding Mechanism

Development of the ICT industry—its human resources, domestic market, and export links—is a key component of the e-Sri Lanka program. But this component was not intended to be planned in detail or programmed in full at the start of the project; it had to evolve over time in response to demand and initiatives from the private sector. The strategy for Sri Lanka’s software and IT-enabled services industry, outlined in chapter 4, was developed through extensive consultations with the private sector and other stakeholders. Yet it still constitutes a top-down synopsis of directions and priorities. It can only provide a guide to setting priorities among the many diverse grassroots initiatives likely to be proposed by the private sector. A process of innovation, experimentation, local adaptation, and self-discovery is necessary to develop specific measures and programs responsive to the national strategic priorities of the ICT industry and the private sector.

The ICBF mechanism has been created to meet the challenge of funding small bottom-up and high-priority initiatives of the private sector even while ensuring that such initiatives will benefit the ICT industry and the economy as a whole. Rather than specifying the activities to be funded up-front, the ICBF enables planners to specify the goals, areas of focus, and administrative and decision-making processes to be used in allocating the fund.¹ Its design emphasizes the following areas:

- Ownership and active participation by the private sector, particularly the software and IT-enabled services industry and its training and educational institutions

- Demand-driven funding through cost sharing or matching grants and the participation of private sector associations, representing both IT suppliers and user enterprises, in generating proposals
- Flexibility and timely response—rather than funding according to detailed and rigid plans—to accommodate the pace of change in the industry
- Innovation and shared learning through pilots and initiatives with large demonstration effects, discovery of specific market niches and development of new sources of growth, support to early adopters, well-developed monitoring and evaluation, and dissemination of lessons learned
- Competitive funding to ensure that scarce grant resources go to the best proposals
- Pump-priming initiatives with strong externalities and demonstration effects, with the intention to scale up these initiatives through other sources of financing—given the large potential demand, potential interest of multinational companies and bilateral aid agencies, and the modest initial funding that could be made available within the e-Sri Lanka project
- Outsourcing to outside agents (rather than the small ICT Agency) the administrative burden of reviewing and disbursing funds for many small initiatives
- Pilots, seed funding, and practical experience to build the competencies of government and business associations in using public-private partnerships in support of ICT capacity building and industry promotion
- Transparency through the creation of an independent ICBF board, independent review of grants, and other safeguard mechanisms

The Four Programs of the Fund

The ICBF encompasses four broad programs (table 5.1):

- Strengthening management and professional skills
- Developing the workforce
- Promoting the industry and creating markets
- Attaining excellence (competitiveness) through innovation and technology capacity development

Program 1: Strengthening Management and Professional Skills

As shown in chapter 4, the lack of ICT professionals is a key constraint to the development of the ICT industry in Sri Lanka. To address that issue,

Table 5.1 Programs under the ICT Capacity-Building and Industry Promotion Fund

<i>Program</i>	<i>Primary goal</i>	<i>Key initiatives</i>
Strengthening management and professional skills	Strengthen management and professional skills with a focus on the following: <ul style="list-style-type: none"> • Team and project leadership • Strategic planning • Research and development capacity across the ICT industry and in selected ICT-user industries 	<ul style="list-style-type: none"> • Scholarships • Course grants • Mentor program • Global network program • Global expert directory • Industry visits and staff exchange program • National conferences and seminars program
Developing the workforce	Strengthen human capital across the ICT industry, enhancing the skills and competencies of those entering and those already employed in the ICT industry	<ul style="list-style-type: none"> • Technical assistance studies • Training incentives • Short course program—lifelong learning • Short course program—voucher scheme • Accreditation of training providers • Training of trainers
Promoting the industry and creating markets	Provide funding and technical assistance to support efforts to identify and take advantage of domestic and global business opportunities in the ICT field	<ul style="list-style-type: none"> • Initiatives to support market penetration for emerging sectors of the ICT industry • Initiatives to expand market share for more mature sectors • Initiatives to promote the use of domestic products and services
Attaining excellence	Identify areas of technology where Sri Lanka has the potential to be among the top three in the world and provide support to help realize this potential	<ul style="list-style-type: none"> • Strategic area grants • Research and innovation grants

Source: ICT Agency, Sri Lanka.

the program to strengthen skills is aimed at ensuring that opportunities and incentives are in place so that 50 percent of Sri Lankan ICT managers and senior professionals receive at least two weeks of training per year over the four-year program.

The program focuses on improving team and project leadership, strategic planning, and research and development capacity across the ICT industry and in selected ICT-user industries. It targets mid- and upper-level managers and research and technical specialists in the private sector, business leaders (to raise awareness), and ICT specialists in ICT-user industries.

Building specialized human resources takes time. Initiatives to improve the quality of training that ICT graduates receive and to increase the number of graduates produced annually will have an impact only three to five years later. Because of Sri Lanka's need to rapidly position itself to take advantage of the global demand for ICT services and the optimism about growth and investment in the country, the program will emphasize investments expected to yield benefits in the short to medium term.

Scholarships. Scholarships are to be awarded for part-time studies leading to a formal degree from an approved institution of higher education offering appropriate postgraduate programs to ICT professionals. Targeted recipients will be private sector ICT employees with management prospects, such as team leaders or project managers, and at least three years of relevant experience in the industry. The scheme will be kept small, with a possibility for extension if it proves particularly successful.

Funds may be provided as matching funds, to give companies an incentive to establish (or upgrade) e-learning facilities at the work site. This assistance will be limited and will require a matching contribution at least equal to the financial support provided.

Funds may also be provided as financial assistance to eligible employees for fees or related study costs. This assistance is structured to alleviate a concern among employers that the benefits from investment in upgrading an employee's qualifications might not flow to the employer, because the employee might leave after obtaining the qualifications. This concern is addressed in two ways: first, by providing an incentive that lowers the investment cost to the firm, and second, by strengthening the bond between employer and employee by requiring the employer, not the employee, to apply for the scholarship.

To ensure that use of the ICBF demonstrates demand and maximizes externalities, applications will need to show benefits for the industry as well as the individual. Competition is expected to be high, with the limited resources restricting the scholarships to a small number, to be awarded in strategic areas determined by the ICBF board.

Course Grants. Grants will be provided for approved intensive, short courses, domestic or foreign, that reflect priority needs defined by the industry (through proposals sought from firms, societies, or associations). Targeted beneficiaries will be private sector ICT employees with management prospects. Grants can cover course fees for candidates nominated by their employers and selected according to strict eligibility

criteria, or provide incentives for training providers to offer appropriate courses. In each case, a matching contribution will be required. A grant to training providers will cover the incremental costs of providing a new and approved course.

Mentor Program. The mentor program will purchase the time of experienced domestic or foreign ICT professionals to work with outstanding young professionals employed in the Sri Lankan ICT industry and develop their leadership potential. Participation in the mentor program will be promoted as one of the most prestigious industry awards. Strict eligibility criteria will limit participants to those considered to be the best and the brightest in their field, with the potential to make a substantial contribution to the domestic ICT industry.

The program will draw the experienced professionals from a talent bank established by the ICBF's managing agent and approved by its board. Many of these are expected to be expatriate Sri Lankans identified in the global network program (see the following section). In most cases, the mentoring will be provided online, to an individual or a small group. For groups, the mentoring will take place in a tutorial atmosphere and through an online chat room.

The program is also expected to have links with the staff exchange program and the national conferences and seminars program. Both of these could provide young professionals and their mentors an opportunity to work together face to face.

Global Network Program and Expert Directory. The global network program will establish a registry of Sri Lankan ICT talent abroad as a virtual talent bank. The aim is to repatriate skills and experience now lost to foreign markets—for example, by outsourcing planning or development tasks for which national capacity is lacking, or by requesting an expatriate Sri Lankan to participate in a focus group or mentor program. Financial support to develop and maintain this initiative includes funding for employing a coordinator, for establishing the initial registry, and for setting up a Web site. The funding, to cover incremental operating costs, will diminish to zero over the life of the program, which is expected to become self-sustaining through fees for access to the talent bank.

The expert directory initiative will identify internationally recognized ICT industry experts and recruit them to provide seminars and master classes for ICT professionals and business leaders in Sri Lanka. The goal is to provide a forum for discussing international ICT trends and cutting-edge

technology. The initiative is expected to complement the national conferences and seminars program and will link to the mentor program.

Industry Visits and Staff Exchange Program. Funding will support opportunities for small groups of business leaders, ideally 5–10, to visit selected countries to review ICT development and study corporate management practices relevant to issues in Sri Lanka. Although proposals will be evaluated case by case, visits typically would be expected to last two weeks and to include both group and individually tailored programs.

Proposals for activities will be solicited from business leaders. These proposals, brief concept statements characterizing the broad industry benefits expected, will be reviewed by an independent panel of reviewers, who will then make recommendations to the ICBF board. Proposals considered broadly relevant for the Sri Lankan ICT community will receive logistical support (with the ICBF managing agent making contacts and arranging a program) and, where necessary, financial support (up to the full travel and associated costs). To ensure broad dissemination of the information gained from the experience, participants will be required to lead discussions at a follow-up national seminar.

Applications also will be sought from industry and government departments for staff exchanges. These exchanges, to be of short duration, could involve placing a candidate from Sri Lankan industry in a comparable position overseas to gain first-hand experience or placing an overseas candidate in the Sri Lankan industry to impart specialized skills.

National Conferences and Seminars Program. This initiative will fund an annual industrywide national conference and smaller-scale national seminars on themes to be developed in consultation with industry groups, societies, and associations. The ICBF board will approve conference and seminar activities drawn from proposals submitted on a competitive basis by ICT industry groups, associations, and societies. The ICBF managing agent will promote synergy with activities under the mentor and global network programs and work in close cooperation with societies and associations.

Program 2: Developing the Workforce

This program aims to strengthen human capital across the ICT industry, enhancing the skills and competencies of those entering and those already employed in the industry. Initiatives will foster innovation and growth and will enhance the capacity of companies to compete on a

level playing field with foreign companies in Sri Lanka and abroad. Program initiatives will include technical training as well as efforts to promote particular skills, such as English proficiency and business communication. Particular emphasis will be given to skills and competencies in software engineering and IT-enabled services.

Training and workforce initiatives will aim to ensure that 50 percent of the Sri Lankan ICT workforce receives at least three weeks of training per year. A training-needs study will provide early guidance to the ICBF board in setting priorities for training. The study will cover strategies to create employment, to address skill shortages and gaps in the workforce, to provide incentives and build capacity for in-house training, and to ensure the quality and accreditation of ICT training providers.

Technical Assistance Studies. A technical assistance initiative will support studies under competitively awarded, fee-for-service contracts to establish a database of training needs. It will also propose appropriate training methods and structures based on international best practice that could be adapted to Sri Lanka. Terms of reference will be developed by the ICBF managing agent in collaboration with relevant staff of the ICT Agency.

Training Incentives. A range of incentives will be established to promote greater English language proficiency and training within the industry in both basic and advanced computing skills. The incentives will be provided to employers to expand and enhance in-house training facilities and allow staff to pursue training and skills upgrading, or to establish and maintain e-learning facilities at the workplace.

Short Course Program—Lifelong Learning. Throughout the project there will be an annual series of short training courses for employees in the ICT industry. Topics will be determined by industry representatives and will reflect their priority concerns for development. Funding will be provided through competitively awarded grants, offered as an incentive (subsidy) to promote lifelong learning opportunities for ICT industry employees.

Short Course Program—Voucher Scheme. An annual series of short training courses will also be provided for people interested in entering the ICT industry. The courses will be prevocational, focusing on basic ICT literacy and business communication skills. Topics will reflect the priority concerns of foreign firms, with the aim of inducing them to establish branches in Sri Lanka. Funding will be provided through a voucher

mechanism as an incentive to instill ICT and business communication proficiency as the hallmark of all Sri Lankans entering the workforce. Particular attention will be given to the IT-enabled services sector—and ultimately to developing a labor force capable of attracting foreign investment in business outsourcing.

Accreditation of Training Providers. There is a broadly recognized need to better regulate ICT training providers—specifically, to provide incentives to effective and well-resourced training providers and to gradually upgrade or close down those that do not provide relevant, high-quality training. This initiative will provide support to approved bodies (for example, societies or associations) to implement the accreditation of ICT training providers.²

Training of Trainers. Training within the industry is hampered by a lack of skilled and experienced trainers. This initiative will support the development of a national trainer education program to upgrade the skills of existing trainers and increase the number of trainers in the industry. The focus will be on developing special-purpose ICT training providers in the private sector and on building in-house training capacity within the industry.

Program 3: Promoting the Industry and Creating Markets

The program for promoting the industry and creating markets will provide funding and technical assistance to help identify and exploit business opportunities. Consistent with the strategy outlined in chapter 4, the program will focus on development of both export and domestic markets and specialized niche markets. Toward this end, the program will cover initiatives aimed at the following:

- Supporting market penetration for emerging sectors of the ICT industry
- Expanding market share for more mature sectors
- Promoting the use of domestic products and services

The program will also support bottom-up initiatives and specific studies proposed by the private sector and other stakeholders in carrying out the action plan outlined in chapter 4, along the lines of the following examples:

- Identifying global or local markets and trends for different products or services and recommending markets that the local industry could effectively exploit

- Identifying ways to brand Sri Lanka's software and IT-enabled services industry
- Recommending marketing channels and strategies for reaching potential markets
- Developing strategies to counter foreign domination of the local market
- Identifying infrastructure needed to implement the strategies identified (such as testing labs, offshore promotional offices, or R&D centers)
- Identifying innovative financing for ICT projects and infrastructure development
- Proposing methods to develop awareness among decision makers and create champions for ICT development

Program 4: Attaining Excellence

The program for attaining excellence is intended to identify areas of technological competency and specialization where Sri Lanka has the potential to be among the top three in the world and to provide support to help realize this potential. Rather than establishing physical *centers of excellence*, the program will focus on supporting priority industries in pursuing excellence and enhancing global competitiveness through the application of ICT. The program will target support to the apparel, tea, gems, and hospitality and tourism sectors, all major industry and service clusters in Sri Lanka. It will also target ICT industries, because they need to serve as leaders in using ICT to attain and maintain excellence.

The program will provide funding through two types of grants. First, it will award strategic area grants for identifying strategic areas in which Sri Lanka has a strong potential to be a world leader and for financing consortia of industry and academia to assist in the pursuit of excellence. Second, it will award research and innovation grants to Sri Lankan ICT companies and higher education and research institutes that enable them to conduct research and produce innovative products and processes. Grants in both categories are expected to spread over multiple years. Funds will be disbursed in slices, with the release of payments tied to the recipients' attaining performance goals specified in a contract.

Implementation of the Fund

The fund's structure separates policy-making and administrative functions. The managing agent takes care of day-to-day administrative functions, and the ICBF board, operating under the ICT Agency's board,

provides policy and strategic direction. The ICT Agency's finance and procurement unit is responsible for contract management and procurement, undertaking expenditures as authorized by the ICBF board. A senior staff member of the ICT Agency serves as managing agent coordinator, providing executive support to the ICBF board and facilitating communication between the managing agent and the board.

The process for awarding grants is designed to ensure transparency and professional management, critical for the ICBF to function effectively and to have an impact. The ICBF board is expected to make decisions on grants based on the recommendations of the managing agent, which in turn should be based on a review and evaluation of proposals by national and international review panels. Each proposal is expected to be reviewed by at least two national and two international reviewers.

Role of the Managing Agent

The managing agent is expected to be selected through international competitive bidding and on the basis of clear criteria relating to knowledge of the sector and competencies in financial management, knowledge management, and monitoring and evaluation. In administering the ICBF on behalf of the ICT Agency, the managing agent is expected to do the following:

- Establish and maintain a registry of national and international peer reviewers to enable the ICBF board to conduct timely evaluation of proposals
- Provide training for national peer reviewers and guidelines for international peer reviewers
- Raise awareness of the ICBF and ensure that the Web site for the ICBF is regularly updated to promote fair and open competition for funding
- Review progress reports by funding recipients and inform ICT Agency procurement staff when performance targets are attained, as triggers for payments
- Develop terms of reference for surveys, studies, and services to address emerging priorities

Role of the ICBF Board

The ICBF board consists of up to seven members, invited by the ICT Agency's board, from civil society and relevant government ministries. The ICBF board is expected to meet at least quarterly, though more often as needed, particularly when proposals are evaluated and grants

awarded. Board members and officers (chair and deputy chair) are appointed for a two-year term that may be extended. The managing agent serves as the board's executive officer. Board members and officers are expected to receive a stipend in line with standard government rates for membership on a committee or board with comparable responsibility.

As noted, the ICBF board is expected to make all decisions on the award of grants, based on the managing agent's recommendations. In addition, the board will provide an annual report to the ICT Agency's board on activities undertaken in the previous 12 months and those planned for the coming 12 months.

Monitoring, Evaluation, and Learning

The outcome indicators for the program were developed by the ICT industry, the ICT Agency, and the World Bank (table 5.2). These indicators are expected to be further validated and refined when the ICBF managing agent and independent monitoring and evaluation agents

Table 5.2 Objectives and Outcome Indicators for the ICT Capacity-Building and Industry Promotion Fund

<i>Objective</i>	<i>Outcome indicator</i>	<i>Use of outcome information</i>
Expanding the ICT skill base; creating employment; enhancing the competitiveness of the local ICT industry; and increasing the use of ICT by the private sector	50 percent of ICT professionals receiving an average of two weeks' training per year Number of businesses participating in and benefiting from ICT awareness building program	<ul style="list-style-type: none"> • Measure progress toward project objectives (quarterly) • Monitor deviation from the plan in project scope, schedule, and cost (quarterly) • Derive lessons learned (quarterly) • Control performance across all components during all phases of the project (annually) • Monitor risks (quarterly) • Ensure that work is correct and is accepted by stakeholders (annually) • Propose corrective action (annually) • Report project performance (quarterly) • Flag possible issues • Highlight the quality of in-service ICT training programs; provide direction on quality assurance in training; and highlight level of demand

are engaged. Additional indicators should be devised to capture broader measures of awareness, diffusion and scaling up of innovations in ICT capacity building programs, and impact on sector growth and employment generation.

Management of the Risks

Experience in other countries and early lessons of experience in Sri Lanka suggest that, like any innovative mechanism for allocating grants, the ICBF is likely to face significant risks during implementation that may reduce its development impact. The fund, its governance mechanism, and its operating procedures are designed to address these risks. Still, it is important to fully appreciate these risks and to further develop the monitoring and evaluation system and other management and governance tools to minimize and manage them as follows:

- *Understanding the political economy and balancing stakeholder interests.* The ICT industry is likely to secure more grants from, and more influence over, the fund than local users of ICT, particularly small and medium-size enterprises, because those users are less organized and their likely benefits more diffuse. Similarly, software exporters, large software houses, and ICT multinationals, with stronger voices and the resources to match, are likely to have greater influence than the smaller, resource-starved software houses catering to the domestic market and small and medium-size enterprises. And programs supporting large, well-established universities are likely to be favored over those for small, local universities, regardless of merit. So analyzing stakeholder interests and the political economy of different programs and policy reforms is important—to understand who benefits and who loses and how these programs and reforms can contribute to the ICT industry and the private sector more broadly. The management of the ICBF should balance these interests and engage local ICT users, particularly small and medium-size enterprises and their associations.
- *Guarding against corruption and capture of the ICBF.* Subsidized programs and grant funds in Sri Lanka have often been politicized, captured, and corrupted. To guard against this outcome for the ICBF, the process of awarding grants is designed to ensure transparency and professional management. The aim should be to avoid politicization and corruption of the fund while minimizing transaction and fund management costs. ICBF programs should establish clear eligibility

criteria and measures for success. They should also hold beneficiaries accountable. Active, broad-based private sector associations could further guard against use of the ICBF funds for corrupt and anticompetitive practices.

- *Maintaining demand-led programs.* Ensuring that granted-funded programs are demand driven involves several challenges. Private sector participants will be tempted to minimize their contribution to cost sharing. Government agencies may be tempted to push for programs favored by political parties, regardless of merit. Low awareness and low trust in program management or benefits may lead to low initial demand and low-quality proposals. To counter these tendencies, the ICBF management should actively market the program and mobilize demand. If demand proves to be high, smart subsidy schemes could be used to minimize the public subsidy. Cost-sharing schemes should help avoid supply-driven programs. Full public subsidy may be justifiable only for programs with substantial externalities, equity imperatives, catalytic and demonstration effects, or sectorwide impact.
- *Clarifying the roles and competencies of the ICBF board and managing agent.* For the ICBF to have the desired impact will depend critically on the effective functioning of its managing agent and board. That calls for a managing agent selected for competencies that go beyond financial management and processing of proposals to include knowledge management, partnership building, support to innovation, monitoring and evaluation, and dissemination of lessons learned. And it calls for the ICBF board to be independent of the ICT Agency, with the stature and integrity to command the respect and trust of the ICT industry and private sector. The board should also have the competencies needed to provide strategic guidance to and control over the managing agent, to draw public policy implications from program implementation, to mobilize further funding for the ICBF, and to encourage other agents to scale up and mainstream successful innovations.
- *Clarifying the roles of the public and private sectors.* An effective public-private partnership is critical to ensure that the ICBF is used for its intended goals and to the broad benefit of the private sector. Achieving such a partnership requires a clear and shared understanding of the roles of the public and private sectors in promoting the ICT industry and ICT education (see chapter 4). The risk of growing

dependency on the government for what are essentially self-help initiatives for a private sector–driven industry is always present. The risk of a passive, antibusiness, or control-oriented public sector posture toward this nascent, entrepreneurially driven industry is also real. Addressing the strategic challenges of this industry demands transparent, accountable collaboration between the public and private sectors through the ICBF mechanism. It also requires effective partners on both sides: the government to strengthen private sector associations representing IT suppliers and users, and the private sector to educate the government about the priorities in building a globally competitive industry.

- *Balancing short- and long-term goals.* A critical challenge has been to establish a balance between short-term solutions for issues of immediate importance (such as skill gaps that need to be addressed in the coming 12–18 months of the e–Sri Lanka program) and structural changes that may take 5–10 years to have an impact (such as accreditation and enhancement of ICT education at the secondary and tertiary levels). At this stage, when surviving beyond the current political cycle is paramount, early wins and visible results on urgent issues will inevitably take priority. Yet adequate resources need to be allocated to the long-term development of key sources of sustainable competitive advantage in the ICT industry. This balancing requires managing expectations and strategically allocating resources.
- *Promoting innovation, learning, and knowledge sharing.* For maximum impact, the ICBF is designed to emphasize innovation, promote shared learning, accelerate the scaling up of successful pilots, and leverage the modest public and donor resources likely to be available to it. This design requires a strong knowledge management system and the use of the ICBF to create communities of practice, strong industry associations, and university–industry partnerships. But there is a risk that the action-oriented culture of the ICT Agency and the pressures for immediate results may distract the ICBF management from developing this practice of managing and sharing knowledge. Another risk may arise from pressures to scale up a few programs that may preempt the use of ICBF resources for truly innovative pilots and initiatives—leaving the scaling up and mainstreaming of innovations to established institutions or other sources of funding, including the private sector.

- *Scaling up.* The ICBF is inevitably a small innovation fund. It is designed to identify and leverage externalities, provide demonstration effects, and promote best practices—not to provide full-scale funding for industrywide or economywide efforts. Yet this poses a risk that the ICBF management may view grants and innovations as ends in themselves. So it is important for the ICT Agency and ICBF board to seek synergies with other programs in support of competitiveness, technical education, private sector development, and other complementary schemes. By promoting strategic partnerships and dialogue, they can support the scaling up of initiatives with ministries for such sectors as higher education, science and technology, and industry and small enterprises.

Notes

1. This is the appropriate level of detail in designing innovation or small grant-making funds.
2. The initiative will be conducted in cooperation with similar programs under the World Bank-financed project Improving Relevance and Quality of Undergraduate Education.

PART 3

Extending an Affordable Information Infrastructure to All

CHAPTER 6

Extending Access to Services: Policy and Regulatory Reforms and Smart Subsidies

Despite rapid growth in telecommunications and information services in the past decade, the developing world falls short of universal access by most measures. Mobile service has helped narrow the gap in voice communication, including in many rural communities. But the technology and economics of today's mobile platforms are less than ideal for access to the ICT-based services needed to realize the vision of an inclusive, people-centered information society. Meanwhile, the number of fixed lines per capita is growing at a slowing pace throughout the world and, in some countries, has even begun to decline as operators shift resources toward the mobile sector and corporate services.

Investment in nationwide infrastructure, particularly in backbone facilities, also is slowing.¹ This is distancing the dream of ICT access in rural areas and may even start slowing growth in mobile service outside urban centers. Even if adequate backbone exists, a similar outcome occurs where open access rules are missing or poorly enforced.

Extending connectivity and access to telecommunications involves complex challenges. Among these is the challenge of creating a competitive, well-functioning market in telecommunications services. The e-Sri Lanka solution has several parts: policy and regulatory reforms to create such a market and thereby remove barriers to the supply of ICT infrastructure services in rural areas; demand-side measures, such as setting up telecenters and distributing vouchers to ensure their adequate use (see chapters 7 and 8); and least-cost subsidies, awarded through competitive auctions, to build regional broadband networks in the deep South, the North, and the East.

Sustaining reforms is critical to avoid falling behind competitors and to make it possible to move on to the next stage—laying the groundwork for the knowledge economy. Merely designing market-based mechanisms can take the process only so far. Political commitment, effective institutions, and market dynamics ultimately determine the chances of success in implementing reforms and subsidy schemes designed to expand access to telecommunications.

In Sri Lanka, delays stemming from political changes and regulatory difficulties will probably lead to the use of a different solution than that originally included in the e-Sri Lanka initiative—or perhaps an interim one. But the analysis underlying the original solution should still be relevant for expanding service delivery in Sri Lanka and in other countries. Moreover, the difficulties encountered in pursuing this solution suggest the challenges that should be anticipated in other developing countries.

Gaps in Rural Services—and Ways to Close Them

In most developing countries government-owned, vertically integrated monopoly operators have failed to provide services in rural areas. This almost universal outcome stems from the normal incentive of monopolies—to provide fewer services and charge higher prices—exacerbated by the perverse effects of government ownership. So the low connectivity and access result mainly from market inefficiencies and policy and regulatory barriers to entry by private operators. Another factor is the affordability of extending access to remote areas with dispersed populations.

Two Kinds of Gaps

Achieving universal access to telecommunications generally requires addressing two kinds of gaps: the market efficiency gap and the access gap.

The *market efficiency gap* is the difference between the level of service penetration operators can achieve under current market conditions and the level they could be expected to achieve under optimal conditions. Countries can narrow this gap without public financial aid by undertaking market-oriented policy reforms—liberalizing markets and ensuring that regulation is fair and predictable, that the private sector plays a lead role in investing in the network and providing services, and that entrepreneurs are free to profit from providing public services.

Many countries have made impressive progress in closing the gap through market liberalization, fair regulation, and privatization. But in implementing such reforms, there will always be questions. For example, what are the market's limits? And how can optimal regulatory and investment conditions be established in an environment that is less than ideal? Questions such as these need to be addressed case by case (Navas-Sabater, Dymond, and Juntunen 2002).

The *access gap* exists because the market has limits that result in an affordability frontier. Beyond this frontier, there may be areas or groups that cannot be reached commercially, even in the most efficient of markets, without some form of intervention. Yet even in these cases, competitive market forces can be brought to bear through minimal, well-targeted subsidies (smart subsidies), which can be leveraged to achieve good social returns and, often, commercial viability in the long run.

Indeed, minimum subsidy auctions are among the most promising approaches being used by developing countries to support universal access programs. In this approach, potential operators bid on the basis of the lowest subsidy required to provide specified services. The government pays out the subsidy to the winning bidder according to a payment schedule closely linked to achievement of service targets set out in the contract.²

Lessons of Experience

International experience confirms the importance of competition. Where telecommunications markets have been liberalized, services are rolled out more rapidly and efficiently and prices for service provision are closer to actual costs. That improves affordability and thus access to services. In Latin America, for example, service coverage in the liberalized markets grew around three times as fast as in countries with a state monopoly and twice as fast as in those with private monopolies.

A liberalized telecommunications market is also vital for making access to the Internet more affordable, because telecommunications accounts for a large part of the costs of such access. In Africa, the cost of Internet access in countries with a highly liberalized market is only one-eighth of that in countries with a closed market.

The benefits of competition are evident in the subsidy cost of providing universal access. Experience in a sample of countries shows that, on a per capita basis, providing universal access can be twice as costly on average in countries that have not introduced sector reforms as in countries where a competitive environment has taken root (table 6.1).

Traditional residential service is not the only way to provide access to the Internet and other ICTs. Providing public access through enhanced phone shops, cybercafés, or telecenters is receiving growing attention from both policy makers and entrepreneurs as concerns about the widening digital divide spread and as businesses opportunities in this area become clearer. Cybercafés, pay phones, and telecenters provide higher revenues than residential lines and, when strategically located, can achieve commercial viability over time.

Although rural markets traditionally were believed to be unattractive, a growing number of operators aware of the new opportunities and incentives

Table 6.1 Design and Outcomes of Universal Access Programs in Selected Countries

<i>Characteristic</i>	<i>Chile</i>	<i>Colombia</i>	<i>Dominican Republic</i>	<i>Nepal</i>	<i>Peru</i>
Design feature					
Target	Meet requests	Towns of 250+	Towns of 300+	Eastern Development Region	Towns of 300+
Funding source	Taxation	USL + licenses	2 percent USL	IDA credit	1 percent USL + fines
Outcome indicator					
Bidders	n.a.	2–7	2	2	2–5
Subsidy per town or village cluster (US\$)	3,600	4,600	6,800	11,885	10,000
Towns or village clusters served	6,059	7,415	500	1,068	6,000
Population served (millions)	2.2	3.7	1.0	4.0	6.0
Subsidy per person (US\$)	10	9	3	3	10

Source: Information and Communication Technology Department, World Bank.

Note: USL is universal service levy, IDA is the International Development Association.

n.a. = not applicable.

now consider them worth the risk. Moreover, once the initial network infrastructure is in place, expanding the network in response to increased demand becomes less expensive. With few exceptions, new rural telecommunications operators have financed infrastructure through a combination of partner equity, private placement, and subsidies from rural access funds.

All these lessons of experience were brought to bear in designing the regional telecommunications networks in Sri Lanka to ensure affordability and sustainability.

Reforms to Bridge the Market Efficiency Gap

Sri Lanka began reforming telecommunications early. But the efforts have faltered, impeding progress in expanding access to services in rural areas.

Liberalization to Encourage New Entry

Sri Lanka started on telecommunications reforms as early as 1991, creating a regulator and beginning to license new entrants. By 1994, it had four nationwide mobile competitors, and by 1997, three nationwide fixed-line competitors. In addition, the government partially privatized the incumbent telecommunications company, Sri Lanka Telecom, in 1997 and now holds less than 50 percent of its shares.

By most measures, the reforms, which followed the classic rule book on liberalization, yielded excellent results. Teledensity has grown rapidly, with fixed-line connections increasing from less than 1 per 10,000 people in 1991 to more than 5 in 2005, and mobile connections from less than 0.1 per 10,000 people to 15. That growth moved the country up in the South Asian teledensity rankings from fourth place to second.

But the growth has been skewed. Western Province, home to the country's capital but to less than one-third of the population, had 64 percent of the fixed-line connections in 2004. Five provinces, home to around one-third of the population, had to make do with 14 percent. And the fiber backbone network is limited to four of the nine provinces.

Like many countries, Sri Lanka removed barriers to entry by licensing new operators. And again like many countries, it did not require the new entrants to buy backbone capacity from the incumbent. Nor did it make a concerted effort to give them open access to the backbone on cost-based terms. One creative solution tried was to license a specialized

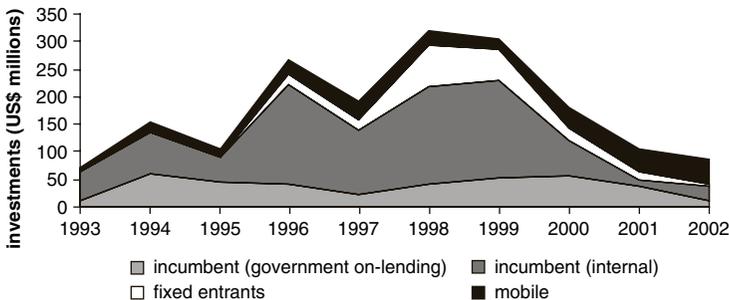
infrastructure provider that could sell only to other operators. But this solution was undermined by the inability to obtain rights-of-way from the railways on reasonable terms. The new entrants were compelled to build their own capacity in rural areas, increasing the costs of providing rural services, especially for the mobile operators.

Interconnection was problematic from the start. The incumbent provider resisted fair interconnection terms by all means, including court appeals and technical disruptions. It also engaged in apparent anticompetitive behavior against ISPs. It denied them equal access to asymmetric digital subscriber line (ADSL) services, and it provided short-code-based access nationwide only to its own ISP, making it difficult for new operators to provide competitive services outside the capital.

Given this environment, the new entrants were poorly positioned to take up the capital-intensive tasks of building the backbone and providing services in underserved areas distant from the capital. The incumbent, however, made significant investments in the period up to 1999, when growth in connectivity was highest, taking advantage of its access to capital through the government and the monopoly rents from its nominal exclusivity over international telecommunications services. But as these advantages dissipated, its investments fell sharply, and in 2001, they were overtaken by investments by new entrants (figure 6.1).

Policy and regulatory shortcomings were big factors in creating the poor investment environment for entrants and thus in limiting rural connectivity and access. The regulatory shortcomings, which included poor enforcement of pro-competitive access and interconnection regimes, contributed to the higher costs of supplying services in rural

Figure 6.1 Trends in Telecommunications Investment in Sri Lanka, 1993–2002



Source: Samarajiva and Dokeniya with others 2005, 143.

areas. In addition, many operators were convinced that people in rural areas lacked adequate purchasing power and therefore perceived them as unattractive customers.

These reasons for the undersupply of rural telecommunications services are not unique to Sri Lanka. Analysis in many developing countries is likely to point to similar reasons. The interrelated problems in the policy and regulatory framework call for a multipronged solution to create an optimal environment for expanding rural access to telecommunications as follows:

- Transparent market entry policies
- Fair, prompt, and responsive access to scarce resources, primarily frequencies, numbers, and rights-of-way
- Effective, cost-based, and nondiscriminatory interconnection and access to backbone capacity
- Effective enforcement of regulatory and competition rules

Renewed Efforts in Reform—and Continuing Obstacles

A reform-oriented government initiated actions in 2002–03 that focused on the incumbent's monopoly over international telecommunications services, a big source of friction in the sector. Besides implementing the market-entry principle of “licenses where scarce resources are involved; authorizations otherwise,” the government developed comprehensive interconnection rules in consultation with operators. In March 2003, it ended the monopoly and immediately promulgated the new interconnection rules. Prices for outgoing calls dropped by around 70 percent, and formal barriers to reducing the cost of international leased lines were eliminated.

But the full benefits of the liberalization were blocked by the inflexibility of the incumbent. By January 2004, the incumbent had failed to officially give interconnection to even one of the more than 20 unaffiliated external gateway operators licensed in March 2003, despite repeated promises and assurances that it would do so.³ Yet the Telecommunications Regulatory Commission (TRC) failed to take appropriate action against the incumbent. The issue led to delays in other policy actions and has generally undermined the regulatory climate and the credibility of the reforms.

On other fronts, there was more reason for optimism. Considerable progress was made in opening up the South East Asia–Middle East–Western Europe undersea cable to competitors. The TRC implemented

a new 10-digit numbering plan in November 2003.⁴ It successfully conducted the first auction of frequency slots. It made the licensing process simple and transparent.⁵ And a comprehensive assessment in 2003 of the regime for managing frequencies helped lay the foundation for reassigning those not optimally assigned and introducing a transparent process for assigning new ones based on such mechanisms as auctions.

The competitive environment in the sector poses a serious threat, however. Apparent anticompetitive practices against ISPs and pay phone operators have existed for some time. And with the incumbent's acquisition of all the shares in the third largest mobile operator in 2002,⁶ concerns have been raised about the possibility of cross-subsidization and other anticompetitive practices against mobile operators. Facing capacity constraints, the TRC obtained international consulting assistance to combat anticompetitive practices. But changes in government and resultant changes in the TRC's leadership have stalled this process.

The experience of the past decade shows the extreme importance of regulatory competence and independence. From 1991 to 1997, the regulator (then the Office of the Director General of Telecommunications) functioned as a government department, with government salaries and performance to match. It had limited independence, serving more or less as an expert bureau of the Ministry of Telecommunications (Samarajiva 1997). Amendments implemented in 1997–98 gave the regulator, now a collegial five-member commission, more independence and greater resources. But the government still controlled salaries. Despite extensive professional training and efforts to build a new organizational culture, the TRC lacks the capacity to regulate a dynamic, competitive industry.

Implementing the telecommunications reforms necessary to foster a modern ICT industry and an inclusive information society will require a new organization, with new expectations. The organization will need to recruit and train a small, motivated, and skilled workforce that focuses on a few key, manageable regulatory tasks while delegating the rest to the market. A new act was drafted in 2003 to cover such urgent reforms in the regulation and regulatory institutions of the telecommunications sector. But the reforms have not been enacted since the change in government in 2004.

Smart Subsidies to Bridge the Access Gap

Even if the regulatory reforms succeeded, the problem of building the backbone and providing access to rural areas would remain. In Sri Lanka, as in many developing countries, the existing network was poorly designed and dimensioned. In the investment spurt following the major reforms of 1996–97 (including the partial privatization of the incumbent and the opening of the sector to new entrants), the incumbent built two fiber rings, one covering metropolitan Colombo and an outer ring covering the areas it considered commercially attractive (only a small part of the country and population). Other areas (those in the North affected by war) are served by microwave and satellite.

In the postbubble investment environment after 2001, it was recognized that raising capital to extend the backbone would be difficult. To maintain continuity with a market-based approach that had yielded relatively good results, the e-Sri Lanka solution proposed awarding licenses and accompanying subsidies for the regional telecommunications networks through least-cost-subsidy auctions. In the first instance, the licenses would cover a quadrant containing around 2 million people in the deep South, including some of the country's least developed areas, and a triangle containing around 1.5 million people in the Northeast, including some of the areas devastated by the civil war.

Bidders, prequalified as operationally and technically competent, would be required to supply broadband connectivity to a defined set of telecenter locations. The bidder asking for the lowest subsidy, either because it has the most efficient technology and business plan or because it is investing more of its own capital, would be the winner. After being awarded a contract, an operator would build the infrastructure and operate it for a specified period, receiving subsidy payments only after achieving construction milestones. The licenses would allow operators to offer a range of services under light regulation. The solution mobilizes the efficiency drivers of market supply; allows all current operators and newcomers to participate through transparent, competitive bidding; and creates conditions for continued maintenance and upgrading of the networks.⁷

The e-Sri Lanka initiative was expected to build on international best practice and on the telecommunications reforms under way. Consistent with international best practice, the development and funding of networks would be kept separate from the development and funding of

applications and local delivery arrangements. That separation recognized that regional or national operators would be best able to develop the networks, while local entrepreneurs would probably be best placed to deliver e-government services to their communities. And the reforms under way would enable the development of the infrastructure needed to underpin the e-Sri Lanka initiative. For example, greater competition in providing leased circuits would reduce the cost of Internet access.

In earlier initiatives in developing countries, the practice had been first to extend access to voice communication and later to increase data speeds to improve use of the Internet and other advanced e-services. But the e-services to be delivered through the e-Sri Lanka program call for broadband networks from the outset. Access to broadband networks would help meet pent-up demand for these e-services, for which the population would be willing to pay, thus improving the business case for extending those services to them. Voice and other narrow-bandwidth services could be added at low marginal cost.

But would subsidizing investment costs be enough to make broadband networks commercially sustainable? How much subsidy might be needed?⁸ And given financial constraints, how quickly could the broadband network be rolled out? These questions were answered through cost-and-demand analyses and eventually can be further addressed through the market process (least-cost-subsidy auctions) devised to allocate subsidies. Given the novelty of the approach, the cost issues, the impact on the government's broader strategy to use ICT for development, and subsequent start-up investment financing in the e-Sri Lanka initiative, the World Bank closely coordinated this upstream work.⁹

Tools for Reinforcing Demand

One reason for the perceived lack of commercial viability in rural areas is that few operators factor in termination revenues—the revenues paid by other operators for incoming calls terminated (received) on the local network. Good interconnection terms—especially asymmetric interconnection reflecting the higher costs of terminating calls in the less dense networks in rural areas—can go a long way toward correcting this situation. In most cases, the lower prices made possible by the least-cost subsidies (and the resulting reduction in capital costs and competition), along with termination revenues, would change the business case for investing in rural telecommunications.

Where these policy and regulatory actions prove inadequate, such as in the postconflict and high-poverty areas to be served by the regional telecommunications networks, there may be a need to supplement demand. In the e-Sri Lanka program, telecenters aggregate demand, supplemented by vouchers that will be given to target groups such as those ages 13–22.

A Changing Environment

The e-Sri Lanka solution to the infrastructure problem is novel and comprehensive and uses subsidies only to augment market forces. But the subsidies can go to waste if the essential preconditions of regulatory reform are not met. For example, if regulation fails to ensure nondiscriminatory, cost-based access to the incumbent's fiber ring, and if the incumbent is allowed to bid in the least-cost-subsidy auctions, the subsidies will simply go to the incumbent and further distort the market.

In the course of designing the e-Sri Lanka program, two options were considered: a backbone-only solution and the regional network solution, which includes both access networks and backbone. The regional network solution was chosen because the cost-and-demand analysis indicated that the backbone-only solution would require a larger subsidy. Although the regional network solution was understood to be more complex, the government's declared commitment to substantial reforms created confidence in its ability to manage the complexity.

But the political uncertainty emerging since 2004 has hindered efforts to obtain bipartisan support for continuing with reforms. Within eight months of the reforms to end the incumbent's exclusivity over international telephony services, the ministry responsible for the issue was taken over by the then president.¹⁰ Skeptical about the continuation of the reforms, the operators went to court to halt the regional network process. Although the ICT Agency has prevailed in the District Court, appeals pending as of February 2006 have led to further delays in conducting the least-cost-subsidy auctions.

Market conditions have also changed. New cellular frequencies (code-division multiple access, or CDMA, frequencies) have been issued to the three fixed operators and possibly a fourth new licensee, with no allotment of frequencies for the planned regional networks. More than 250,000 CDMA connections had been issued by February 2006, possibly mopping up part of the unmet demand. Faced with the continuing legal uncertainty and changing market conditions, the ICT Agency was

reviewing all options, including issuing data-only licenses and developing Internet backbone-only consortia.

As developing countries seek to realize the vision of an inclusive, people-centered information society, they will have to come to grips with the infrastructure problem barring many of their citizens from participating. Competition can get them only so far in addressing the problem. Critical to any solution are effective institutions and regulations. In some cases, capital subsidies may be needed. In even fewer cases, demand-side subsidies to reinforce demand may be required. But in all cases, political commitment to address the market efficiency gap must go hand-in-hand with market-based mechanisms to overcome the access gap and the digital divide.

Notes

1. A backbone is a larger transmission line that carries voice and data gathered from smaller lines that interconnect with it.
2. This is a variation on the standard licensing process in which a private operator undertakes to build infrastructure facilities and operate them for a specified period.
3. According to the Telecommunications Regulatory Commission, a few operators have obtained interconnection since January 2004, though the agreements are said to contain anticompetitive provisions that need to be revised.
4. Sri Lanka, Telecommunications Regulatory Commission, "Consultation Documents." http://www.trc.gov.lk/trc12_consultation_document.htm.
5. Sri Lanka, Telecommunications Regulatory Commission, "External Gateway Operator Licences." <http://www.trc.gov.lk/ego.htm>.
6. Sri Lanka Telecom, "Our Profile." <http://www.slt.lk/data/aboutslt/profile.htm>.
7. For a more detailed description of subsidy schemes and success factors, see Wellenius (2006).
8. The subsidy requirements were estimated at about US\$6 million to US\$7 million annually for three to five years, equivalent to 1.5 to 2.0 percent of total telecommunications revenues in Sri Lanka in 2003. This level is higher than that in other developing countries pursuing similar efforts, where the range is typically 0.3 to 1.0 percent. But these efforts have sought to provide voice and low-speed data access, not broadband. In general, determining the appropriate level of public support for nascent markets requires examining costs and benefits for the economy as a whole.
9. The Canadian International Development Agency financed technical assistance for the demand study, the design of the rural network access program, and the launch of the competitive bidding process.

10. Within 13 months, the government responsible for the major telecommunications reforms of 2003 and the design of e-Sri Lanka was defeated in the general elections. The chairman of the TRC changed three times in less than two years, and the director general of telecommunications was also replaced. A presidential election was held in November 2005, resulting in further changes to the leadership of the TRC.

CHAPTER 7

Designing the Telecenter Program for Poverty Reduction

The telecenter program is perhaps the most visible part of the e-Sri Lanka initiative. It provides the main interface between e-Sri Lanka and ordinary citizens, particularly in rural areas. By establishing telecenters, the program aims to bring information and communication services to rural areas of the South, North, and East where connectivity is being provided in parallel through the regional telecommunications networks. And through this delivery channel for content, it aims to bring critical public services to citizens in rural areas, where 80 percent of the country's people and nearly 90 percent of its poor live (see annex 7.1).

The basic design of the telecenter program emerged from a process of thinking through the issues and options that first confronted program designers. The design was also shaped by principles based on international experience with similar efforts aimed at using ICT in ways that help reduce poverty and promote economic growth. This design process emphasizes building partnerships and integrating the telecenter program into poverty reduction strategies in the country.

The program is seen as a strategic opportunity to create partnerships of mutual benefit between the telecenters, government agencies, and

grassroots organizations. These partnerships are key in developing the telecenter network and in using it effectively to deliver information and services across different locations and under different social and economic conditions. Government agencies can rely on the network as a shared infrastructure for delivering information, knowledge, and services to citizens. Similarly, community organizations and trade and professional associations can partner with the telecenter program and its support institutions to develop and deliver content and services for their members and beneficiaries.

The broad role envisioned for telecenters reflects the intent that the program support poverty reduction strategies—not just serve as a means to close the digital divide. The digital divide does not merely reflect differences in access to technology. It is a symptom of much more profound and longstanding economic and social divides. The digital divide therefore needs to be understood and addressed in the context of these broader divides. Unless part of a broader strategy to combat poverty, efforts to bridge the digital divide and increase access to ICTs risk diverting attention and resources from efforts to address the underlying causes of poverty.

In Sri Lanka, where economic growth in the 1990s failed to lead to the expected decline in poverty, most of the poor have not yet entered the mainstream of economic development. Telecenters are seen as the first step in extending the benefits of ICTs to marginalized groups and ultimately increasing economic growth, improving the quality of life, and reducing poverty.

Basic Design of the Telecenter Program

The telecenter program aims to develop centers that are multipurpose, offering such basic services as telephone, computer use, Internet connectivity, fax, and photocopying, as well as delivering a variety of social services, including e-government, community information, and health information. The telecenters will provide such services as vocational training, ICT training for youth, and distance learning for teachers and health care workers. They will also help create jobs and income through such activities as deploying e-commerce, delivering agricultural price information, making microfinance schemes more widely available, and providing information about job opportunities and matching them with applicants.

The telecenter program is designed for scalability and replicability across the country within a relatively short period. The first phase is intended to put into place the following:

- A network of 200 telecenters providing low-cost access to ICT in small rural communities—100 in the deep South and another 100 in the provinces of the North and East
- A network of eight distance learning centers, each furnished with a video interactive room, a computer laboratory, and a small playback room
- A program to train Sri Lankans in basic computer skills

Operating the Program

The ICT Agency retains overall responsibility for planning, program management, compliance with agreed policies, and quality assurance (table 7.1). Five other types of stakeholders or institutions are involved: telecenter operators, telecenter support institutions, a managing agent contracted by the ICT Agency to run a voucher scheme, suppliers of equipment and connectivity, and an independent monitoring and evaluation unit. The largest and most diverse is a group of 200 telecenter operators being recruited through a competitive selection process. Content and e-government service developers are also critical players and strategic partners. All these institutions have key roles to play to ensure the sustainability of the program (figure 7.1).

Selecting Locations

The telecenter program focuses primarily on rural communities with a population of no more than 5,000. Locations for telecenters are selected on the basis of criteria developed with stakeholders to provide the minimum conditions needed for sustainability: a population of at least 2,000, a secondary school with at least 300 students, a reliable supply of electricity through the grid, and proximity to a fixed market with at least 15 wholesale vendors.

Promoting Sustainability by Subsidizing Costs and Mobilizing Demand

To help telecenters establish and sustain their operations over an initial period, the program will fund their ICT equipment and software requirements and pay for connectivity through a declining subsidy over

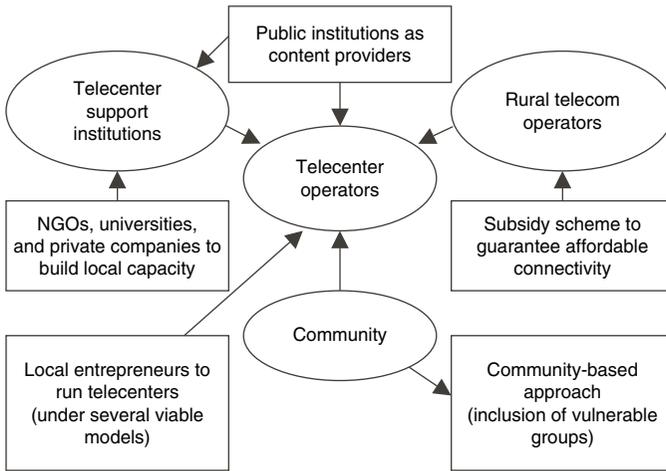
Table 7.1 Key Institutions for Implementing the Telecenter Program

<i>Institutions</i>	<i>Roles and responsibilities</i>
ICT Agency	<ul style="list-style-type: none"> • Provide overall program planning and management • Disburse capital and connectivity subsidies • Ensure compliance with policies and guidelines • Provide project oversight and quality assurance • Train support institution facilitators
Telecenter operators	<ul style="list-style-type: none"> • Manage setup and operation of telecenters • Provide specified ICT services through the telecenters
Telecenter support institutions	<ul style="list-style-type: none"> • Provide training and capacity building for telecenter operators • Provide support in setting up telecenters • Provide managerial and technical support to telecenter operators • Where possible, provide content for the telecenters • On behalf of the ICT Agency, ensure that telecenters fulfill their five-year service obligations in every targeted community
Managing agent for voucher scheme	<ul style="list-style-type: none"> • Implement the voucher scheme • Manage and administer the voucher scheme
Monitoring and evaluation unit	<ul style="list-style-type: none"> • Monitor and evaluate the performance of telecenters through monthly reports and periodic evaluations of outcomes throughout the program • Evaluate impact of initiative later in the project • Report to the ICT Agency quarterly on the performance of the telecenters and support institutions
Regional telecommunications network operators	<ul style="list-style-type: none"> • Construct regional telecommunications networks in the designated areas • Provide mandatory service to the telecenters for a preagreed number of years

Source: Author.

the first four years of operation. The ICT Agency will ensure connectivity by entering into a mandatory service agreement with the regional telecommunications network provider.

To further enhance the prospects of sustainability, the program will provide parallel subsidies to targeted beneficiary groups through vouchers for telecenter services, encouraging use of telecenters and ensuring inclusion of the poorest groups. The vouchers will be nontransferable, have a variable value based on the market price per unit of service (but with an upper limit), and be redeemable by telecenter operators only after providing the service. In addition, the e-society fund will finance

Figure 7.1 Key Institutional Roles and Links in the Telecenter Program

Source: Author.

grassroots initiatives for local content and community investments that make effective use of ICTs.

In another initiative to rapidly expand the use and clientele of telecenters while also enhancing secondary education in rural communities, the telecenter program will provide teacher training and allow local school authorities to use the telecenter facilities. Combined with the voucher program, this initiative will help ensure productive use of the telecenter facilities, especially during the normally low-use morning hours.

Supporting Telecenter Operators

Telecenters can be operated by a local entrepreneur, an NGO, or the manager of a local public service agency, such as a school, library, or community center. Although rural Sri Lankans have experience in managing businesses, the telecenter operators are likely to need managerial, technical, and logistical support to improve their business capabilities and increase their chances of successfully sustaining a telecenter.

To provide this support, eight telecenter support institutions have been selected through a competitive process to supply services through a franchise arrangement with the telecenter program. This selection has been based on criteria relating to management and organizational capacity, business skills, technical experience, logistical capability, and relevant community development experience.

The support institutions will provide two types of functions critical to the success of the telecenter program as follows:

- Full-service providers will offer comprehensive support to telecenter operators on managerial, technical, and logistical issues.
- Specific-service providers will focus on particular services such as connectivity, maintenance, software, training, or employment creation through job training and microfinance.

The support institutions will meet telecenters' ongoing needs for training through facilitators, themselves to receive training from the program. Once trained, the facilitators will become trainers for ICT champions in telecenter communities, as well as for telecenter operators and staff.

Telecenter support institutions are also expected to develop and provide other services identified by demand surveys as required by the majority of telecenters. And they will contribute to the sustainability of telecenters in several other ways. Together with the ICT Agency, they will engage communities in the area where a telecenter will be established to build awareness of the telecenter's operations and services and the benefits of ICT. Once the telecenters are in operation, the support institutions will play a major role in facilitating the development of content by operators, grassroots organizations, and individuals.

Telecenter operators will be able to choose the support institution with which they wish to be associated, either one of the eight preselected organizations or another organization that meets the same criteria. These may be drawn from a range of organizations—NGOs, schools, libraries, universities, producers' organizations, farmers' associations, civic organizations, private businesses, telecommunications service providers, and self-employed women's associations. The association can take the form of a partnership between the telecenter operator and support institution or a service fee-based agreement.

Monitoring and Evaluating Performance

An independent unit monitors progress in implementing the telecenter program and will periodically evaluate the operation of telecenters and the activities of the support institutions and the voucher scheme's managing agent. This unit will outsource certification of telecenters' compliance with their five-year service contracts.

Analysis of the Issues and Options

This basic program design emerged from a process of thinking through issues and options. As grassroots initiatives, telecenters depend critically on the local environment and the communities they serve for their success, and there can be no one-size-fits-all blueprint. Thus, the program designers confronted a range of questions: Should the program be included in e-Sri Lanka on a pilot basis only or as its centerpiece? Should the program be primarily government driven, purely private, or NGO led? How should its diverse and complementary activities be sequenced? And what should be done to ensure that the emerging telecenter network could deliver relevant content? Given the limited experience of the country and the World Bank with telecenter programs of any comparable scale, the answers were by no means obvious.

Deciding on Initial Scale and Scalability

In the initial stages of conceptualizing the e-Sri Lanka program, the preparation team intensely debated the scale and scope of the telecenter program. Some from the World Bank argued that the program was too risky to scale up. The Bank had never been involved in financing a national program for telecenters, and donor-supported initiatives, limited to pilots, had produced mixed results. Given these facts, they feared that a risk-averse institution like the Bank would never approve financing of a large-scale program of telecenters. Some Sri Lankan counterparts took the opposite view: telecenters would be quick to deploy, highly visible, and a clear signal that the e-Sri Lanka program would be tied to reducing poverty and bridging the digital divide. They conveyed a sense of urgency.

Two factors tipped the balance in favor of a bold, large-scale telecenter program. First, much of the development payoff from e-government services would depend on telecenters to provide adequate connectivity and delivery channels for rural areas. The e-society applications also would probably rely on telecenters as delivery channels. Second, on a recent visit to India, some senior policy makers and e-Sri Lanka team members had seen several exciting programs that had been scaled up through a franchise model.

The challenge for the design team was to make a strong case to the Bank's management for accepting a high-risk, high-payoff program—one that would adapt best practices to secure scalability, sustainability, and development impact all at the same time. To bolster that case, the team

decided that a public sector support strategy should be used to accelerate the development of telecenters into a network or national movement.

The team also decided that umbrella support institutions or franchisers might be needed to exploit economies of scale, carry out R&D for new services and content, provide training materials and technical and managerial support, and reduce the learning costs for individual telecenters by sharing experience. But this option posed some uncertainties: Did Sri Lanka have support institutions with the capabilities needed? And could telecenters be empowered as small enterprises and grassroots organizations without creating dependencies or stifling local adaptation and innovation?

Choosing among Competing Models for Impact and Sustainability

Another fundamental choice related to who should own and run the multipurpose telecenters—the government, the private sector, or civil society? Installing a telecenter is easy; the hard part is to keep it running. Who would be best placed to do that?

Some local stakeholders favored a public sector model: the post office administration and local governments viewed telecenter functions as mere extensions or transformations of their own tasks. Some advocated a purely private sector model (as long as connectivity was secured), perceiving government initiatives as highly politicized and unsustainable.¹ The World Bank (2006) advocates telecenters conceived as private businesses—though with development functions—that are commercially sustainable beyond initial public support. Private-led telecenters, the Bank and potential private sector providers also argued, are likely to be more demand driven and to foster entrepreneurial and managerial skills.² Meanwhile, some large Sri Lankan NGOs that had been pioneers in developing community information centers argued that only they had the understanding and commitment to reach the very poor and ensure the social sustainability of rural telecenters.

The preparation team searched for local experience to guide these debates and choices. But local experience with telecenters was limited, providing little evidence on impact or sustainability. Private sector models—cybercafés—had been established only in cities and towns, and their services were limited to telephone and Internet access, with no local content or e-government services. The public sector had made feeble attempts to deliver computers and ICT tools to schools, but these tended to be short-lived, politically driven initiatives. A few large NGOs had developed promising village or community information centers that created vibrant social organization, local content, and basic communication

services. But these centers lacked Internet connectivity, and the charges for leased lines, when available, were prohibitive. Most notable was the absence of partnerships or complementarities between the public, private, and civil society sectors.

Debate in a focus group representing the diverse sectors and viewpoints eventually produced a consensus: *Telecenters operating in poor rural communities are likely to have impact and sustainability only if they bring together a blend of public, private, and civil society resources and competencies.* To help identify those best qualified to operate telecenters, it was agreed that all candidates would be required to submit business plans. Standard subsidies would then be granted on the basis of the merits of the business plans and the credibility of the candidates. Local entrepreneurs, where available, would be given priority and were expected to make up the majority of suitable candidates. But in the poorest areas, NGOs, local governments, or social entrepreneurs might take the lead. Partnerships between the public, private, and civil society sectors, it was agreed, should be encouraged.

Determining Pace and Sequencing

Program preparation and political pressures for visible actions allow little time to build capacity in advance of a scaled-up telecenter program. But experience in Sri Lanka and elsewhere made it clear to the team that community mobilization and capacity building for telecenter operators and support institutions had to take place before or in parallel with physical investments. A grant from the Japan Social Development Fund was sought early in program design to develop training and toolkits for community leaders, telecenter operators, and other stakeholders.

Managing the investments in human capabilities and community mobilization so as to keep pace with the physical investments in telecenters was expected to pose a challenge throughout the program. A similar sequencing issue arose relating to whether support institutions should select telecenter operators (along the lines of a franchise model) or the other way around. The focus group successfully argued that the program should empower local entrepreneurs to select their support institutions, reversing a history of Colombo dominance over rural entrepreneurs.

Generating Relevant Content

From the outset it was clear that telecenters could become financially viable only when they began delivering priority public services and relevant local content developed through the e-government and e-society

programs. How could the government ensure that the telecenters had relevant content and services with high development impact?

Government agencies lacked any modern means or strategy for delivering information and services to citizens, businesses, or small farmers. The substantial information and knowledge resources that departments held seldom reached even their own extension or local staff outside Colombo. As some relatively advanced agencies became aware of the potential of telecenters, they sought to build their own exclusive, specialized delivery channels rather than rely on the proposed telecenters. Aid agencies, focused on specific sectors, reinforced these bureaucratic silos.

The program designers resolved to turn this challenge into an opportunity to create strategic partnerships of mutual benefit between the telecenters, their support institutions, and government agencies.

Principles Guiding Program Design for Poverty Reduction

The design of the telecenter program was guided by a framework for poverty reduction through ICTs based on international experience with similar efforts (Harris 2003). This framework encompasses nine key principles as follows:

- *Supporting poverty reduction strategies* through partnerships with government agencies and NGOs
- *Pursuing ICT policies that directly address poverty* by targeting its determinants
- *Ensuring affordable and sustainable access* to relevant technologies and content
- *Partnering with government as a user of ICT* to support the ability of key ministries to deliver pro-poor services through telecenters
- *Mobilizing communities* through grassroots capacity building and participatory evaluation to enhance benefits
- *Transforming partner institutions* through the use of shared telecenters.
- *Promoting information services* by targeting early winners through strategic partnerships
- *Collaborating with poor people* and targeting priority services to them
- *Differentiating support institutions* by function—whether technical support or content development—to ensure a good match between capabilities and roles

Supporting Poverty Reduction Strategies

The telecenter program can support poverty reduction strategies through strategic partnerships with initiatives and agencies that use the telecenter network to deliver content and services to, and to engage with, the poor. Early in the program, those already involved in poverty reduction activities with a substantial information component would be best suited for such partnerships.

Government programs are well positioned to take advantage of the telecenters. Strategic partnerships with government institutions—or *e-government partnerships*—could be coordinated with the other e-government components of the e-Sri Lanka program.

A particularly good fit might be the Community Development and Livelihood Improvement Program. This program, being implemented by the Ministry of Rural Economy, includes a fund to improve connectivity and information technology at the community and district levels and to support efforts to inform communities about the possibilities of setting up village centers for information, computer education, and other services (World Bank 2003c, 2004a). An exercise mapping the common objectives of the two programs illustrates the kind of analysis needed to link the telecenter program to others (table 7.2).

Other government programs also offer potential openings as follows:

- *National HIV/AIDS Prevention Project*. This program, being implemented by the Ministry of Health, emphasizes community-based approaches and engagement with civil society, NGOs, and other private agencies to bring about behavioral changes among high-risk groups (World Bank 2002b). The program sponsors a broad advocacy and communications campaign, as well as efforts to empower highly vulnerable, often marginalized segments of the population—activities that could make good use of the telecenter network.
- *Sri Lanka Land Tiling and Related Services Project*. This program, under the Ministry of Land Development and Minor Export Agriculture, aims to build a foundation for increasing land productivity through a fair, efficient, and sustainable land administration system (World Bank 2001). Initiatives in such countries as India have successfully automated land registry services and delivered them through community-based ICT kiosks, thereby enabling farmers to obtain copies of land records, which are critical for securing credit for farm inputs (see box 8.1 in chapter 8).

Table 7.2 Common Objectives of the Community Development and Livelihood Improvement Program and the Telecenter Program

<i>Community Development and Livelihood Improvement Program</i>	<i>Telecenter Program</i>
Building and strengthening community organizations	Building capacity through training for community leaders and meetings for village stakeholders
Financing community and social infrastructure and livelihood activities identified as priorities in village development plans	Mobilizing communities by training facilitators, disseminating information, and building awareness
Providing technical training and seed money for income-generating activities	Developing toolkits for capacity-building program
Funding connectivity improvements and infrastructure	Providing guaranteed broadband connectivity at initially subsidized rates
Financing information technology, including village information and computer centers	Identifying viable models and service providers for telecenters
Developing institutions	Selecting telecenter support institutions
Building capacity of national and district agencies	Selecting viable business models and target institutions for piloting capacity-building program for telecenters
Monitoring and learning	Monitoring performance and evaluating impact

Source: Author.

- *Virtual Academy of Food Security and Rural Prosperity*. This Indian project emphasizes an integrated, pro-poor, pro-women, pro-nature approach to development and community ownership of technological tools; the model could be adapted and diffused throughout Sri Lanka.³ The bottom-up approach involves local volunteers to gather information, feed it into an intranet, and provide access through centers in different villages. Most of the operators and volunteers are women, who gain status and influence. All centers evolved to meet the information demands of the local community.
- *E-commerce for community-based tourism*. A promising candidate though not yet a formal program, community-based tourism fosters local development in poorer rural areas and is attracting growing attention from the Sri Lanka Tourism Board. Where poor communities have access to ICT, e-commerce enables them to bypass the tourism industry and engage directly with overseas travelers. Such efforts target an important market segment in rich countries—independent travelers seeking new and authentic experiences unavailable to the mass market.

The telecenter program can also form partnerships with NGOs—or *e-NGO partnerships*. NGOs involved in socioeconomic development, peace building, and poverty reduction will be able to put telecenters to good use in delivering information services to their clients in support of their activities. Partnerships with such NGOs can be coordinated with the e-society program.

For both types of partnerships, the terms should be individually negotiated to accord with the partner's program and the support that the telecenter program is able to provide. As experience with such development activities accumulates, the telecenter program will be in a position to advocate partnerships, with other agencies, further leveraging the value of the telecenter network.

Design principle 1:
Supporting poverty
reduction strategies

- Select e-government development partners and assist them in using the telecenter network as the main delivery mechanism for their programs in rural areas
- Select e-NGO development partners and encourage them to use the telecenter network as the main delivery mechanism for their programs in rural areas
- Structure the partnerships so that ICTs extend or intensify the partners' efforts for target beneficiaries
- Use the experience to promote the telecenter program for potential partnerships with development actors to enable them to achieve their objectives more effectively

Pursuing ICT Policies That Directly Address Poverty

National ICT policies typically promote e-commerce, e-government, and the ICT industry, all of which will benefit better-off citizens. To benefit poor citizens, ICT policies need to directly address the causes of poverty, such as isolation, powerlessness, social exclusion, unequal opportunity, uncertain land tenure, slow growth in agriculture, lack of economic integration, and lack of access to education and social services. Meanwhile, poverty reduction policies and programs should take advantage of ICT applications, which offer more innovative and cost-effective ways to meet poverty reduction goals than do traditional programs and modes of delivery.

As the telecenter program unfolds and increasingly interacts with different stakeholders, it will be in a position to advocate and implement poverty reduction policies with ICTs. Such policies will probably evolve over time as policy makers become aware of the capability of ICTs and the institutional adaptations needed to achieve their full potential. For example, agricultural extension services sometimes encourage farmers to grow crops they cannot sell for a reasonable return. In those cases, merely providing ICTs to extension agencies is unlikely to improve farm incomes. The agencies' extension strategy must also change. ICTs can then be used to implement the new strategy more effectively than would otherwise have been possible.

The success of the telecenter program will be measured by development outcomes from its target clientele—rural communities. Thus, leaders of the program should look for and take advantage of openings for advocating poverty reduction policies that can be facilitated and enhanced by ICTs. Several sources should help in identifying such opportunities: the country's poverty reduction strategy, donors' assistance strategies, and the Millennium Development Goals. The agencies assigned to focus on these priority areas would be natural partners for the program.

- Design principle 2: Pursuing ICT policies that directly address poverty
- Champion the cause of ICT-enabled development
 - Advocate institutional (and supply chain) adaptations that use the telecenter network to deliver services
 - Seek strategic partnerships with agencies focusing on priority areas for poverty reduction

Ensuring Affordable and Sustainable Access

International and local experience points to five factors key to ensuring affordable and sustainable access to relevant technologies and content through the telecenters:

- *Community participation in design and implementation.* Achieving community buy-in for the telecenters is essential so that communities assume a sense of ownership over the facilities. Participatory demand surveys can help village communities and telecenter operators determine what services the communities believe they need.

- *Locally relevant content and services.* Participatory, bottom-up capacity building in the recipient communities helps ensure that telecenters address the needs of the poor, women, minorities, and vulnerable groups. Partnerships with development-oriented NGOs as telecenter operators also help ensure that information services are locally relevant and supportive of development.
- *Affordable technologies.* Computers and Internet connectivity should form the basic technology for telecenters, but locally relevant information programs may justify introducing variations such as radio and television (box 7.1). The use of open source software should be encouraged.
- *Financial and operational sustainability.* Achieving financial and operational sustainability requires addressing the community's needs, achieving community participation, encouraging the manager's

Box 7.1

Access to Which Technologies?

Technology choices in Sri Lanka's telecenter program will be driven by the development strategies they support, with some technologies more suitable for certain types of delivery and exchange than others. Radio and television have both proved to be effective for social development and most rural Sri Lankans already have access to these technologies, but they have not yet achieved their full potential.

The most notable example of using radio and television for development probably comes from China, with its agricultural television station and China Central Radio and Television University. The university has 1.5 million students, two-thirds of them in degree programs. It caters to working adults, broadcasting lectures by radio and television at fixed times to students at 2,600 branch campuses and 29,000 study centers, as well as at workplaces.

In Sri Lanka, the Kothmale Internet Community Radio provides a gateway to the Internet. It combines local radio broadcasts in local languages with ICT applications in a wide range of social, economic, and cultural areas. Using community radio as an interface between the community and the Internet has helped raise awareness about the Internet among those without access to computers and connectivity. The Kothmale Internet Community Radio has proved to be an efficient way to promote community participation in small target areas.

Source: Author.

entrepreneurial creativity, and marketing the center. The first step is to understand the information and communication needs of the community.

- *Sustainable partnerships with content providers.* Such partnerships should be sought in government, educational institutions, the private sector, NGOs, and the like.

Engaging communities is critical to developing an understanding of their information needs and thus ensuring that telecenters provide relevant technologies and content. This engagement should take place through both demand analysis and community mobilization. Whereas demand analysis will capture community needs and priorities at a point in time, mobilization can empower communities to continually express their information needs as their experience with the telecenters unfolds. The full potential of ICTs for rural development emerges from continual interaction between and among empowered citizens and responsive institutions.

Moreover, although demand analyses can give broad indications of a community's information needs, they are best used to alert institutions and information providers to the types of interactions needed to satisfy that demand, not to compile volumes of static information to be delivered through the Internet. And demand analyses covering a wide population cannot be relied on to identify the continuing requirements of particular communities in sufficient detail. Local requirements are usually locally specific. Effective community mobilization empowers communities for social appropriation of telecenters, enabling them to take control of obtaining the information they need.

To ensure relevant technologies and content, the telecenter program will accordingly take into account several aspects of participation (Colle and Román 2003) as follows:

- *Involving a variety of stakeholders, including marginalized groups,* through a steering committee to oversee the telecenter and ensure that its operator addresses the community's interests
- *Evaluating community needs through continual feedback* to capture the continually changing requirements
- *Integrating the telecenter into community institutions* and combining efforts with those of existing community organizations
- *Raising awareness about the telecenter in the community* by focusing on information, not hardware—the key to reaching much of the community that has a natural resistance to technology⁴

To succeed in their development roles, telecenters need to engage with their communities and to be effective in managing their technology and finances. Although telecenters will initially benefit from subsidies, they are required to contribute to their financial needs. To minimize subsidies and maximize development and equity impacts, it is important to focus subsidized approaches on the least-served communities. It also becomes necessary to think of telecenters as a business, subject to the same entrepreneurial and managerial principles governing any other. Accordingly, each telecenter is required to develop a business plan—a detailed statement of its objectives and its strategies for achieving those objectives, along with an explanation of how it will monitor and assess its progress (box 7.2).

The business plan will be continually updated to guide operation of the telecenter, explain to partners and funders why the telecenter needs their help, and set the telecenter's operational budget. A local steering committee may review the business plan every year to suggest new ideas.

Box 7.2

What Are the Key Elements of a Good Business Plan for a Telecenter?

The key elements of a good business plan for a telecenter are as follows:

- A program focus based on demand analysis in the community
- A description of what services and programs will be provided and how these will meet the identified community needs
- Community partners and strategies for the user steering committee to develop partnerships with other organizations and groups in the community
- User projections, including how many people will use each of the services and programs
- User fees for different services
- Regular expenses
- A marketing strategy
- An evaluation of services, including a plan for self-evaluation to determine whether the telecenter is meeting its objectives
- Contingency plans for dealing with common problems
- Budget and financial planning, including a projected cash flow worksheet showing costs and revenues for the first year of operation

Source: Colle and Román 2003.

The program will support telecenter operators in managing their technology and finances through a range of capacity-building initiatives. Meanwhile, it is using stakeholder meetings to mobilize the communities for local development initiatives.

- Design principle 3: Ensuring affordable and sustainable access
- Experiment with a variety of technologies in conjunction with strategic development partners; combine technologies, such as Internet and community radio, to expand the reach of both
 - Configure flexible telecenter ownership, technology, and financing models capable of adapting to local circumstances and requirements
 - Focus subsidized approaches on least-served communities
 - Ensure effective and productive engagement with the community, including the poor

Partnering with Government as a User of ICT

Telecenters can enable government to interface directly with the public, through e-government programs and services. E-government shows rapidly growing promise for alleviating such dimensions of poverty as powerlessness, voicelessness, vulnerability, and fear. Moreover, it can support Sri Lanka's commitment to better government—helping to increase transparency, accountability, efficiency, and responsiveness. And e-government services would give operators something useful to sell to their clientele, helping to support self-financing.

The program will develop strategic alliances with government agencies wishing to use the telecenters to deliver public services. Good candidates for such partnerships include the Ministry of Rural Economy, Ministry of Education, Ministry of Agriculture, and Ministry of Samurdhi (social welfare).

By providing a delivery mechanism for early experiments in e-government, the telecenter program will accelerate learning in government institutions. It will support a phased approach to e-government, helping government institutions make an early entry into information delivery, proceeding through important learning as they do so, and then move on to online transactions. This orderly and relatively risk-free approach will allow steady accumulation of institutional capacity and learning by both the government and the telecenters.

- Design principle 4: Partnering with government as a user of ICT
- Promote telecenters as the vehicle for delivering e-government
 - Partner with selected government ministries to create services for growth and poverty reduction
 - Showcase the outcome of such partnerships as a demonstrator for other ministries

Mobilizing Communities

Programs for reducing poverty by harnessing ICTs should be participatory and demand driven. Methods that foster listening to the poor and factoring their wishes into the design of solutions are usually more sustainable. And development programs that are demand driven have a far greater likelihood of achieving their aims. When communities are effectively mobilized to participate in development activities exploiting information assets, the result is social appropriation of the technology, replacing outside control over its use with local initiatives, decision making, monitoring, and evaluation.

The telecenter program mobilizes communities to participate in telecenter activities through an initiative financed by the Japan Social Development Fund (box 7.3). The aim is to build the capacity of community leaders, prospective telecenter operators, and support institutions to use participatory approaches in the poorest regions of Sri Lanka.

The program also emphasizes participatory evaluation of telecenters. Participatory evaluation feeds the cycle of learning and action in communities, yielding additional benefits—enhancing the operation of telecenters, fostering further participation, and garnering support. Continual evaluation keeps telecenters focused on activities that communities appreciate. Regularly publicizing the results of evaluations raises awareness among NGOs, government agencies, and potential stakeholder groups, winning political and financial support for the program and encouraging participation. One powerful approach is to develop multimedia resources to tell stories depicting the social impacts of the program.

The telecenter program's work in community mobilization and participatory monitoring is informed by the village self-help pilots under way in the Rural Poverty Reduction Program in Sri Lanka. This program is aimed at enabling the rural poor to improve their livelihood and quality of life by the following:

- Empowering poor communities through the transfer to them of decision-making power and control over resources

Box 7.3**Building Capacity to Promote Participation in the Telecenter Program**

The capacity-building program uses the “train the trainers” approach, collaborating with NGOs, community-based organizations (CBOs), and support institutions that train village leaders and prospective telecenter managers.

Identifying viable models and telecenter support institutions

Viable business models and target institutions for piloting the capacity-building program for telecenters are selected on the basis of evaluations of community information centers in Sri Lanka and neighboring countries such as India and Thailand. The telecenter support institutions are selected from local NGOs, CBOs, and telecommunications or data service providers. The selection of models and support institutions is based on these criteria:

- Type of ownership (private franchise, village phone shop, or NGO based)
- Type of content or service (communication, ICT training, e-learning, e-government, agricultural information, e-commerce, or job creation)
- Financial sustainability (breakdown of costs and revenue, capital costs, and recurrent costs)
- Attainment of minimum standards for technical competence, financial soundness, and managerial capability

Developing toolkits

A range of toolkits is being developed for use in the capacity-building programs conducted by participating support institutions as follows:

- A toolkit to promote involvement of vulnerable groups in the community in the consultation process
- A toolkit on preparing business plans for basic service delivery and additional social services and applications using telecenters
- Training materials for the telecenter managers and employees
- A technical guide on maintaining equipment, software, and Internet connections
- A mechanism for sharing knowledge among local telecenters and with telecenters in neighboring countries

Mobilizing communities and disseminating knowledge

Mobilization and dissemination can be achieved through the following:

- Facilitator training
- Dissemination and awareness
- Community mobilization

Building capacity in communities

Building capacity can be realized by the following:

- Training for community leaders
- Meetings for village stakeholders

Monitoring performance and evaluating impact

Monitoring and evaluation can be accomplished by the following:

- Self-monitoring by telecenters
- Annual progress reports by managers
- Detailed studies to measure development impact

Source: Author.

- Building communities' ability to engage in participatory appraisal, priority setting, planning, implementation, management, monitoring, and evaluation
- Building accountable and responsive local governments and linking communities with private sector and other partners at the local level

The telecenter program could also develop synergies with the United Nations Development Programme's South Asia Poverty Alleviation Programme (SAPAP).⁵ This program has established robust methods for social mobilization, a process for harnessing local resources that can foster sustainable forms of community self-development. It is now extending these efforts to harnessing information through ICTs for community development.

Design principle 5:
Mobilizing
communities

- Develop and apply community mobilization techniques that foster social appropriation of technologies
- Partner with existing programs that support the rural poor
- Develop multimedia resources to tell stories depicting the social impacts of the program

Transforming Partner Institutions

Telecenters can become a tool for transforming government institutions and their approaches to delivering services to and interacting with citizens, boosting growth and poverty reduction. Thus, the telecenter program needs to be not only about building telecenters and acquiring technologies but also about encouraging government agencies and NGOs that provide

information services to communities to appropriate and enact these technologies.⁶ The program should promote the adoption of ICTs through an approach that leads to their optimal use—by addressing the underlying strategic intentions of the adopters.

The adoption of ICTs has three distinct phases and outcomes (see, for example, Hanna, Guy, and Arnold 1995). *Substitution* occurs when a new or improved technology merely substitutes for an existing one. *Enhancement* occurs when the new technology substantially improves performance. *Transformation* takes place when the new technology opens up opportunities for redefining tasks by completely altering work practices and organizational structures.

Most decisions to adopt ICTs are driven by substitution rather than enhancement or transformation. But transformation is usually the ultimate outcome, once the adopter fully realizes the potential of the technology. This process can be accelerated by encouraging the fundamental changes in underlying practices and behaviors needed to achieve transformational outcomes. In partnering with public institutions, the telecenter program is well positioned to steer them toward the transformational benefits of adopting ICTs. It should identify those within public institutions who seek new channels to improve the delivery of services, enlist them as champions and partners in using the telecenters as platforms for delivery, and in the process help them transform the way their institutions do business and relate to clients.

- | | |
|---|---|
| Design principle 6:
Transforming partner
institutions | <ul style="list-style-type: none"> • Promote the telecenters as a transformational technology with benefits that transcend efficiency gains • Identify and support champions within potential strategic-development partners who are capable of propelling their institutions quickly through the phases of adopting ICTs |
|---|---|

Promoting Information Services

As telecenters open, they can be expected to attract a great deal of public interest, making it important to have useful information services in place at the outset. Thus, an early imperative is to develop a strategy to ensure that telecenters can offer desirable services as soon as they open—a strategy focused essentially on catalyzing content development by other institutions through partnerships. There are already indicators of what these services could be (such as market prices), with implications for which support institutions could best deliver them (table 7.3).

Table 7.3 Typical Categories of Telecenter Information

Category	Examples	Source	Delivery
Generic information	E-government services, agricultural extension, farm market prices, distance education, e-commerce, e-health, news, and weather	Government and national or regional institutions	Institutional partnerships
ICT-focused services	E-mail, voice over Internet protocol, chat, Internet searches, word processing, spreadsheets, presentations, ICT training, printing, photocopying, scanning, and newsletters	Local telecenter owners, operators, and staff	Creative and client-centric entrepreneurial activity at the telecenter
Development programs	HIV/AIDS awareness campaigns, micro- and small enterprise development support services, skills training, microcredit support, and community-based tourism	National or regional development initiatives	Marketing of telecenters among local and international NGOs and business associations
Locally based information	Local laws, poverty reduction schemes, local NGO activities, yellow pages, job placement services, classified advertisements, and market prices	Local activists, NGOs, community-based organizations, government offices, social entrepreneurs, volunteers, and schools	Community outreach, community mobilization, and infomobilization

Source: Author.

A strategy for content development can begin by supporting programs and agencies already working to deliver information services to the rural poor. A public program similar to that launched by the Malaysian government can promote other opportunities (box 7.4). In addition, the e-society fund offers opportunities for providing incentives and resources to promising programs (see chapter 3 for a brief description of the e-society program and the forthcoming book on the Sri Lanka experience for more on its design).

Community members should be encouraged to create locally relevant content in the local language. Existing portals such as the Sri Lanka

Box 7.4**How to Get Started with Content: Malaysia's Demonstrator Application Grant Scheme**

To promote innovative uses of information and communication technologies for social and economic development, the Malaysian government launched a grant program—the Demonstrator Application Grant Scheme—in 1998, allocating it US\$13.2 million. The National Information Technology Council Secretariat administers the program, awarding grants to projects accredited as demonstrator applications.

The grant scheme has several objectives as follows:

- Acculturate Malaysians to ICT, enabling them to gain the maximum benefits of ICT applications at work and at home
- Build an integrated network of electronic communities using ICT and multimedia technology
- Promote the dynamic growth of Malaysian Web shapers and adapters
- Develop entrepreneurial communities enabled by electronic networks
- Encourage closer cooperation and collaboration between public agencies, private corporations, nonprofit organizations, and NGOs through joint ventures and institutional links
- Encourage Malaysians to be more innovative in using and adapting existing ICT and multimedia technologies

Source: <http://www.nitc.org.my/dags/index.shtml>.

Country Gateway and planned ones under the reengineering government program could collaborate with telecenters to aggregate local content. Other service content, identified by the demand surveys, will be developed by the telecenter support institutions, at times with support from the e-society fund. Content development could be continually guided by a panel of telecenter representatives.

- Design principle 7: Promoting information services
- Promote information services under all four categories in table 7.3
 - Target market price dissemination, agricultural support services, and microenterprise support services as early winners

Collaborating with Poor People

Experience with ICT programs for the public suggests that by default they benefit the more advantaged people—the better-off and the educated, with the means and the capability to use ICTs. In some cases, entrenched societal structures, such as caste systems and gender discrimination, pose barriers to equality in the sharing of the benefits of ICTs. Women may face constraints on their time or on their movement outside the home that can reduce their ability to access technologies.

Ensuring that the poor and other excluded groups are able to share in the benefits of ICTs requires specific actions. Services need to be capable of differentiating between the poor and the not-so-poor, so that benefits can be directed to those most in need. Some of these considerations necessarily influence the choice of location for telecenters. The program can win friends by involving local communities in this choice as much as possible while ensuring adherence to basic principles of equity and accessibility.

Targeting efforts to pro-poor organizations can also help ensure that the benefits of ICTs reach poor people. Some of these organizations are natural users of ICTs and developers of content (box 7.5). Building the capacity of such organizations to use ICTs can help them accumulate social capital by nurturing the networks, norms, and social trust that facilitate cooperation for mutual benefit. ICTs can help create and sustain online and offline networks that connect people working toward similar goals. Many women's organizations have recognized this potential and have undertaken projects supporting the use of ICT as an advocacy tool. ICTs can also enable individuals, especially early adopters, to spark catalytic change in their communities.

Given the poverty profile of Sri Lanka, the telecenter program can maximize its effect on poverty by the following:

- Identifying target beneficiary groups that are underprivileged—such as farmers, women, minorities, landless laborers, and plantation workers—and building capacity to use ICTs within the organizations that support these groups
- Involving women, the poor, and excluded groups in managing the program
- Adopting a more participatory approach to choosing the location of telecenters
- Focusing on geographic areas of greatest need or exclusion
- Addressing the needs of the poorest and ensuring that benefits reach poor people directly

Box 7.5**Which Sri Lankan NGOs Could Make Good Use of Telecenters to Help the Poor?**

The Sewalanka Foundation works with rural communities to enable the poor to become directly involved in development. Using an approach based on social capital, it empowers local groups to take initiative beyond the time frame of a single project. An initiative begins by organizing families into small groups and developing leadership and skills. Target groups are sensitized to their problems, enabling them to develop a logical understanding of poverty and its causes and leading to collective action to overcome poverty. The small groups, each of about five families, are federated into a community-based organization, or *sewa society*, beginning a process of developing democratic village institutions.

Sanasa is the Sinhala acronym for the Federation of Thrift and Credit Cooperative Societies in Sri Lanka. Sanasa is the only network of credit cooperatives covering all provinces, with 8,424 primary societies and 805,000 members representing all races and religions in the country. A Sanasa society focuses on promoting the habit of thrift, mobilizing savings, enhancing productivity and reducing unemployment, using the funds mobilized (mainly for microcredit), and preparing communities to adopt information technology and indigenous technology.

The *Sarvodaya Shramadana* movement began in the mid 1950s, when a group of high school teachers in Colombo decided to translate their convictions into action. They organized *shramadana* camps where students from relatively affluent urban homes gave up their vacations to work in the country's most backward and outcast villages. Sarvodaya's five-stage development model works to do the following:

- Develop functional leadership and community spirit
- Form functional groups and training programs according to the needs of individuals—mothers, youth, elders, and children
- Encourage groups to prioritize needs and launch projects
- Promote income-generating activities to help create a more self-financing community
- Share surplus with other communities as self-financing continues

Sources: <http://www.sanasa.lk/>; <http://www.sarvodaya.org/>; <http://www.sewalanka.org/>.

Design principle 8:
Collaborating with
poor people

- Develop a people-centric, pro-poor strategy for the telecenter program
- Establish model villages as exemplars of the strategy
- Target the poor and other excluded groups as recipients of direct benefits

Differentiating Support Institutions

The capabilities of potential partners should be taken into account in determining the precise role to be played by telecenter support institutions. Differentiating between technical and managerial support (to enhance efficiency) and content development support (to enhance effectiveness) should help identify candidates with capabilities more closely aligned to the roles they would be expected to play. Computer training and business support organizations, for example, could best provide managerial and technical services. And a range of organizations—such as NGOs, government agencies, and farmers' or producers' organizations—could provide content-related services, delivering generic information, development programs, and locally based information. There may also be support institutions capable of fulfilling both roles, and in time more may become equally proficient in the two.

This approach would allow technical and managerial support to be defined within a standard contract suitable for all organizations. Meanwhile, support for content development could be negotiated with each strategic development partner based on the content, target beneficiaries, and location.

Design principle 9:
Differentiating
support institutions

- Match the roles support institutions are required to fill with the roles they are best capable of filling
- Distinguish between the different roles of support institutions to attract a range of suitable partners
- Invite key NGOs and government agencies to adopt the role of strategic partners, and the private sector and NGOs to adopt the role of support institutions

Table 7.4 Applying the Design Principles to the Tasks in the First Phase of the Telecenter Program

<i>Design principle</i>	<i>Select telecenter locations</i>	<i>Develop monitoring and evaluation framework</i>	<i>Design and prepare curriculum and toolkit</i>	<i>Prepare relevant and local content</i>	<i>Identify potential telecenter models</i>	<i>Select telecenter support institutions</i>	<i>Identify facilitators</i>	<i>Train facilitators</i>	<i>Analyze site specific demand and engage communities</i>	<i>Train telecenter staff and local ICT champions</i>	<i>Prepare business plans for telecenters</i>	<i>Organize help desk</i>
1. Supporting poverty reduction Strategies	✓	✓		✓		✓			✓			
2. Pursuing ICT policies that directly address poverty				✓		✓			✓			
3. Ensuring affordable and sustainable access	✓			✓	✓				✓		✓	✓
4. Partnering with government as a user of ICT				✓		✓			✓			
5. Mobilizing communities		✓	✓					✓		✓		✓
6. Transforming partner institutions				✓		✓						
7. Promoting information services	✓			✓		✓			✓			
8. Collaborating with poor people		✓		✓		✓	✓		✓			✓
9. Differentiating support institutions						✓						

Source: Author.

Applying the Design Principles to Program Activities

The design principles, embodying international best practices, should be applied to the key tasks of implementing the telecenter program. Those where the principles are most important are preparing relevant and local content, selecting telecenter support institutions, and analyzing site-specific demand and engaging communities (table 7.4). The framework outlined in the table can help exploit synergies and ensure that the design principles are applied wherever opportunities arise during implementation.

Annex 7.1 Poverty in Sri Lanka

More than 39 percent of the population of Sri Lanka can be classified as poor (when the North and East are excluded, this share drops to around 23 percent; table A7.1).⁷ Rural areas, with 80 percent of the total population, are home to nearly 90 percent of the poor.

Agriculture employs about 40 percent of the labor force yet accounts for only about 18 percent of national production (Ratnayake 2002, 16). Not surprisingly, households whose principal income earner works in agriculture account for the largest share of poor households, at 42 percent (table A7.2). The poverty rate among such households is 51 percent.

The poor population in Sri Lanka consists mainly of the following:

- Those living in remote, isolated areas
- Landless workers in low-wage occupations
- Farmers cultivating low-value crops
- Plantation workers
- Fisheries and livestock workers
- Squatter settlers
- Workers in cottage or small industries that cater to low-income markets
- Petty traders providing low-value services to low-income consumers
- Craftsmen without regular work
- Internally displaced persons
- Low-income urban and slum shanty dwellers
- Social outcasts from minority castes
- Pensioners

Sri Lanka's economic growth has not automatically trickled down to the poor. A modest growth rate has been accompanied by little or no income redistribution. Even though per capita GDP growth averaged nearly 4 percent a year in the 1990s, the expected decline in poverty

Table A7.1 Household Poverty Rate and Population by Location in Sri Lanka, Various Years
percent

<i>Location</i>	<i>Household poverty rate, 2002^a</i>	<i>Share of total population, 2001^b</i>	<i>Share of poor population, 1995/96^c</i>
Rural	24.7	80.0	87.0
Estate	30.0	5.3	4.0
Urban	7.9	14.6	9.0
Total	22.7	100.0	100.0

Source: Author.

Note: Data exclude the North and the East.

a. *Poverty Indicators: Household Income and Expenditure Survey 2002* (Sri Lanka, Department of Census and Statistics 2003). Total is a weighted average.

b. *Census of Population and Housing 2001* (Sri Lanka, Department of Census and Statistics 2001). Total is rounded to 100.

c. World Bank 2002c (66). Based on head count.

Table A7.2 Household Poverty Rate by Sector of Employment of Principal Income Earner in Sri Lanka, 1995/96
percent

<i>Sector</i>	<i>Household poverty rate</i>	<i>Share of all poor households</i>
Agriculture	51	42.0
Mining and quarrying	59	2.0
Manufacturing	36	11.0
Construction	44	7.0
Wholesale and retail trade	30	9.0
Transportation	26	4.0
Finance	10	0.4
Communications	23	10.0
Unclassified	67	10.0
Unemployed or not participating in labor force	28	5.0

Source: Household Income and Expenditure Survey 1995/96, as cited in Sri Lanka, Government 2002 (135).

did not occur. Determinants of poverty in Sri Lanka include the following:

- Inadequate growth and unequal opportunity
- Armed conflict
- Isolation and a lack of economic integration
- Limited access to high-quality education
- Limited access to basic social services
- Slow growth in agriculture
- Lack of clear land tenure
- Environmental degradation
- Social exclusion and powerlessness

Notes

1. As Proenza points out (2003, 10), "Telecenters are a highly visible, powerful and inexpensive political tool. They generate much fanfare during the early planning and inauguration stages of the programs, but interest in their operation and effectiveness wanes shortly afterwards."
2. International experience is emerging that supports this position, though global debate continues on the tradeoffs between financial sustainability and reaching the very poor. See, for example, Badshah, Khan, and Garrido (2003).
3. Established by the M. S. Swaminathan Research Foundation, the Virtual Academy is researching ways to empower often-illiterate Indian villagers, including women, through scientific know-how. The foundation, a leading research institution, is pioneering the rural use of ICTs. It has connected 10 villages near Pondicherry, in southern India, through a hybrid wired and wireless network consisting of personal computers, telephones, VHF duplex radio devices, and e-mail connectivity through dial-up telephone lines providing both voice and data transmission.
4. A Food and Agriculture Organization study advocates an approach to rural ICTs that promotes and fosters community appropriation of and empowerment through ICTs, an approach that sees ICTs as most effective for development when they are people's media (Michiels and Van Crowder 2001).
5. In Sri Lanka, SAPAP has created a grassroots structure of community-based organizations (CBOs) with the aim of reducing poverty by forming sustainable, self-managed, integrated support organizations at the village level; by preparing village investment plans as a tool for development at the family and community levels; by enhancing the microfinance capacities of the CBOs; and by developing a series of CBO-managed microenterprises with promising market opportunities.
6. For background on the process of enacting technology and the interplay between institutional context and the uses of ICT, see Fountain (2001).
7. This annex is adapted from Sri Lanka, Government (2002, annex 2).

CHAPTER 8

Designing the Telecenter Program for Impact and Sustainability

With the broad design issues of the telecenter program settled, it becomes increasingly important to focus on how to achieve maximum impact and sustainability, the benchmarks of success. As the design of the program continues to evolve, it needs to exploit opportunities for maximizing the development impact of the telecenters through the services they can provide—communications, community services, and e-government services. The hope is that the telecenters, by providing access to information, to services, to opportunities, and to assets, will empower the powerless, enhance productivity, and ultimately contribute to the country's economic growth and development.

Achieving these goals, however, requires tackling key challenges to the financial sustainability of the telecenters—addressing barriers to the use of ICTs, developing affordable telecommunications services, extending the reach to the very poor, and developing coordination among the many stakeholders that need to be effectively engaged to ensure the program's success. This chapter proposes ways to address both the opportunities and the challenges confronting the telecenter program.

The telecenter program remains a risky undertaking. Its success depends on other critical parts of the e-Sri Lanka program, especially the regional telecommunications network program, and on the policy reforms

on which that program relies. It depends on large numbers of people adopting new technologies and learning new skills and thus creating markets for information and knowledge services. And it relies on major changes in government attitudes toward sharing public information and in the way public services are delivered. Moreover, because of the visibility and importance of the telecenter program, it is susceptible to political interventions that could undermine its effectiveness. Caution is warranted during both planning and implementation.

Thinking through Impact and Sustainability

Determining how to maximize the development impact and sustainability of the telecenter program means addressing some key questions: Given the causes of rural poverty in Sri Lanka, what ICT-enabled services will have the maximum impact on the poor? How can the program make ICT tools affordable to the majority of the population? What determines the financial sustainability of the telecenters? Can they become profitable over time, even in the poorest communities? How can public policy and government incentives mobilize private investment for telecenters in ways that achieve both development goals and commercial success?

In thinking through these questions, it becomes clear how intertwined the issues are. Unless telecenters deliver services that have real impact—services that meet users' needs and help reduce poverty—they may not be financially sustainable, because users must be both willing and able to pay for services. And unless telecenters achieve financial sustainability, they cannot have real impact over time.

Achieving Development Impact

To have significant impact, the telecenter program needs to directly address the causes of rural poverty in Sri Lanka. Among the main causes are limited assets; limited access to low-cost, high-quality services; the weak bargaining position of farmers; the few opportunities for earning off-farm income; and low productivity. All these factors point to concrete services that telecenters can provide.

Impact also depends on the relevance of services provided and on the ability of the program to provide scalable and reliable business models for the delivery of these services in diverse rural settings.

Achieving Sustainability

In thinking through sustainability, one realizes that a systemic concept that goes beyond the individual telecenter is essential. Commercial

telecenters—cybercafés, for example—are not all sustainable. Some fail while others thrive. Yet the system as a whole is resilient as long as there is a demand for the service. Similarly, all the telecenters set up through state action need not survive. What is important is for the service to continue—provided by telecenters initially sponsored by the state or by other centers that emerge to help meet the demand stimulated by the program.

An individual center is sustainable if it can generate sufficient revenues to cover operating expenses (operational sustainability). Ideally, it should also earn a return on investment so that it can eventually replace its capital equipment (full financial sustainability).

Telecenters operating in rural areas face greater challenges in achieving sustainability than do those operating in urban areas (table 8.1). That is the reason that the e-Sri Lanka telecenter program focuses on towns with at least 2,000 people (among other criteria), even while trying to reach the poorest and most isolated rural areas by focusing on towns with less than 5,000.¹

Public action can influence some determinants of telecenter profits but not others. In the short term, a telecenter project cannot improve community income or otherwise affect a community’s ability to pay for telecenter services. But a well-designed project can help lower rural connectivity costs (such as by expanding rural infrastructure, as with e-Sri Lanka’s regional telecommunications network program). It can also help avoid technological lock-in to costly proprietary software. On the revenue side, a project can enhance the quality and quantity of services provided

Table 8.1 Key Determinants of Telecenter Profits and the Effect of an Urban or Rural Setting

<i>Determinant</i>	<i>Urban</i>	<i>Rural</i>	<i>Amenable to change?</i>
Cost			
Connectivity	Low	High	Yes, through the regional telecommunications network program
Equipment operation and maintenance	Low	High	Yes, through the telecenter support institutions
Software	Neutral		Yes, through national policy (such as open source policy)
Revenue			
Population density	High	Low	No
Ability to pay	High	Low	Yes, though only in the long term
Willingness to pay	High	Low	Yes, through provision of valued services

Source: Proenza 2002.

and thus motivate rural residents to use and pay for them. A project can also improve sustainability through judicious use of subsidies.

Getting the Subsidy Right. As noted in the previous chapter, for each telecenter there will be an initial period of subsidy, which will decline over time as the telecenter generates enough funds to contribute toward its own costs. A parallel scheme will provide subsidized access, through vouchers, to specific telecenter services for targeted beneficiary groups. Getting the subsidy right requires generating specific information about how much subsidy a telecenter needs, how long the subsidy will be needed, at what rate the subsidy can be reduced and eventually withdrawn, and how much it will cost to subsidize access for the target groups.

Answering these questions requires a financial and economic analysis of the telecenter program. The telecenter movement lacks a robust, field-tested econometric model for guiding this analysis. But experience suggests that such an analysis needs to take into account the following factors:

- The costs and benefits of telecenters do not occur simultaneously or even within comparable time frames. Although costs are immediate and regular, benefits are slow to mature, irregular, and partly unpredictable.
- Benefits also depend on subjective judgments, which may vary among stakeholders.
- How telecenter clients use the material and information they obtain is not under the control of telecenter promoters; there are many intervening factors in the causal chain between information provision and socioeconomic development.
- Telecenter users' willingness to pay a certain price indicates the value they place on the service they receive in return.
- Projecting use rates and the need for future maintenance and upgrades often involves uncertainty.
- The beneficiaries of a telecenter extend beyond the direct users and the members of the community where it is located.

Projecting Cash Flow. A cash flow projection for a typical four-computer telecenter suggests that the rate of return could reach 6 percent over a 10-year planning horizon (table 8.2). The projection estimates that most telecenter revenues will at first come from telephone services, as is common for urban cybercafés in Sri Lanka. The rate of return could even be higher if Internet and computer services gain importance as revenue generators.

Table 8.2 Prototype Cash Flow—Four-Computer Telecenter

U.S. dollars

	Total hours per year	Price US\$/hour	Investment year US\$	Year 1		Year 2		Year 3		Year 4		Year 5		Years 6–10						
				Occ %	Hours	US\$	Occ %	Hours	US\$	Occ %	Hours	US\$	Occ %	Hours	US\$	Occ %	Hours	US\$		
Revenue																				
Telephone					2,964			3,120			3,276			3,432			3,583			3,583
Internet																				
Morning hours	4,608	0.60	10	461	276	25	1,152	691	40	1,843	1,106	50	2,304	1,382	60	2,765	1,659	60	2,765	1,659
Evening hours	6,912	0.75	35	2,419	1,814	50	3,456	2,592	60	4,147	3,110	70	4,833	3,629	80	5,530	4,147	80	5,530	4,147
Subtotal					2,091			3,283			4,216			5,011			5,806			5,806
a. Revenue projections					5,055			6,403			7,492			8,443			9,389			9,389
Operating expenses																				
Connectivity					2,400			2,400			2,400			2,400			2,400			2,400
Rent					600			600			600			600			600			600
Utilities					480			480			480			480			480			480
Staff					1,440			1,400			1,400			1,400			1,400			1,400
Equipment replacement					n.a.			958			958			958			958			958
Insurance					400			400			400			400			400			400
Other					490			490			490			490			490			490
Subtotal					5,810			6,768			6,768			6,768			6,768			6,768
VGK Installation Investments																				
Equipment and software			5,321																	
Air conditioning			200																	
Office furnishings			200																	
Total VGK Investment			5,721																	
b. Unsubsidized cash flow			(-5,721)		-755		-364			725			1,676			2,627			2,627	

(continued)

Table 8.2 Prototype Cash Flow—Four-Computer Telecenter (continued)

U.S. dollars

	Total hours per year	Price US\$/hour	Investment year US\$	Year 1			Year 2			Year 3			Year 4			Year 5			Years 6–10		
				Occ %	Hours	US\$	Occ %	Hours	US\$	Occ %	Hours	US\$	Occ %	Hours	US\$	Occ %	Hours	US\$	Occ %	Hours	US\$
Subsidies																					
Connectivity					2,400			2,400			1,600			800							
Equipment and software			5,321																		
c. Subsidized cash flow			(–400)		1,645			2,036			2,325			2,476					2,627		2,627
Implementation subsidies																					
Network/Commitment/ Training fee					1,500			833			833			833					833		2,000
Certification					100			100			100			100					100		100
d. Subtotal					1,600			933			933			933					933		2,100
e. Unsubsidized cash flow			–5,721		–2,355			–1,297			–208			743					1,694		527
(b–d)																					
Rate of return (unsubsidized cash flow) 6.0%																					

Source: ICT Agency, Sri Lanka.

n.a. = not applicable.

The analysis underlines the critical importance of key sources of revenues and expenses. Having the regional telecommunications network in place in time to provide the telecenters with services at competitive prices is critical for early phases of operation. Receiving basic technical and managerial support to ensure the reliability and quality of such services as Internet is also critical, particularly in the early phases of creating markets and reputations. Given the poverty and low population density in rural Sri Lanka, only investing significantly in digital literacy, developing markets, and diversifying services can augment the revenue of telecenters, and this only over the long term.

Opportunities for Maximizing Impact

Opportunities for maximizing the development impact of telecenters come through three main kinds of services and delivery mechanisms, or lines of action:

- Communications provided through access to the telecenter equipment (telephone, e-mail, and chat lines)
- Locally provided social and community development services enabled through the e-society program and the telecenter support institutions
- Online government services, or e-government

All three of these lines of action can enhance the willingness and, over time, the ability of rural users to pay for telecenter services—by helping to overcome the constraints faced by Sri Lanka’s rural population (table 8.3). Local provision of social and community development services, however, may undermine sustainability if telecenters assume the costs.

The first two lines of action—communications and locally provided community services—involve the initiative of individuals, enterprises, and grassroots organizations. So while they are potentially more important than the third, they are also more difficult for national planners to anticipate. Properly supported, private initiative and civil society are powerful engines of innovation for these lines of action.

Greater attention is warranted here to the third line of action: the provision of government services online. The reason is that e-government requires a focused and purposeful choice by the state to be effective. E-government also is a riskier and more challenging undertaking.

Supporting Communications

By supporting communications—telephone, e-mail, Internet telephony—telecenters will enhance the lives of rural people in many ways. They will

Table 8.3 Causes of Rural Poverty and Potential Impact of Services Delivered through Telecenters in Sri Lanka

<i>Constraint causing poverty</i>	<i>Potential impact of ICTs on constraints</i>	<i>High-impact ICT services</i>		
		<i>Communications</i>	<i>Local provision of community development services</i>	<i>e-Government^a</i>
Few assets	Enhanced information and opportunities to build up assets	Opportunities to exchange idiosyncratic information with family, friends, business associates, and an expanded network of contacts	Organizational and technical support tailored to seize local opportunities and satisfy the needs of individual communities	Land registry Microfinance information
Limited access to high-quality services	Expanded access to and lower cost of high-quality services			Distance education Support to rural health workers E-money order
Low-productivity setting	Greater access to information on better products and techniques			Online technical assistance to farmers
Low bargaining power	Expanded competition, wider markets, lower transaction costs			Market portals with online advice and market intelligence
Limited opportunities to earn off-farm income	Increased information on jobs and income opportunities elsewhere Wider markets for processed products			Job placement portal Online technical assistance to small and medium-size enterprises Public procurement information portals
Limited power to influence policy and programs	New opportunities to organize and to influence local policy (virtual activism)			Government portals with project and grant information Local government online

Source: Author.

a. These are merely examples of possible e-government services.

put within reach the ability to exchange specific, idiosyncratic information about markets, projects, community activities, and local government, enabling rural residents to overcome some of the main constraints they face. Rural people will be able to learn about markets, refine their production techniques, avoid traveling to get information and services, and keep in touch with personal networks.²

Market intelligence is among the most valuable kinds of information for farmers. Farmers living in Nuwara Eliya might be able to learn much from the radio or from formal Web sites developed by the Department of Agriculture. But through less formal sites or chat rooms, they might be able to find out what price their high-value specialty product could fetch in European markets, who the buyers in those markets are and what kind of quality is demanded, and how they, on their own or with other Sri Lankan producers, can sell in those markets. And by networking through e-mail with other producers, in Sri Lanka or elsewhere, they might also be able to find out about a trustworthy individual or company in Europe that would be interested in purchasing a shipment of high-value vegetable products. That information would be invaluable, impossible to reproduce through more formal means (such as a survey-based government information service).

The telecenters will expand access to both telephone and Internet-enabled communications. Telephony, a service well known and highly valued in the target communities, will be more important, especially at first. But Internet communication (e-mail, chat, and VoIP) is likely to become increasingly important. Even in developed markets where telephone service is ubiquitous, e-mail provides valuable conveniences. In the United States, for example, it is by far the biggest use of the Internet (NTIA 2002, 31).

Providing Community Services

Local initiatives by provincial authorities or nongovernmental and grass-roots organizations can greatly enhance the impact of telecenters. Consider financial services. Obtaining up-to-date, reliable information for loan supervision in remote rural areas with small, scattered populations is very costly. In Sri Lanka, this has thwarted the emergence of low-cost rural financial service institutions.³

Computerization has made it possible for microfinance institutions to manage a large number of loans cost-effectively. And the Internet has been radically changing the way financial services are managed and provided (such as through online banking), also reducing costs. In countries like Bolivia, rural microfinance service institutions (such as Finrural) are

establishing rural telecenters to expand their outreach, improve service to clients, and generate more revenue.⁴

Local provision of community development services is a worthwhile activity deserving of government support. But the sustainability of telecenters should not be compromised in the process, as would happen if they were burdened with the costs of delivering services not directly linked to their operations. Support to different kinds of services is best kept separate, to enhance transparency and accountability and to stimulate efficiency.⁵ Telecenters could then be paid a fee for providing community development services, enhancing rather than undermining their sustainability.

Channeling e-Government Services for the Rural Poor

The connectivity that telecenters will provide ordinary citizens offers government agencies a critical opportunity to deliver cost-effective services that address the specific needs and constraints facing the country's rural poor. These high-payoff services need not be directly operated by government, nor should they substitute for private sector initiatives.

Priority e-government services for the rural poor are those aimed at increasing access to assets, expanding cost-effective access to services, strengthening the bargaining power of farmers, expanding off-farm employment opportunities, enhancing farm productivity, and promoting rural entrepreneurship.

Increasing Access to Assets. Farmland is the most important rural asset, and lack of access to land is among the main determinants of poverty in Sri Lanka. About 80 percent of land in Sri Lanka belongs to the state (Ratnayake 2002). Over the years, state-owned land has been let for use under a variety of uncertain and insecure tenure arrangements. Tenure insecurity prevents farmers from investing in land to improve its productivity and limits its value as loan collateral. To improve farmers' ability to gain access to freehold land, and reduce the cost of doing so, the country's system of land administration needs to be made simpler, less expensive, and less dependent on multiple institutions. The Internet can play a part in this.

With World Bank assistance, the government of Sri Lanka has started a pilot project to test new land titling procedures that should increase tenure security and improve the operations of the title registry. The new approach is expected to lower the cost of titling a land parcel by more than 60 percent and reduce the share of parcels with unresolved issues that, after adjudication, prevent titling by about 50 percent (Ratnayake 2002, 18). Once the pilot fine-tunes these fundamental back-office

operations, availability of reliable land boundary and registry information through the Internet can help small farmers identify land with tenure security that they may buy or rent. The Bhoomi project in India shows the potential of online land titling services (box 8.1).

Expanding Cost-Effective Access to Services. Education reforms now under way in Sri Lanka are tackling the low quality of education, high failure rate, and low school attendance, especially in rural areas, and addressing the poor match between curricula and job market requirements, reflected in high unemployment rates among higher-level graduates (Sri Lanka, Ministry of Education 2001, 11). Telecenters can provide several services giving concrete support to these reforms. They will make it possible to provide connectivity and computer services to rural schools. With online content provided by the Ministry of Education,

Box 8.1

E-Government Simplifies Land Titling in Karnataka

The Bhoomi project in the Indian state of Karnataka has introduced online delivery of land titles, drawing on 20 million computerized records of landownership for 6.7 million farmers in the state. Before, farmers had to go to the village accountant to get a copy of the Record of Rights, Tenancy, and Crops (RTC), a document needed to apply for a bank loan and many other purposes. Farmers faced delays, harassment, and demands for bribes. Changes to records could take months to process and were often manipulated by officials.

Today, for a fee of 15 rupees and a wait of only 5–30 minutes, farmers can get a printed copy of the RTC from computerized land record kiosks (Bhoomi centers) in nearly 200 *taluks* (districts) or at Internet kiosks in rural area offices. Farmers can also get a statement of their total land holdings from the kiosks. The Bhoomi software incorporates a biometric log-on feature that authenticates all users by their fingerprint. The system maintains a log of all transactions, keeping officials accountable for their actions.

The response from citizens has been overwhelming. Queues form at the kiosks, and 330,000 people have paid the higher fee without complaint. The success has prompted plans to use the Bhoomi kiosks to disseminate other information, such as weather forecasts, lists of families living below the poverty line, and lists of destitute and handicapped pensioners.

Sources: http://www1.worldbank.org/publicsector/egov/bhoomi_cs.htm; <http://www.revdept-01.kar.nic.in/bhoomi/Home.htm>.

they can help enhance the quality of teaching and of the curriculum. And they can provide access to the distance and e-learning activities being developed under the e-Sri Lanka program, helping to raise the skill levels of both teachers and a broad spectrum of the population at low cost.

Another service particularly important for poor Sri Lankans is facilitating remittances. For urban households in Sri Lanka, foreign remittances represent an important supplement to incomes. For the rural poor, domestic remittances are even more significant (Gunetilleke 2000, 10). In an e-Sri Lanka pilot, the University of Colombo, in partnership with the postal service, has developed an e-money order. Once refined and expanded, the e-money order, combined with connectivity through telecenters, could stimulate an increase in remittances to the country's rural poor.

Strengthening the Bargaining Power of Farmers. Small farmers have weak bargaining positions relative to intermediaries buying crops at the farm gate. Government programs like the Paddy Marketing Board, the Multi-Purpose Cooperative Societies, and the retail outlets of the government-owned Sathosa Retail have not succeeded in significantly improving the prices received by farmers or in mitigating the effects of price instability.

An e-Sri Lanka pilot project has developed a new system to improve farmers' bargaining power, and telecenters can provide a key link. The farmer knowledge (*govi gnana*) system is aimed at improving the accuracy and timeliness of price information on about 130 vegetable products traded in the spot markets at the Dambulla and Meegoda dedicated market zones. Local traders have agreed to provide price information and to compete with other markets. Investigators roaming the markets with personal digital assistants (PDAs) verify the information provided. The information is then broadcast on large, centrally located screens, popular among farmers visiting the markets. Once the telecenters are in place, the spot price information gathered by the system can be broadcast by the Internet, informing farmers across the country and strengthening their bargaining position with local traders.

Expanding Off-Farm Employment Opportunities. Rural Sri Lankans depend heavily on off-farm income, especially from nonagricultural employment. For the poorest agricultural households, wage earnings and nonfarm income account for 61 percent of income.

With markets shifting rapidly and jobs increasingly temporary, boosting the efficiency of the labor market and reducing the amount of time a worker spends unemployed or between jobs should be key labor policy objectives. Governments often provide job search sites; good examples

include those in Australia (<http://www.jobsearch.gov.au>), Canada (<http://www.hrdc.gc.ca>), and the United States (<http://www.ajb.org>) (Accenture 2002, 21). This kind of public service is justifiable mainly on equity grounds.

As often happens where connectivity is limited, Sri Lanka lacks a well-developed online labor exchange system. Once the telecenters are in place, online labor market exchanges directed at low-income wage earners could be developed to ease job searches, reduce the duration of unemployment, and increase income-earning opportunities for rural residents.

Enhancing Farm Productivity. Productivity in agriculture, the dominant activity in rural Sri Lanka, is very low compared with that in industry and services. Agricultural productivity is lowest in the two provinces with the largest shares of poor households, Sabaragamuwa and Uva. Diversification to higher-value crops (such as fruits and vegetables) has been slow, and rice and cereals still occupy two-thirds of the cropped area.

In an effort to boost farm productivity, a pilot “cyber-extension” project is outfitting 17 pilot extension offices with computers and connectivity (Sri Lanka, Department of Agriculture 2004). The pilot project has collated practical knowledge on a wide range of crops onto CD-ROM. Plans call for training extension agents and village extension workers and enabling farmers to consult with experts in Internet chat rooms about technical problems they are facing. Expansion to the entire country is expected to follow the pilot phase.

Once the telecenters are in place, the cyber-extension system can be deployed through the telecenter network, allowing farmers to benefit from the knowledge base that has been developed and from direct consultation with extension agents and Department of Agriculture specialists.

Promoting Rural Entrepreneurship. For entrepreneurs launching a new business or trying to increase productivity, networks are essential. At the early stages of a business, family and friends provide support, helping to create the initial concept and business model and even to raise initial investment capital. As the firm begins to operate and develop, other kinds of networks become important. Some, such as banks and financial entities, provide important inputs. Others, such as trade fairs and training institutions, help expand sales opportunities and improve productive techniques.

Motivated by weak rural markets for technical, marketing, and training services, governments in many countries provide business development services to improve the productivity and viability of small firms (Overy Miehlsbradt 2002). The Internet offers a low-cost way of providing these services, especially effective when combined with face-to-face assistance.

Sri Lanka has a rich set of networks that could be leveraged through the telecenter program to promote rural entrepreneurship.⁶ Two promising areas are expanding regular transactions—applications and forms online—and providing technical assistance to small and medium-size firms on short notice by e-mail or chat rooms. Forms should be made available online through the e-government component of e-Sri Lanka. The next step is to simplify citizen-to-government and business-to-government transactions and to enable citizens and businesses, particularly small and medium-size firms, to carry out these transactions online.⁷

Technical assistance—mainly technical papers and short pamphlets—is already being offered online by some Sri Lankan agencies. Once the telecenters are in place, entrepreneurs will be able to draw on the network of support agencies to obtain high-quality, personalized, fast-response online technical assistance.⁸ The cyber-extension initiative being developed by the Department of Agriculture could be combined with the capabilities of other agencies to provide a single entry point into a comprehensive system of technical assistance.

Another initiative, being developed by the Federation of Associations of Small and Medium Enterprises of Sri Lanka with support from the ICT Agency, is a Web portal for small and medium-size enterprises that provides a way to obtain online advice and technical assistance (<http://sme.nccsl.lk/index.asp>). Once completed, the Web portal will host Web pages for more than 200 small and medium-size enterprises, providing each of them with an online marketing tool.

Challenges to Financial Sustainability

To help ensure that telecenters can achieve financial sustainability, the telecenter program will need to overcome four critical challenges:

- Addressing barriers to the use of ICTs
- Achieving connectivity at an affordable cost
- Increasing outreach to the very poor
- Coordinating with stakeholders, both government agencies and civil society

Addressing Barriers to the Use of Information and Communication Technologies

The first and greatest challenge facing telecenters will be to make productive use of their computer and Internet facilities. Addressing that

challenge will require meeting local language needs, promoting the development of low-cost software, raising awareness of the value of ICTs, and supporting operators through training and a strong network to provide peer-to-peer learning.

Meeting Local Language Needs. While large enterprises in Sri Lanka work in English, most small businesses, government employees, and individuals work in their own language.⁹ And most students study in Sinhala or Tamil. Yet most software and information systems run in English. The applications that run in local languages are limited to word processing and publishing.

Thus, enabling the use of Sinhala and Tamil will be a key factor in the success of the telecenter program. Expanding instruction in English may be an option for the long term, but expanding computerization and ICT literacy swiftly will require providing immediate support to users in the local languages.

A focus on local language service is also needed to give a boost to Sri Lankan entrepreneurs providing content in Sinhala and Tamil.¹⁰ Ongoing efforts by the ICT Agency to develop a standard keyboard, fonts, and Unicode representations of Sinhala characters are a critical first step (Dias n.d.). Every computer in the telecenters should be equipped with a keyboard enabling users to work in Sinhala, Tamil, or English.

Promoting Low-Cost Software. Three kinds of software will be required to support the telecenter program: government portals and service delivery systems, common desktop office applications, and software for community networking and online collaboration (box 8.2). Judicious, cost-effective use of open source software could help meet these needs and prevent technological lock-in. Consumers can become captive to or locked in to a single technology when everyone uses that technology and the costs of shifting to alternative products and learning to use them are high.¹¹

E-GOVERNMENT SYSTEMS. Public intervention in support of an open source platform for e-government may be justified on social welfare grounds. The Internet is a prime example of a public good. And open source solutions developed for e-government applications could potentially be useful to broader society, particularly if made available to third parties under a license allowing further development and reasonable commercial exploitation.¹² Thus, the Sri Lankan government would do well to consider open source solutions in developing its e-government applications.

Box 8.2**Three Software Markets: Open Source, Desktop, and Networking Applications**

Three software markets are likely to be important for the telecenter program in Sri Lanka: open source, desktop, and networking applications. The most successful open source systems—Perl, Linux, Apache, PHP—are used primarily by information technology specialists, who value the ability to make changes in code to suit special needs. Many e-government applications fall into this category. The possibility of modifying code is valuable to public agencies developing online service applications: it allows an agency to share code and coordinate developments with other agencies without having to reinvent the wheel or pay hefty proprietary fees.

In contrast, the much larger market for desktop applications—spreadsheets, word processing, presentation, publishing—is made up of people interested in ease of use and standard features. These users typically have little desire or technical ability to alter code. And their costs of shifting from one technology platform to another are generally high.

Software for networking and online collaboration is also typically used by nonexperts—members of community groups who use mailing lists and interact with other members to achieve social and economic objectives and rely on administrators or Webmasters to manage the software. For these users, the cost of shifting technologies is not an overriding concern, but the availability of a system that meets their requirements and can occasionally be upgraded at low cost is.

Source: Author.

Some governments are making large-scale migrations from proprietary to open source software.¹³ But use of open source need not be an all-or-nothing proposition. Where a wholesale shift in software technology is not practical, significant economies can still be achieved by sharing open source applications.¹⁴ For example, Brazil's interoperability architecture (*e-ping*) envisages an occasional need to use proprietary software but will rely mainly on open source solutions and open standards (Brazil, Comitê Executivo de Governo Eletrônico 2004).

In Sri Lanka, where a rapid expansion in e-government applications is imminent, e-Sri Lanka presents an exceptional opportunity to expand systems rapidly while avoiding both duplicating technologies and locking the country's e-government services into proprietary technologies

that could prove costly. (E-government efforts have often resulted in *data dungeons*—disparate systems residing in different agencies that do not interact with one another and rapidly become outdated.) To seize this opportunity, a committee on open source and interoperability in e-government applications could be established, bringing together senior information technology officers from ministries and agencies planning e-government systems. The first order of business for such a committee should be to draft guidelines for developing, using, and sharing low-cost, interoperable applications.

DESKTOP APPLICATIONS. Most Sri Lankans using computers—1.3 percent of the population in 2002—are English speakers who use proprietary software. The costs of shifting to another software technology are high for these few well-off individuals, even if insignificant for Sri Lankan society as a whole. Most decision makers fall into this category, however, so the views of these users carry weight.

But a dependency on proprietary software in desktop systems probably should not be forced on Sri Lankans who do not speak English, the vast majority of the population. These potential users have no vested interest or training in the dominant technologies. Moreover, they have limited income yet will pay the most if the e-Sri Lanka initiative adopts, whether by design or by default, an expensive proprietary software platform. Another risk is that they will not pay, even if the proprietary standard becomes widespread. Pirated software is common in developing countries. But policing small shopkeepers, cybercafé operators, or individuals to prevent pirating is impractical and could even harm the budding local software industry.

The telecenter program envisages installing low-cost software in all the telecenters. That will require the availability of open source software options. Emerging best practices in running telecenters in an open source environment, such as in São Paulo, Brazil, offer lessons for Sri Lanka.¹⁵ Standard Sinhala fonts developed under e-Sri Lanka should be independent of any software platform (that is, not tied to proprietary software). A Sinhala version of the OpenOffice desktop applications suite should be developed under the umbrella of the e-Sri Lanka initiative for distribution to the telecenters.

COMMUNITY NETWORKING. Software to establish mailing lists and Web pages and allow the sharing of resources is a valuable tool for empowering rural communities and encouraging online collaboration (Oksa and Turunen 2000, 7). Supporting the development of open-source community portal and networking software would therefore be consistent with

the goals of the telecenter program. Such software would enable the ICT Agency to establish and host its own portal to meet the needs of the e-Sri Lanka telecenter community—telecenters, support institutions, operators, and users—for networking and for posting local content.

To be most effective, the proposed software should have characteristics similar to those of www.Dgroups.org (presently available for free) but with the following additional features:

- Development with use of open source software under a nonrestrictive license regime
- An ability for users to communicate in Sinhala, Tamil, or English, with the corresponding standard fonts
- A possibility for each institution using the software—school, small business, and community group—to have its own distinct portal shell with its logo and banner
- Ease of use so that user groups need no external assistance
- A Web page interface allowing chatting among registered members of a group, with each group having a separate section

To develop the community portal and networking software, the ICT Agency could explore the possibility of joining forces with other institutions involved in developing similar open source software (such as Bellanet, Universidad de la Frontera in Chile, or the Information and Communications Technology Project in Jamaica). During a transition period, while the software is under development, Dgroups could help meet the immediate needs of the telecenters for local interaction. The feasibility of developing interfaces in Sinhala and Tamil for this transition period merits consideration.

Raising Awareness. Efforts by the telecenter program to raise awareness of the value of ICTs should focus first on students—an ideal target group. Young people are the first to take up information technology, using it to communicate with friends and to do their schoolwork. The voucher subsidy scheme to allow schools to use telecenters during morning hours will be key in reaching this important target group and building demand.

The process for awarding vouchers has been structured so that it can be handled locally. A telecenter operator may approach the local school administrator and offer the use of the telecenter facilities for educational purposes for up to four hours in the morning every school day. The voucher program will provide a subsidy to the school equal to the cost of those four hours discounted by about 20 percent (to keep the value

of the subsidy in check and to account for the lower commercial value of morning computer and Internet use). To qualify for the voucher subsidy, school administrators will need to ensure that at least one teacher is properly trained to teach computer and Internet skills (for which the program also provides funding) and obtain written approval from the local parent-teacher association.

Because of the mature age structure of Sri Lanka's population, raising citizens' awareness of the value of ICTs also will require targeting adult users. More educated rural residents—government officials, small business owners, members of NGOs and special interest groups—are likely to find immediate value in using ICTs. But unlike children and young adults, who take up the technology with little effort, this target group will need special training to gain basic familiarity with and proficiency in the use of computers and the Internet. This training would also raise awareness of the potential of telecenters to empower communities, entrepreneurs, and disadvantaged groups.

The telecenter program will support two kinds of training and awareness-raising activities. First, it will support the design and implementation of a basic computer literacy training program, similar to the international computer driving license initiative (CSSL 2003), targeting government officials, entrepreneurs, women, and leaders of NGOs and special interest groups. Second, it will implement a practice voucher program to help adult customers become proficient in using telecenter services to meet everyday needs. This program will target especially those in leadership positions, such as teachers, heads of NGOs, and local government officials.

Providing Training and Peer-to-Peer Support for Telecenter Operators.

The start-up phase of the program will be a challenge for telecenter operators, who have responsibility for three kinds of activities (Colle and Román 2003):

- *Administrative*—charge for services, keep accounts, market services, keep costs in check, develop new sources of revenue, work with local schools to arrange morning services, and help administer the voucher program
- *Technical*—operate and maintain equipment and mediate between users and technology
- *Agent of social change*—interact with communities, help develop local content, train community leaders in ICT use, and encourage the formation of community networks

The support institutions can help meet this challenge for telecenter operators by providing distance and on-site training and by establishing a virtual network of operators to encourage peer-to-peer support and exchange of knowledge. The training could draw on the program's eight distance learning centers combined with face-to-face sessions.

Achieving Connectivity at an Affordable Cost

The cost of connectivity in rural areas has been a big deterrent to ICT development in Sri Lanka and will be a big determinant of the sustainability of telecenters. Developing the connectivity infrastructure needed in the foreseeable future at a reasonable cost is a formidable challenge given the present situation in the telecommunications sector (see chapter 6).

A big part of the issue is regulatory. All the licenses granted by Sri Lanka's telecommunications regulator have been service based—that is, non-facilities-based gateway licenses that force new operators to use the international switches of the four facilities-based licensees. Facilities-based competition is preferable to service-based competition, even if it requires the duplication of facilities and is therefore costly in the short term. The reason is that dominant operators have a strategic edge in negotiations over interconnection agreements for sharing the infrastructure under their control. Moreover, they can affect the quality of service provided by competitors using that infrastructure. And they behave strategically when facing the prospect of a new entrant building infrastructure that could potentially challenge their monopoly over facilities (Borreau and Dogan 2003).¹⁶

Sri Lanka's least-cost-subsidy auctions would provide an opportunity to increase facilities-based competition in the country and avoid a lock-in to telecommunications technologies that could give a commanding advantage to the dominant operator. Network specifications should be written in a way that is consistent with the requirements of low-income rural communities with little experience and few opportunities to make effective use of high-speed broadband. Care should be taken not to spend more than is necessary and to avoid developing a backbone that will not be fully utilized for a long time.¹⁷ A suitable license and a competitively priced interconnection agreement may need to be part of the tender offer, to enable the winning bidder to complete local and international calls at an affordable price.

In addition, the telecenter program could augment demand by designing the tender to combine connectivity to telecenters with connectivity to government institutions in the small towns to be served. These institutions could include hospitals, libraries, post offices, police stations, and secondary schools.

Increasing Outreach to the Very Poor

The telecenter program will focus on larger towns, mostly forsaking service to ancient (*purana*) villages, which represent about one-fifth of Sri Lanka's 38,000 villages and hold pockets of severe poverty. These ancient villages tend to be remote and isolated, limiting access to transport, education, and health care services. Serving them at an affordable cost would be difficult. If telecenters were allowed to broadcast services or establish wireless connections to those remote areas, a basic level of service could be achieved, but present legislation does not allow either of these options. A review of the legislation precluding local WiFi networks and broadcasting from the telecenters would therefore be beneficial.

Another group difficult to reach are those affected by Sri Lanka's civil war. These include displaced families, amounting to an estimated 380,000 people at the end of 2003 (Norwegian Refugee Council 2004), and people in the provinces of the North and East, beginning to reconstruct their lives in a difficult setting affected by years of destruction and abandoned infrastructure.

A third group needing special assistance are the chronic poor—people who “fall through the cracks” (Tudawe 2001, 20–26). They include the urban poor, especially destitute and indigent people, unemployed youths, female-headed households, older people, street children, and working children.

To help extend services to these groups in special need, grant assistance could reward NGOs willing to support them through innovative approaches making effective use of ICTs. The e-society grants can enable NGOs and grassroots groups to undertake community initiatives using telecenter services. In addition, the design of the telecenter program could be coordinated with other programs aimed at reaching the very poor, especially the Community Development and Livelihood Improvement Project (World Bank 2004a).

Coordinating with Stakeholders

Tackling many of the critical opportunities and challenges that will determine the impact and sustainability of telecenters requires partnerships with a range of government agencies and with civil society:

- Realizing the proposed e-government services requires coordination with such institutions as the Sri Lanka Business Development Center, the University of Colombo, the Institute of Surveying and Mapping,

and the Ministries of Labor, Education, and Agriculture. Similarly, developing interoperable e-government standards requires inter-agency policy decisions in consultation with academia, civil society, and industry stakeholders.

- Work on Sinhala fonts has involved several government agencies. Future work on low-cost software solutions will require coordination with the country's open source community, such as the Linux User Group, Lanka Software Foundation, and University of Colombo School of Computing.
- Ensuring that the proposed local arrangements for using telecenters during morning hours are compatible with education policy and plans for teacher training and ICT use in schools requires coordination with Ministry of Education officials.
- Enhancing the impact of computer literacy training, practice voucher schemes, and telecenter operator training requires good coordination with such agencies and stakeholders as local government officials, chambers of commerce, the Ministry of Education, and the managers of distance learning centers.
- Designing the least-cost-subsidy auction and making changes to allow WiFi and broadcasting from telecenters require coordination with the Telecommunications Regulatory Commission and the adoption of legislation.
- Ensuring interagency coordination is indispensable for determining common connectivity points to be shared by telecenters and government institutions and establishing interagency agreements to enable the government to defray the costs of the infrastructure developed.
- Ensuring that the e-society voucher program is effective requires involving civil society stakeholders and coordinating with other programs that also target NGOs and grassroots organizations.

Achieving good interagency cooperation tends to be difficult. It requires leadership, new mechanisms of coordination, and changes in institutional incentives. Yet the e-Sri Lanka initiative has been marked by an appreciation of the importance of an integrated approach to ICT development from the start. The ICT Agency was created to lead inter-agency cooperation. Focus groups have been formed to involve a broad spectrum of the population in key planning and programming decisions. The ICT Agency should continue to develop tools and incentives to harness the goodwill of other agencies and achieve effective inter-agency coordination.

Fostering Coordination to Exploit Opportunities. Experience shows that seed funding can induce government agencies to innovate and deliver services through telecenters. In the United States, for example, a seed fund provided a good stimulus to innovative e-government services in New York and Virginia, two states with successful e-government programs (Anderson and others 2003).

A similar scheme could be used in Sri Lanka to support innovative e-government modules with a potentially large effect on poverty reduction. A stepwise approach could reduce risks, allowing modules that proved worthwhile to be expanded under ordinary budgetary allocations. Seed funding of e-government services would also facilitate coordination of and compliance with interoperability requirements. Capture of funding on a basis other than merit could be prevented by establishing a special board with strong representation from civil society organizations to select proposals on a competitive basis.

Fostering Coordination to Tackle Challenges. The challenges requiring coordination among multiple stakeholders call for ad hoc stakeholder committees—at both policy and technical levels—to sort out plans, resources, and approaches for implementation. Some of this work started during program design, mainly through working groups for the e-society and telecenter programs.

Two additional mechanisms can help increase the effectiveness of these groups. First, make full use of online public consultation. Online consultation on new plans and activities can help keep other stakeholders informed about opportunities and needs for collaboration. It can help engage citizens, increase awareness, and shift the incentives of public sector staff in support of greater coordination.

Second, use national e-society conferences to review the progress of the e-society fund and the telecenter program. The first e-society conference, held during program preparation, made a valuable contribution by helping to raise awareness of the importance of ICTs for the country's social and economic development. Using such conferences to review progress could add even more to their practical value. After being presented to the ICT Agency and then to other stakeholders for discussion, the results of the annual monitoring and evaluation review should be opened to public scrutiny online and at the e-society conference. A key focus would be coordination issues, and the e-society conference could exert social pressure for coordination and collaboration to meet the challenges.

Early Implementation and Lessons

The telecenter program has proved to be the most politically visible and fluid component of e-Sri Lanka. Despite significant progress in the first phase of its implementation, many uncertainties remain and many lessons are still to be learned. But the early lessons that have emerged reinforce the message that partnerships and coordination among the many stakeholders are critical in taking on both the opportunities and the challenges facing the telecenters, including the continual learning and adaptation demanded for success.

Working with Competing Models and Political Context

The guiding principles, financial and economic analysis, and recommended design for the program have assumed a primarily entrepreneurial and business-driven model, with selective, short-term subsidies and institutional support to maximize development impact without compromising sustainability. What has emerged is two models: the rural knowledge center (RKC), following the original design, and the e-library, a downsized investment of a few computers hosted in temples or other religious institutions.

The RKC model is essentially a demand-driven model, based on public-private partnership, competition, rural entrepreneurship, financial viability, and a support network. In the first year of program implementation more than 70 RKCs were established, a pace far exceeding that needed to reach the target of an estimated 200 telecenters for the first phase of the four-year program.

The e-library model was initiated by the 2004 government, whose focus on rural development was key to its election and whose prime minister was keen to offer services to the poor free of charge through telecenters in religious institutions. Under this model, senior politicians select the communities and monks or priests operate the centers. The model builds on the service orientation of religious leaders and the traffic generated by pilgrims and visiting schoolchildren. But the operators do not charge for services, instead depending on community donations to the religious institution.

The e-library model needs to be monitored and evaluated before the telecenter program scales up to the ambitious target set by the government of 1,000 e-libraries. This model is generating substantial demand and making important contributions to communities. But because it involves no financial incentives and because most e-libraries are run by a single person, most centers close early (about 5:00 pm, when RKCs are

busiest). Moreover, by offering free services, e-libraries are creating expectations for free provision of ICT-enabled services in the future, with serious long-term implications for the financial sustainability of the telecenter program. Public funding is unlikely to be sustainable, and depending on donor funding for the long term is risky.

The concerns go beyond financial sustainability. Locating the facilities in temples has discouraged women from using them. And the implicit support of religious institutions is a contentious issue in a country divided by ethnic and religious conflict.

The e-library model could provide an opportunity for experimentation and adaptation without wasting significant resources if limited to the most visited and financially well-endowed temples. But moving toward the government's target of 1,000 e-libraries will necessarily require locating more in smaller temples, where centers are likely to be underutilized and unsustainable. Extending the support network originally designed for RKC's to the e-libraries could enhance their impact and sustainability. The ICT Agency has taken an important step in this direction by linking the e-library and RKC operators in a network for common training and knowledge sharing.

In developing telecenters, context and local adaptation matter. But international experience suggests that politically popular programs that ignore financial sustainability, entrepreneurial incentives, or local community participation can be costly.

Relying on Connectivity for Sustainability

The planning for the telecenters assumed that most of their revenue would come from local calls and that the telecenters would have broadband connections first through VSAT (satellite) and then through the rural telecommunications networks. But the VSAT operator has been hindered by the incumbent's interconnection charges, which price local calls out of the market. Local content and e-government services, which have the potential to become a major revenue source, will take time to develop. Moreover, Internet-based communications (chatting, Skype, VoIP) have not been functional in many telecenters, perhaps because the VSAT operator, most of whose revenue comes from international phone service, does not allow them. As a result of all this, RKC's depend heavily for current income on computer training. Diversifying their services is critical to their impact and sustainability.

These developments reinforce the interdependency among e-Sri Lanka components. Affordable telecommunications service is key to the

sustainability of the telecenters and to their use as a hub for learning and knowledge services. This sustainability, in turn, depends on regulatory enforcement of cost-based provision of interconnection, but that remains a challenge. Without local calls as a source of income, telecenters are likely to find it tough to survive—both in the short term, as content and e-services are being developed, and in the medium term, as the connectivity subsidy is eliminated. That local entrepreneurs have taken up the challenge of investing in telecenters is testimony to their courage.

Developing Digital Literacy and Local Content

Telecenters are revealing subtle aspects of the digital divide, relating to local-language content, digital literacy, and local needs for basic information.

Sri Lanka's high literacy rate is contributing to a quick buildup of demand. But while most of the online content is in English, few of the literate majority are literate in English. Tamil speakers fare better, because more content is available in Tamil (from India) than in Sinhala.

Long-term demand for telecenters also depends on developing digital literacy. The voucher scheme, expected to address this need, will have to have more funding. Operators are finding innovative ways to develop digital literacy, but broadening the demand for telecenter services through digital literacy will take time, and the public sector is better positioned to provide this initial education expenditure.

To help better meet local needs for basic information, the ICT Agency has formulated a content development strategy. Aimed at complementing the efforts of local entrepreneurs, this strategy defines priorities for local content to be developed at the community and national levels. At the community level, the strategy calls for focusing on mapping exercises to assemble, for example, directories of local government, private sector, and NGO services and resources. This exercise could be conducted by young people in exchange for computer training and Internet access. At the national level, a third-party agent is needed to conduct systematic surveys of government agencies, national NGOs, and donor-funded institutions to catalogue the priority content that these organizations are developing. The e-society fund and telecenter support institutions are expected to support such initiatives. Universities could also play an active role. All these efforts should ensure that priority is given to content most relevant to young adults, who have been the biggest users of telecenters.

Notes

1. The intent is for the program to extend affordable access to towns with populations of less than 5,000 through partnerships among the private, public, and civil society sectors while leaving it to entrepreneurs to extend services to towns with sufficient population density to support telecenters without initial subsidies.
2. Social interaction through e-mail and chat rooms is often undervalued as superficial, just as it was in the early days of “snail mail” and the telephone. Yet such point-to-point communication forms the basis for trust and social capital and for economic interaction and exchange (Odlyzko 2000; Proenza 2002).
3. In Sri Lanka, the formal banking sector has limited reach in rural communities, supplying less than 19 percent of the credit requirements of smallholders and often forcing the rural poor to rely on high-interest moneylenders (Bandara 1997; Olsen 2001). NGOs, using local knowledge much as moneylenders do, increase local competition in financial services and often provide a good alternative at a lower cost (Wenner and Proenza 2000).
4. In Sri Lanka, Sarvodaya, an NGO with a financial and microenterprise service network (Sarvodaya Economic Enterprise Development Services, or SEEDS) that extends throughout the country, is one of the partners of the telecenter program.
5. This is the approach used for the competitive e-society grants, aimed at encouraging innovative uses of ICTs in support of community development and poverty reduction.
6. The main networks providing services in support of micro, small, and medium-size enterprises in Sri Lanka include the Ministry of Youth Affairs and Sport (mainly through its Small Entrepreneurship Development Division and the National Youth Cooperatives), Ministry of Tourism and Rural Industrial Development (Department of Small Industries, Industrial Development Board, Sri Lanka Handicrafts Board, and National Design Center), Sri Lanka Export Development Board, Department of Textile Industry, Sri Lanka Business Development Center, Small and Medium Enterprise Development Project (German Agency for Technical Cooperation), Federation of Thrift and Credit Cooperative Societies (Sanasa movement), and Sarvodaya Economic Enterprise Development Services (SEEDS).
7. See, for example, the award-winning Chilean site for trámite e fácil, <http://www.tramitefacil.cl>.
8. A good working model is the Chilean technical assistance service Web site (<http://www.redsercotec.org>), through which registered entrepreneurs submit queries online to more than 80 specialists on 40 different topics and get a response within 48 hours. The site offers a choice of several specialists for each category of advice.

9. About 75 percent of Sri Lanka's population are Sinhala speakers, and 25 percent are Tamil speakers. The official national languages are Sinhala and Tamil. English is commonly used in government and is spoken by about 10 percent of the people, mainly in urban areas.
10. Consider the Republic of Korea, where the national language uses no Latin characters and few people are fluent in English. Not unreasonably, the top 10 Web sites visited by Korean Internet users are Korean language sites, and few Koreans surf non-Korean sites (ITU 2004b, 11).
11. Software products are generally subject to network economies that make an application rise rapidly in value as the number of its users increases. This leads to winner-take-most markets, where a single enterprise achieves overwhelming dominance. Network effects are greatest where a significant investment in a proprietary technology is already in place. That situation is hardly the case in Sri Lanka, where e-government and computerization are just starting.
12. The Hypertext Markup Language (HTML) exemplifies a successful software that is in the public domain and is continually upgraded by a consortium of corporations, research groups, nonprofit organizations, and government agencies.
13. The small municipality of Extremadura, Spain, was perhaps the first to make the move, but major cities like Bergen and Barcelona have followed suit (InformaticaPublica 2004; Znet 2004). Munich and Paris are also considering migrating most of their systems, including desktop applications, to open source (Lettice 2004; Libbenga 2004). The government of Brazil will reportedly migrate 80 percent of its computers to Linux (Miyajima 2003).
14. In the United States, some states and cities have formed the Government Open Code Collaborative Repository to enable government agencies to share open source software code (http://www.gocc.gov/docs/about_GOCC). Municipalities in Spain (Extremadura and Barcelona) and Brazil (Porto Alegre) have established a similar network to exchange experiences and software developments (Porto Alegre Government 2004). A similar initiative has been proposed for the European Union. The United Kingdom has adopted a flexible open source policy (United Kingdom, Cabinet Office 2002). It has also adopted an interoperability framework mandating the use of open standards by all government agencies (United Kingdom, Cabinet Office 2004). Proprietary software is allowed as long as it meets the open standards.
15. The city of São Paulo has run a telecenter program in an open source environment, including the operating system (Linux) and desktop applications, since 2001 (<http://www.telecentros.sp.gov.br>). The city now sponsors 107 telecenters, all in its most impoverished areas, showing that inexperienced users can do well in an open source environment. The program serves as a model for Brazil's national telecenter program, now being implemented.
16. According to the Office of the United States Trade Representative (2004), SLT (Sri Lanka Telecom) and the two wireless operators have formed an

unofficial cartel to control local gateways and restrict interconnection to other operators. This has adversely affected the operations of other telecom and Internet operators and new international gateway licensees who are unable to make use of their licenses due to lack of interconnection by the three local exchange operators.

17. Some countries in Latin American and the Caribbean are making good progress in developing rural telecommunications services. These countries have incomes and population densities similar to Sri Lanka's and are using an approach to supporting infrastructure development similar to e-Sri Lanka's. The least-cost-subsidy auction has been most widely used in Chile, Colombia, and Peru, with other countries in the region following their example. Two features of the regional experience stand out. First, connectivity specifications are modest, commensurate with the low-productivity setting and the limited ability of rural populations to afford high-speed broadband. Second, although the auction has been technology neutral, satellite technology (particularly VSAT) has repeatedly won out.

Bibliography

- Abeyasinghe, Kumar. 2002. "Regulatory Issues in the Era of Convergence: Sri Lanka's Perspective." *Daily News* (Colombo), May 23.
- Accenture. 2002. *E-government Leadership: Realizing the Vision*. <http://www.accenture.com>.
- Adelman, Irma. 2000. "Fifty Years of Economic Development: What Have We Learned?" Paper presented at the Annual World Bank Conference on Development Economics—Europe 2000, Paris, June 26–28.
- Aizu, Izumi. 2002. "A Comparative Study of Broadband in Asia: Deployment and Policy." Asia Network Research, Tokyo. http://www.anr.org/web/html/index_e.htm.
- Allee, Verna. 2003. *The Future of Knowledge*. Amsterdam: Butterworth Heinemann.
- Anderson, Robert, Tora K. Bikson, Rosalind Lewis, Joy Moini, and Susan Straus. 2003. *Effective Use of Information Technology: Lessons about State Governance Structures and Processes*. Santa Monica, CA: Rand Corporation. <http://www.rand.org/publications/MR/MR1704/>.
- Aryasinha, Ravinatha. 2002. "The Internet in South Asia: Opportunities and Challenges." *Daily News* (Colombo), January 23, 26, and 28.
- A. T. Kearney. 2003. "Selecting a Country for Offshore Business Processing: Where to Locate." Company report. http://www.atkearney.com/shared_res/pdf/Where_to_Locate_S.pdf.

- Badshah, Akhtar, Sarbuland Khan, and Maria Garrido, eds. 2003. *Connected for Development: Information Kiosks and Sustainability*. New York: United Nations, Department of Economic and Social Affairs, ICT Task Force.
- Bandara, W. M. Abeyratna. 1997. "Rural Poverty in Sri Lanka." Paper presented at the Regional Expert Meeting on Capability-Building to Alleviate Rural Poverty, Beijing, March 25–28. United Nations Economic and Social Commission for Asia and the Pacific, Bangkok. http://www.unescap.org/rural/doc/beijing_march97/sri_lanka.PDF.
- Barr, Avron, and Shirley Tessler. 2002. "Developing Sri Lanka's Software Industry." Aldo Ventures. Report to the World Bank, South Asia Region, Washington, DC.
- Bornstein, David. 2004. *How to Change the World: Social Entrepreneurs and the Power of New Ideas*. Oxford, UK: Oxford University Press.
- Borraeu, Marc, and Pinar Dogan. 2003. "Service-Based vs. Facility-Based Competition in Local Access Networks." <http://www.enst.fr/egsh/borraeu/Recherche/policyLL.pdf>.
- Brazil, Comitê Executivo de Governo Eletrônico. 2004. "E-PING Padrões de Interoperabilidade de Governo Eletrônico." Brasília. http://www.governoeletronico.gov.br/governoeletronico/publicacao/down_anexo.wsp?tmp.arquivo=E15_385eping_minuta_v031052004_consulta.pdf.
- Broadbent, Marianne, and Ellen S. Kitzis. 2005. *The New CIO Leader: Setting the Agenda and Delivering Results*. Boston: Harvard Business School Press.
- Brynjolfsson, Erik, and Lorin M. Hitt. 2000. "Beyond Computation: Informational Technology, Organizational Transformation, and Business Performance." *Journal of Economic Perspectives* 14 (4): 23–48.
- . 2003. "Computing Productivity: Firm-Level Evidence." *Review of Economics and Statistics* 85 (4): 793–808. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=290325.
- BSA (Business Software Alliance) and IDC (International Data Corporation). 2004. *First Annual BSA and IDC Global Software Alliance Piracy Study*. Washington, DC. <http://www.bsa.org/globalstudy/>.
- Carmel, Erran. 2003. "The New Software Exporting Nations: Impacts on National Well-Being Resulting from Their Software Export Industry." *Electronic Journal on Information Systems in Developing Countries* 13 (2). <http://www.ejisdc.org>.
- Central Bank of Sri Lanka. 2002. *Annual Report for 2001*. Colombo.
- . 2003a. *Annual Report for 2002*. Colombo.
- . 2003b. *Performance 2002 and Activities 2003*. Colombo.
- . 2004. *Annual Report for 2003*. Colombo.
- Chang, Ha-Joon, ed. 2003. *Rethinking Development Economics*. London: Anthem Press.

- Clarke, Sir Arthur C., and Nalaka Gunawardene. 1999/2001. "A Cyber Odyssey." *Himal Southasian* (Kathmandu). <http://www.himalmag.com>.
- Colle, Royal D., and Raul Román. 2003. *A Handbook for Telecenter Staffs*. A project sponsored by the International Telecommunication Union, Food and Agriculture Organization, and Communication Department of Cornell University. Ithaca, NY: Cornell University. <http://ip.cals.cornell.edu/commdev/handbook.cfm>.
- Competitiveness Initiative. 2002. *Roadmap for ICT Success in Sri Lanka*. Colombo.
- CSSL (Computer Society of Sri Lanka). 2003. "International Computer Driving License." Press release. Colombo, January 13. http://www.cssl.lk/computer_driving_license.htm.
- Dawson, Ross. 2005. *Developing Knowledge-Based Client Relationships*. Boston: Elsevier.
- Dedrick, Jason, and Joel West. 2004. "An Exploratory Study into Open Source Platform Adoption." In *Proceedings of the 37th Hawaii International Conference on System Sciences-2004*. <http://csdl.computer.org/comp/proceedings/hicss/2004>.
- Dedrick, Jason, Vijay Gurbaxani, and Kenneth L. Kraemer. 2002. "Information Technology and Economic Performance: Firm and Country Evidence." University of California, Center for Research on Information Technology and Organizations, Irvine. <http://repositories.cdlib.org/crito/business/296/>.
- Denning, Stephen. 2005. *The Leader's Guide to Storytelling*. San Francisco: Jossey-Bass.
- de Silva, Harsha. 2004. "The Govi Gnana [Farmer Knowledge] System: An Innovative ICT Solution to Fight Agricultural Poverty in Sri Lanka." *Sinhala ICT Monthly*, June 2. http://www.pariganaka.lk/article/june_2.asp.
- Dias, Gilhan. n.d. "Using IT in Local Languages." Sri Lanka, ICT Agency, Colombo. <http://www.fonts.lk/doc/local%20language%20IT.pdf>.
- Dravis, Paul. 2004. *Open Source Software: Perspectives for Development*. Report prepared for infoDev Symposium. infoDev Program of the World Bank, Washington, DC. <http://www.infodev.org/symp2003/publications/OpenSourceSoftware.pdf>.
- Drucker, Peter. 1993. *The Post-Capitalist Society*. Oxford, UK: Butterworth Heinemann.
- The Economist*. 2003. "Open Source's Local Heroes." December 13. http://www.economist.com/science/tq/displaystory.cfm?story_id=2246308.
- Ellerman, David. 2005. *Helping People Help Themselves: From the World Bank to an Alternative Philosophy of Development Assistance*. Ann Arbor: University of Michigan Press.

- Ellerman, David, Stephen Denning, and Nagy Hanna. 2001. "Active Learning and Development Assistance." *Journal of Knowledge Management* 5 (2): 171–79.
- ESC (Electronics and Computer Software Export Promotion Council). 2003. *An Introduction to Sri Lanka*. A workshop conducted by the Sri Lanka Business Development Center for the Asia Foundation. Bangalore.
- Fernando, U. 2003. "The Landscape of NGOs in Sri Lanka: Issues and Challenges." Amsterdam Research Institute for Global Issues and Development Studies. http://www2.fmg.uva.nl/agids/publications/2003/fernando_ls.html.
- Fountain, Jane E. 2001. *Building the Virtual State*. Washington, DC: Brookings Institution Press.
- Franke, Nikolaus, and Eric von Hippel. 2002. "Satisfying Heterogeneous User Needs via Innovation Toolkits: The Case of Apache Security Software." Working Paper 4341-02, Massachusetts Institute of Technology, Sloan School of Management, Cambridge, MA. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=299419.
- Friedman, Thomas L. 2005. *The World Is Flat: A Brief History of the Twenty-First Century*. New York: Farrar, Straus, and Giroux.
- Fukuyama, Francis. 2004. *State-Building: Governance and World Order in the 21st Century*. Ithaca, NY: Cornell University Press.
- Gamage, Aruna S. 2003. "Small and Medium Enterprise Development in Sri Lanka: A Review." Meijo University, Faculty of Business Management, Nagoya, Japan. http://wwwbiz.meijo-u.ac.jp/SEBM/ronso/no3_4/aruna.pdf.
- Gunaratne, Shelton. 2000. "Sri Lanka." In *Handbook of the Media in Asia*, ed. Shelton Gunaratne. New Delhi: Sage.
- Gunawardane, Gamini Nanda, and Nishantha Dantnarayana, eds. 2002. *E-reality: Proceedings of the 21st National IT Conference*. Colombo: Computer Society of Sri Lanka.
- Gunawardane, R. P. 2001. "Moving Sri Lanka Swiftly into the E-world." *Daily News* (Colombo), January 23.
- . 2002. "Citizen Friendly Public Service through E-governance." *Daily News* (Colombo), March 1.
- Gunawardane, Nalaka, and Chanuka Wattedgama. 2001. "Sri Lanka." In *Internet in Asia*, ed. Sankaran Ramanathan and Jorg Becker, Singapore: Asian Media Information and Communication Centre.
- Gunetilleke, Neranjana. 2000. "Basic MIMAP Poverty Profile: Sri Lanka." Institute of Policy Studies, Colombo. Draft, August. <http://web.idrc.ca/uploads/user-S/10282110970mimap49.doc>.
- Hahn, Robert W., ed. 2002. *Government Policy toward Open Source Software*. Washington, DC: AEI-Brookings Joint Center for Regulatory Studies. <http://www.aei.brookings.org/publications/abstract.php?pid=296>.

- Hamel, Gary, and C. K. Prahalad. 1994. *Competing for the Future*. Boston: Harvard Business School Press.
- Hanna, Nagy. 1991. "The Information Technology Revolution and Economic Development." Discussion Paper 120, World Bank, Washington, DC.
- . 1994. "Exploiting Information Technology for Development: A Case Study of India." Discussion Paper 246, World Bank, Washington, DC.
- . 1996. "The East Asian Miracle and Information Technology." Discussion Paper 326, World Bank, Washington, DC.
- . 2003. "Empowering the Rural Poor through Community Information and Learning Centers." Report submitted to Japan Social Development Fund. World Bank, Washington, DC.
- . 2004. "Why National Strategies Are Needed for ICT-Enabled Development." ISG Staff Working Paper 3, World Bank, Information Solutions Group, Washington, DC.
- Hanna, Nagy, and Sandor Boyson. 1993. "Information Technology in World Bank Lending." Discussion Paper 206, World Bank, Washington, DC.
- Hanna, Nagy, and Robert Picciotto. 2002. *Making Development Work: Developmental Learning in a World of Poverty and Wealth*. New Brunswick, NJ: Transaction Publishers.
- Hanna, Nagy, Ken Guy, and Erik Arnold. 1995. "The Diffusion of Information Technology: Experience of Industrial Countries and Lessons for Developing Countries." Discussion Paper 281, World Bank, Washington, DC.
- Hanna, Nagy, Shirley Tessler, and Avron Barr. 2003. "National Software Industry Development: Considerations for Government Planners." *Electronic Journal on Information Systems in Developing Countries* 13 (2). <http://www.ejisdc.org>.
- Haque, Irfan. 2006. "Rethinking Industrial Policy." Report prepared for United Nations Conference on Trade and Development, Geneva.
- Harris, R. W. 2003. "A Framework for Poverty Alleviation with ICTs." In *Community Networking and Community Informatics: Prospects, Approaches, Instruments*, ed. Michael Gurstein, Michel Menou, and Sergei Stafeev. St. Petersburg, Russian Federation: Center of Community Networking and Information Policy Studies.
- Hausmann, Ricardo, and Dani Rodrik. 2003. "Economic Development and Self-Discovery." *Journal of Development Economics* 72: 603–33.
- Heeks, Richard. 2002. "Failure, Success and Improvisation of Information Systems Projects in Developing Countries." Development Informatics Working Paper 11, University of Manchester, Institute for Development Policy and Management, Manchester, UK.
- , ed. 2003. *Reinventing Government in the Information Age: International Practice in IT-Enabled Public Sector Reform*. London: Routledge.

- Hirschman, Albert O. 1994. *Development Projects Observed*. Washington, DC: Brookings Institution Press.
- ICT Agency. "Internal memo." ICT Agency, Sri Lanka.
- ICT Cluster Initiative. 2002. "A Competitiveness Strategy for Sri Lanka's Information and Communication Technology Industry." Colombo.
- ILO (International Labour Organization). 2001. *World Employment Report 2001*. Geneva.
- InformaticaPublica. 2004. "L'Ajuntament de Barcelona comença la migració al software Lliure en català." Barcelona, July 21. http://www.informaticapublica.com/notis/noticia.php?id=169&show_comments=true.
- International Monetary Fund. 2001. *World Economic Outlook: The Information Technology Revolution*. Washington, DC.
- International Trade Center. 2000. *Offshore Back-Office Operations: Supplying Support Services to Global Markets*. Geneva.
- ITU (International Telecommunication Union). 2003. *Broadband Korea: Internet Case Study*. Geneva. http://www.itu.int/ITU-D/ict/cs/korea/material/CS_KOR.pdf.
- . 2004a. *ITU Database*. Geneva.
- . 2004b. *Shaping the Future Mobile Information Society: The Case of the Republic of Korea*. Geneva. <http://www.itu.int/osg/spu/ni/futuremobile/general/casestudies/koreacase-rv4.pdf>.
- Japan International Cooperation Agency. 2000. "Industrial Master Plan for Sri Lanka." Prepared by Council for Information Technology (CINTEC), National Policy for IT, Colombo.
- Jayasuriya, Sisira, and Malathy Knight-John. 2002. "Sri Lanka's Telecommunications Industry: From Privatization to Anti-Competition?" Working Paper 14, University of Manchester, Institute for Development Policy and Management, Centre on Regulation and Competition, Manchester, U.K. <http://idpm.man.ac.uk/crc/wpdl149/wp14.pdf>.
- Jomo K. S. and Ben Fine, eds. 2006. *The New Development Economics*. London: Zed Books.
- Kamarck, Elaine C., and Joseph S. Nye, eds. 2002. *Governance.com: Democracy in the Information Age*. Washington, DC: Brookings Institution Press.
- Kaufmann, Daniel, Aart Kraay, and Massimo Mastruzzi. 2003. "Governance Matters III: Governance Indicators for 1996–2002." Policy Research Working Paper 3106, World Bank, World Bank Institute, Washington, DC. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=405841.
- Kotter, John P. 1996. *Leading Change*. Boston: Harvard Business School Press.

- Lall, Sanjaya. 1999. "Competing with Labour: Skills and Competitiveness in Developing Countries." Issues in Development Discussion Paper 31, International Labour Organization, Geneva.
- . 2001. *Competitiveness, Technology and Skills*. Cheltenham, U.K.: Edward Elgar.
- Lee, Heejin, and Jyoti Choudrie. 2002. "Investigating Broadband Deployment in South Korea." Report on broadband mission to Republic of Korea. U.K. Department of Trade and Industry and Brunel University, London. http://www.broadbanduk.org/reports/SKorea_report.pdf.
- Lee, Nae-Chan. 2002. "Broadband Internet Service: Korea's Experience." Republic of Korea, Ministry of Information and Communications, Seoul. http://www.mic.go.kr/eng/res/res_pub_db/res_pub_sep_brd/Broadband_Internet_in_Korea_2002.pdf.
- Lettice, John. 2004. "MS Offers 57% Price Cut as Paris Tilts to Open Source." *The Register*, July 2. http://www.theregister.co.uk/2004/07/02/ms_fights_paris_open_source/.
- Libbenga, Jan. 2004. "Munich Embraces the Penguin." *The Register*, June 17. http://www.theregister.co.uk/2004/06/17/munich_embraces_penguin/.
- Liyanaige, Lalith. 2002. "Why Sri Lanka Needs a National Policy in Information Technology." *Daily News* (Colombo), July 24.
- Lundvall, Bengt-Ake. 1996. "Information Technology in the Learning Economy: Challenges for Development Strategies." Background paper for United Nations Commission on Science and Technology for Development (UNCSTD) Working Group on IT and Development, UNCSTD, New York.
- Mansell, Robin, and Uta Wehn. 1998. *Knowledge Societies: Information Technology for Sustainable Development*. Oxford, UK: Oxford University Press.
- Matta, Nadim, Ron Ashkenes, and Jean-François Rischard. 2000. "Building Client Capacity through Results." Report, World Bank, Washington, DC.
- McKinsey Global Institute. 2003. "Offshoring: Is It a Win-Win Game?" Report, San Francisco.
- . 2004. "Exploring the Myths about Offshoring." Report, San Francisco.
- . 2005. *The Emerging Global Labor Market: Part III—How Supply and Demand for Offshore Talent Meet*. San Francisco.
- Michiels, S. L., and L. Van Crowder. 2001. "Discovering the 'Magic Box': Local Appropriation of Information and Communication Technologies." Food and Agriculture Organization, Sustainable Development Department, Rome. http://www.fao.org/sd/2001/kn0602a_en.htm.
- Mitra, Raja M. 2004. "IT and ITES Industry Development in Sri Lanka: Strategic Review and Action Agenda." World Bank, South Asia Region, Washington, DC.

- Miyajima, André. 2003. "Brazilian Government to Adopt Linux." Yankee Group Research, Boston.
- Mody, Ashoka, and Carl Dahlman, eds. 1992. "Diffusion of Information Technology: Opportunities and Constraints." Special issue, *World Development* 20 (12): 1703–19.
- Moore, Mark. 1998. *Creating Public Value: Strategic Management in Government*. Cambridge, MA: Harvard University Press.
- Moragoda, Milinda. 2002. Parliamentary speech, Appropriation Bill 2002. Committee Stage Debate on the Ministry of Economic Reform, Science, and Technology. *Daily News* (Colombo), April 12.
- Mutaliph, T. M. Z., D. Wasantha, and Anila Dias Bandaranaike. 2002. *A Provisional Estimation and Analysis of Regional Economic Activity in Sri Lanka (1996–2000)*. Colombo: Central Bank of Sri Lanka. <http://www.lanka.net/centralbank/Staff%20Studies%20-31&32-2001&2002.pdf>.
- National Chamber of Commerce of Sri Lanka. 2002. "Recommendations: Transforming Sri Lanka through Information, Communication and Technology." Report, Colombo.
- Navas-Sabater, Juan, Andrew Dymond, and Niina Juntunen. 2002. "Telecommunications and Information Services for the Poor: Toward a Strategy for Universal Access." Discussion Paper 432, World Bank, Washington, DC.
- North, Douglass C. 1990. *Institutions, Institutional Change and Economic Performance*. Cambridge, UK: Cambridge University Press.
- Norwegian Refugee Council. 2004. "Sri Lanka: Setbacks in Peace Process Perpetuate Suffering of Internally Displaced People." Oslo. <http://www.idproject.org/>.
- NTIA (National Telecommunication and Information Administration). 2002. "Falling through the Net: Defining the Digital Divide." Report, Washington, DC.
- Odlyzko, Andrew. 2000. "The History of Communications and Its Implications for the Internet." Draft, June 16. University of Minnesota, Digital Technology Center, Minneapolis. <http://www.dtc.umn.edu/~odlyzko/doc/networks.html>.
- OECD (Organisation for Economic Co-operation and Development). 2000. *Regulatory Reform in Korea: Regulatory Reform in the Telecommunications Industry*. Paris. <http://www.oecd.org/dataoecd/25/27/2956241.pdf>.
- Office of the United States Trade Representative. 2004. "Sri Lanka." In *2004 National Trade Estimate Report on Foreign Trade Barriers*. United States Government Printing Office, Washington, DC.
- Oksa, Jukka, and Jarno Turunen. 2000. "Local Community Net: Evaluation Study of the Learning Upper Karelia Project." Report, University of Joensuu, Karelian Institute, Joensuu, Finland. <http://www.joensuu.fi/ktl/projsoc/infosoc/upperkar.pdf>.

- Olsen, Wendy. 2001. "Poverty and Access to Credit in Sri Lanka in the 1990s: A Multilevel Analysis." Report, University of Manchester, School of Social Science, Cathie Marsh Centre for Census and Survey Research. <http://www.ccsr.ac.uk/staff/wkolsen/paper1draft2.doc>.
- OSRM (Open Source Risk Management). 2004. "OSRM Position Paper: Mitigating Linux Patent Risk." Release Version 1.1., Durham, NC.
- Overy Miehlsbradt, Alexandra. 2002. *Assessing Markets for Business Development Services: What Have We Learned So Far?* Geneva: International Labour Organization.
- Perez, Carlota. 2001. "Technological Change and Opportunities for Development as a Moving Target." Report, United Nations University, Maastricht.
- Peters, Thomas J., and Robert H. Waterman Jr. 1982. *In Search of Excellence: Lessons from America's Best-Run Companies*. New York: Harper & Row.
- Porter, Michael. 1990. *The Competitive Advantage of Nations*. New York: Free Press.
- Porto Alegre Government. 2004. "Porto Alegre integra Rede de Cooperação de Governos Locais pelo Software Livre." Report, Porto Alegre, Brazil. <http://www.portoalegre.rs.gov.br/noticias/Default.asp?proj=81&secao=369&m1=21862>.
- Prahalad, C. K. 2005. *The Fortune at the Bottom of the Pyramid: Eradicating Poverty through Profits*. Upper Saddle River, NJ: Wharton School Publishing.
- Premaratne, Sandaran P. 2002. *Entrepreneurial Networks and Small Business Development: The Case of Small Enterprises in Sri Lanka*. Colombo.
- Proenza, Francisco J. 2002. "E-ForAll: A Poverty Reduction Strategy for the Information Age." Report, Food and Agriculture Organization (FAO). <http://www.e-ForAll.org/publications.php>.
- . 2003. "A Public Sector Support Strategy for Telecenter Development." In *Connected for Development: Information Kiosks and Sustainability*, ed. Akhtar Badshah, Sarbuland Khan, and Maria Garrido, 9-24. New York: United Nations, Department of Economic and Social Affairs, ICT Task Force.
- Radwan, Ismail, and Gihani Fernando. 2006. "Offshore to Sri Lanka." World Bank, South Asia Region, Washington, DC; and Ari Investment Limited, Nugegoda, Sri Lanka.
- Ratnaweera, Anuradha. 2003. "Migrating to Open Source." In *Proceedings of the 22nd National IT Conference*. Colombo: Computer Society of Sri Lanka. <http://www.cssl.lk/conferences/anurada%20ratnaweera%20letter%20size.doc>.
- Ratnayake, R. M. K. 2002. "Country Case Study: Sri Lanka." Paper presented at the World Bank Regional Workshop on Land Issues in Asia, Phnom Penh, Cambodia, June 4–6. <http://lnweb18.worldbank.org/ESSD/ardext.nsf/24ByDocName/ProgramfortheAsiaRegionalWorkshop>.

- Rodrik, Dani. 2000. "Development Strategies for the Next Century." Paper presented at the Annual World Bank Conference on Development Economics, Washington, DC, April 8.
- . 2004a. "Getting Institutions Right." CESifo DICE Report. University of Munich, Center for Economic Studies and Ifo Institute for Economic Research, Munich.
- . 2004b. "Industrial Policy for the Twenty-First Century." Report, Harvard University, John F. Kennedy School of Government, Cambridge, MA.
- Samarajiva, Rohan. 1997. "Institutional Reform of Sri Lankan Telecommunications: The Introduction of Competition and Regulation." In *Telecommunication Systems in Western Asia and the Middle East*, ed. Eli Noam. New York: Oxford University Press.
- Samarajiva, Rohan, and Anupam Dokeniya, with Sabina Fernando, Shan Manikkalingam, and Amal Sanderatne. 2005. "Regulation and Investment: Sri Lanka Case Study." In *Report on the World Dialogue on Regulation—Stimulating Investment in Network Development: Roles for Regulators*, ed. A. K. Mahan and W. H. Melody. World Dialogue on Regulation for Network Economies. http://www.regulateonline.org/index.php?option=com_docman&task=docclick&Itemid (accessed February 10, 2006).
- Samaranayake, V. K. 1978. "Presidential Address." In *Proceedings of the Annual Sessions of the Sri Lanka Association for the Advancement of Science (SLAAS)*. Section E. Colombo: SLAAS.
- . 2000. "E-learning: The Sri Lankan Experience." Paper presented at the South East Asia Regional Computer Confederation Conference, Manila.
- . 2001. "Human Resource Development in IT: A Case Study of Some Innovative Initiatives from Sri Lanka." Paper, University of Colombo.
- . 2002. "An Overview of Human Resources: Needs, Availability and Plans for the Future." In *E-reality: Proceedings of the 21st National IT Conference*. Colombo: Computer Society of Sri Lanka.
- Scott, James C. 1998. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven, CT: Yale University Press.
- Senge, Peter. 2000. "Leading Learning Organizations." In *Knowledge Management: Classic and Contemporary Works*, ed. Daryl Morey, Mark Maybury, and Bhavani Thuraisingham, Cambridge, MA: MIT Press.
- Shrestha, Govinda, and Saman Amarasinghe. 2001. "Perspectives on the Use of the Internet in Sri Lanka." LCS Technical Report TR-815, Massachusetts Institute of Technology. Laboratory for Computer Science, Cambridge, MA.
- Sida (Swedish International Development Cooperation Agency). 2002. *Country ICT Survey for Sri Lanka*. Prepared by Greenberg ICT Services. Stockholm.
- Sri Lanka, Board of Investment. 2003. *Investor Information: The IT Industry*. Colombo.

- Sri Lanka Business Development Center. 2002. *Survey on E-commerce Implementation in the SME Sector of Sri Lanka*. Colombo.
- Sri Lanka, Department of Agriculture. 2004. "Establishment of a National Agricultural Information Network (Cyber Agricultural Extension)." *News and Events of the Department of Agriculture, 2004*. Colombo. <http://www.gov.lk/Agriculture/Agridept/NEWS/News.htm>.
- Sri Lanka, Department of Census and Statistics. 2001. *Census of Population and Housing 2001*. Colombo. <http://www.statistics.gov.lk/census2001/population/district/t001a.htm>.
- . 2003. *Poverty Indicators: Household Income and Expenditure Survey 2002*. Colombo. <http://www.statistics.gov.lk>.
- . 2004. *Official Poverty Line for Sri Lanka*. Colombo. <http://www.statistics.gov.lk/poverty/OfficialPovertyLineBuletin.pdf>.
- Sri Lanka, Government. 2002. *Regaining Sri Lanka: Vision and Strategy for Accelerated Development*. Poverty Reduction Strategy Paper. Colombo.
- . 2003. "ICT Act No. 27 of 2003." Colombo. June.
- . 2003. "Intellectual Property Act No. 36 of 2003." Colombo.
- Sri Lanka, Ministries of Education and Higher Education. 2001. *National Policy on IT in Education*. Colombo.
- Sri Lanka, Ministry of Education. 2001. "Achieving Excellence with Equity." Colombo. Report. <http://www.gov.lk/moe/publications/pdfs/education.pdf>.
- . 2003. "National Policy on Information Technology in School Education." Information Technology Unit, Colombo. <http://www.gov.lk/moe/itunit/itpolicy.pdf>.
- Sri Lanka, Ministry of Plantation Industries, n.d.
- Sri Lanka, Ministry of Science and Technology. 2002. *E-Sri Lanka: An ICT Development Road Map*. Colombo.
- Stiglitz, Joseph E. 1998. "Towards a New Paradigm for Development: Strategies, Policies, and Processes." 1998 Prebisch Lecture. United Nations Conference on Trade and Development, Geneva, October 19.
- . 2000. "Whither Reform? Ten Years of the Transition." In *Annual World Bank Conference on Development Economics 1999*, ed. Boris Pleskovic and Joseph E. Stiglitz. Washington, DC: World Bank.
- Timberman, David, and Gwendolyn G. Bevis. 2001. "Sri Lanka Democracy and Governance Assessment." USAID Consultancy Report. U.S. Agency for International Development Mission, Colombo. http://www.dec.org/pdf_docs/PNACU797.pdf.
- Tudawe, Indra. 2001. "Chronic Poverty and Development Policy in Sri Lanka: Overview Study." Chronic Poverty Research Center Working Paper 9, Institute of Policy Studies, Colombo. <http://www.chronicpoverty.org/pdfs/srilanka.pdf>.

- Tushman, Michael L., and Charles A. O'Reilly III. 1997. *Winning through Innovation: A Practical Guide to Leading Organizational Change and Renewal*. Boston: Harvard Business School Press.
- UNDP (United Nations Development Programme). 2001. *Human Development Report 2001: Making New Technologies Work for Human Development*. New York: Oxford University Press.
- . 2003. *Human Development Report 2003: Millennium Development Goals—A Compact among Nations to End Human Poverty*. New York: Oxford University Press. <http://www.undp.org/hdr2003/>.
- UNDP-APDIP (United Nations Development Programme, Asia-Pacific Development Information Programme). 2004. *ICT Policies and E-strategies in the Asia-Pacific*. New Delhi: Reed Elsevier India.
- United Kingdom, Cabinet Office. 2000. *Successful IT: Modernizing Government in Action*. Review of Major Government IT Projects. E-government Unit, London. http://e-government.cabinetoffice.gov.uk/Resources/ITReportsArticle/fs/en?CONTENT_ID=4000011&chk=PX6aOu.
- . 2002. *Open Source Software: Use within UK Government*. London. http://www.govtalk.gov.uk/policydocs/consult_subject_document.asp?docnum=780.
- . 2004. "E-government Interoperability Framework." Version 6.0. Office of the E-envoy, London. http://www.govtalk.gov.uk/documents/e-gif-v6-0_.pdf.
- United Nations, Department of Economic and Social Affairs. 2003. "World Public Sector Report 2003: E-government at the Crossroads." New York. <http://unpan1.un.org/intradoc/groups/public/documents/un/unpan012733.pdf>.
- Wade, Robert. 1990. *Governing the Market: Economic Theory and the Role of Government in East Asian Industrialization*. Princeton, NJ: Princeton University Press.
- Wanninayaka, T. B. Nandasiri. 2003. "Taking Information and Communications Technology to the Rural Sri Lankan Villages." In *Proceedings of the 22nd National IT Conference, 2003*. Colombo: Computer Society of Sri Lanka. <http://www.cssl.lk/conferences/Taking%20ICT%20to%20the%20Rural%20Sri%20Lankan%20VillagesHorizon%20Papers%20-NITC%202003-final%20draft.doc>.
- Wattegama, Chanuka. 1997. "Ape aththan Pariganaka valata Sinhala igannu hetii" (How we have taught Sinhala to computers). *Lankadeepa* (Colombo), *Pariganaka* supplement, August 12.
- . 2001. "Software Industry in Sri Lanka." Keynote address delivered at the Seminar on Library Automation, Sri Lanka National Library, Colombo, October.
- . 2002a. "Call for a National IT Agenda." *Daily News* (Colombo), January 3.

- . 2002b. "Internet Banking: The Sri Lankan Experience." In *E-reality: Proceedings of the 21st National IT Conference*. Colombo: Computer Society of Sri Lanka.
- . 2002c. "The 100-Day Program and E-government." *Daily News* (Colombo), January 24.
- . 2002d. "Software Industry in Sri Lanka." *Daily News* (Colombo), July 30.
- Wattagama, Chanuka, and K. M. Sreekanth. 1998. "Proliferation of Internet in Sri Lanka and India: A Comparative Study." In *Proceedings of the 17th National IT Conference*. Colombo: Computer Society of Sri Lanka.
- Weerawarana, Sanjiva, and Jivaka Weeratunga. 2003. "The Role of Open-Source in E-Sri Lanka." In *Proceedings of the 22nd National IT Conference, 2003*. Colombo: Computer Society of Sri Lanka. <http://www.cssl.lk/conferences/The%20Role%20of%20Open-Source%20in%20e-Sri%20Lanka%20sanjeewa%20weerawarana%20letter%20size.doc>.
- Weill, Peter, and Jeanne W. Ross. 2004. *IT Governance: How Top Performers Manage IT*. Boston: Harvard Business School Press.
- Wellenius, Björn. 2006. "Extending Communications and Information Services: Principles and Practical Solutions." In *Information and Communications for Development 2006: Global Trends and Policies*. Washington, DC: World Bank.
- Wenner, Mark, and Francisco J. Proenza. 2000. "Rural Finance in Latin America and the Caribbean: Challenges and Opportunities." Report, Inter-American Development Bank, Sustainable Development Department, Washington, DC. <http://www.iadb.org/sds/doc/MICChallengesOpportunities.pdf>.
- Wheeler, David A. 2004. "Why Open Source Software/Free Software (OSS/FS)? Look at the Numbers!" http://www.dwheeler.com/oss_fs_why.html.
- Wijayawardhana, Harsha. 2004. "The Status of Open Source in Sri Lanka." Presentation at Third Asia Open Source Software Symposium, Colombo.
- Wildstrom, Stephen H. 2004. "A Big Fly in the Open Source Soup." *Business Week Online*, August 13. http://www.businessweek.com/technology/content/aug2004/tc20040813_1107_tc120.htm
- Wilson, Ernest J., III. 2004a. *The Information Revolution and Developing Countries*. Cambridge, MA: MIT Press.
- . 2004b. "Leadership in the Digital Age." In *Encyclopedia of Leadership*, ed. James McGregor Burns, George Goethels, and Georgia Sorenson. Thousand Oaks, CA: Sage.
- World Bank. 1999. *World Development Report 1998–1999: Knowledge for Development*. New York: Oxford University Press.
- . 2001. "Sri Lanka Land Titling and Related Services Project." Report PID7857. South Asia Regional Office, World Bank, Washington, DC.

- . 2002a. "Information and Communications Technologies: A World Bank Group Strategy." World Bank, Washington, DC.
- . 2002b. "Sri Lanka National HIV/AIDS Prevention Project." Report PID10794. South Asia Regional Office, World Bank, Washington, DC.
- . 2002c. "Sri Lanka Poverty Assessment." Report, South Asia Region, Poverty Reduction and Economic Management Sector Unit, World Bank, Washington, DC.
- . 2003a. "Sri Lanka Country Assistance Strategy of the World Bank Group 2003–2006." Report, Sri Lanka Country Office, World Bank, Colombo.
- . 2003b. "Sri Lanka: Promoting Agricultural and Rural Non-Farm Sector Growth." Report 25387-CE. South Asia Region, Rural Development Unit, World Bank, Washington, DC. http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2003/04/05/000094946_03032104003277/Rendered/PDF/multi0page.pdf.
- . 2003c. "Sri Lanka Rural Poverty Reduction Program." Report PID11613. South Asia Regional Office, World Bank, Washington, DC.
- . 2003d. *World Development Indicators 2003*. Washington, DC: World Bank.
- . 2004a. "Community Development and Livelihood Improvement 'Gemi Diriya' Project." Project Appraisal Report, South Asia Region, Rural Development Unit, World Bank, Washington, DC. <http://web.worldbank.org/external/projects/main?pagePK=104231&piPK=73230&theSitePK=40941&menuPK=228424&Projectid=P074872>.
- . 2004b. "Project Appraisal Document for E–Sri Lanka Development Project." Report 28979-LK, South Asia Region, Finance and Private Sector Development Unit, World Bank, Washington, DC.
- . 2005a. "E-development: From Excitement to Execution." Paper, Global Information and Communications Technology Department, World Bank, Washington, DC.
- . 2005b. "Treasures of the Education System in Sri Lanka: Restoring Performance, Expanding Opportunities, and Enhancing Prospects." Report, World Bank, Washington, DC.
- . 2006. *World Information and Communications for Development 2006: Trends and Policies for the Information Society*. Washington, DC: World Bank.
- World Bank, Operations Evaluation Department. 1998. *The Effectiveness of the Bank's Appraisal Process: An OED Study*. Washington, DC: World Bank.
- . 2001. *Information Infrastructure: The World Bank Group Experience*. Washington, DC: World Bank.
- . 2003. *Sharing Knowledge: Innovations and Remaining Challenges*. Washington, DC: World Bank.

- World Bank and Asian Development Bank. 2005. *Sri Lanka: Improving the Rural and Urban Investment Climate*. Colombo: World Bank Country Office.
- World Economic Forum. 2004. *The Global Information Technology Report 2003–2004: Towards an Equitable Information Society*. New York: Oxford University Press.
- Woroch, Glenn A. 2002. "Local Network Competition." In *Handbook of Telecommunications Economics*, ed. Martin Cave, Sumit Majumdar, and Ingo Vogelsang. Amsterdam: North-Holland. <http://elsa.berkeley.edu/users/woroch/local%20competition.pdf>.
- Yun, Kyounglim, Heejin Lee, and So-Hye Lim. 2002. "The Growth of Broadband Internet Connections in South Korea: Contributing Factors." Paper, Stanford University, Asia-Pacific Research Center, Stanford, CA. <http://aparc.stanford.edu/publications/20032/>.
- Yusuf, Shahid. 2003. *Innovative East Asia: The Future of Growth*. New York: Oxford University Press.
- Znet. 2004. "Norwegian City Government Switches to Open Source." June 15. <http://hardware.silicon.com/desktops/0,39024645,39121367,00.htm>.

Index

Boxes, figures, notes, and tables are indicated by b, f, n, and t in italics.

A

access gap, 121, 127–28, 130*nn*8–9
access to ICT-based services, 46
 gaps in rural services, 120–23, 130*n*3
 overview, 119–20, 130*n*1
 as poverty reduction strategy, 146–50, 160*t*7.4, 163*n*4
 reforms to bridge market efficiency gap, 123–26, 130*n*3
 smart subsidies to bridge access gap, 127–28, 130*nn*8–9
 tools for reinforcing demand, 128–29
 universal access, 122, 122*t*6.1
accountability, 29, 41*n*21
action plan, 48–49, 90–93, 64*n*4
ADSL. *See* asymmetric digital subscriber line (ADSL) services
agriculture, 143, 161, 173–74, 177
aid agencies, 5, 38, 42*n*26
Andhra Pradesh, 36–37
Asian Development Bank, 13, 23, 33
Asia-Pacific Development Information Programme, 7*n*3
Association for the Software Industry, Sri Lanka, 77–78

Association of Computer Training Organizations, 78
asymmetric digital subscriber line (ADSL) services, 124
asymmetric interconnections, 128

B

backbone facilities, 119, 123–24, 130*n*1, 184
backbone-only solutions, 129
banking sector, 191*n*3
best practices, international, 127–28, 161
Bhoomi project, India, 175, 175*b*8.1
Board of Investment, 77, 78, 79, 93
bottom-up initiatives, 19, 27–28, 41*n*17
BPO. *See* business process outsourcing (BPO)
brain drain, 76
broadband connectivity, 127, 128, 189
Broadbent, Marianne, 41*n*22
business environment, 37, 76–77, 87*f*4.2, 149, 149*b*7.2
business process outsourcing (BPO), 67, 72, 73, 97*n*2
 the India effect, 80
 labor costs in, 75
 prospects for, 97*n*5

C

call centers, 67
 Canadian International Development Agency, 130n9
 capacity building
 and e-strategies, 3–4, 7n3
 local, 27, 34, 41n16
 need for, 88, 89
 and ownership, 16–18, 40n7
 for telecenters, 141, 152–53b7.3
 cash flow, projections of, 168–71
 CBOs. *See* community-based organizations (CBOs)
 CDMA. *See* code-division multiple access (CDMA) frequencies
 cellular frequencies, 129
 CEOs. *See* chief executive officers (CEOs)
 chat rooms, 173, 191n2
 chief executive officers (CEOs), 13, 16–17
 chief information officers (CIOs), 12–14, 38n3, 52
 chief innovation officers, 35, 52–53
 China, use of technologies, 147b7.1
 China Central Radio and Television University, 147b7.1
 CINTEC. *See* Council for Information Technology (CINTEC)
 CIOs. *See* chief information officers (CIOs)
 citizen registration, 59b3.1
 civil service, and e-development, 5, 45, 63–64
 civil society, as partner to sustain telecenters, 185–87
 code-division multiple access (CDMA) frequencies, 129
 communications, 61–62, 171–73, 191n2
 See also information and communication technology (ICT)
 communities
 community networking, 179, 180b8.2, 181–82
 mobilization of for poverty reduction, 151–53, 160t7.4, 163n5
 mobilization of for telecenters, 141
 participation in design and implementation of e-development, 146, 148, 163n4
 community-based organizations (CBOs), 152–53b7.3, 163n5
 community development, 174, 191n5
 Community Development and Livelihood Improvement Program, 144t7.2, 185

community services, 171, 172t8.3, 173–74, 191m3–5
 competition, 68, 115
 anticompetitive behavior against ISPs, 124
 for connectivity, 184
 importance of, 121–22
 role of human resources and industry promotion in, 48, 54
 computer crimes, 52, 64n5
 computer literacy, 183, 186
 computer services, to rural schools, 175, 176
 Computer Vendor Association, 78
 connectivity, 46, 124, 136, 186
 access to, 120–21
 at an affordable cost, 184, 192–93m16–17
 broadband, 127, 128
 and e-government programs, 15–16
 online labor exchange system, 177
 relying on for sustainability, 189–90
 via VSAT, 55, 64n8
 content
 local language, 190
 relevancy of, 141–42, 147, 148–49
 strategy to develop, 155–56, 156b7.4
 support for development of, 159
 cost sharing, 113
 Council for Information Technology (CINTEC), 77, 78, 79
 crimes, 52, 64n5
 cross-subsidization, 126
 cybercafés, 122, 167, 168–71
 cybercrime, 64n5
 Cybercrime Unit, 64n5
 cyber-extension project, 177

D

data entry, employment in, 71
 data protection, 52, 64n6, 79
 data transfer speeds, 98n8, 128, 130n8
 delivery mechanisms, 150
 demand
 demand-led programs, 113
 for ICT services, 128–29
 mobilizing demand for telecenters, 135–37
 surveys for, 138
 demand-side subsidies, 130
 Demonstrator Application Grant Scheme, Malaysia, 156b7.4
 desktop applications, 180b8.2, 181, 192n15

- developing countries
 - and ICT industry, 7n3, 100, 125, 204
 - and technology assimilation, 30
 - development
 - impact of telecenter program on, 128, 166–71, 191n1
 - objectives for e-Sri Lanka, 48, 48t3.3
 - social, 28
 - using radio and television for, 147b7.1
 - See also* e-development
 - development assistance, 6, 31, 37–39, 42m24–27
 - Dgroups, 182
 - diaspora, 76, 93, 98n11
 - Digital Access Index, 44, 45t3.2
 - digital divide, 134
 - digital literacy, 45, 190
 - displaced families, 185
 - distance learning centers, 36, 42n23
 - donors, coordination of, 46, 53
- E**
- e-citizen ID, 59b3.1
 - e-commerce, 144
 - e-development, 7n3
 - and aid agencies, 38, 42n26
 - key aspects of, 4–5
 - overview, 1–2, 7n1
 - population as issue in, 5, 191n1
 - ranking, 44–45
 - synergies as key element of, 21–22, 41n12
 - e-development thematic group, 42n26
 - education, 16, 23, 40n6
 - and action plan, 93
 - as constraint to software and IT-enabled services, 73–76, 97–98m6–10
 - and cost-effective access to services, 175, 176
 - course grants, 104–5
 - infrastructure for, 74–75, 98n10
 - See also* trainers and training
 - e-employment, 59b3.1
 - E-Gate, 57
 - e-government, 44, 56, 139, 187
 - channeling services for rural poor, 171, 172t8.2, 174–78
 - and connectivity, 15–16
 - partnerships for poverty reduction, 143–45, 160t7.4, 163n3
 - priority services of, 59b3.1
 - systems of, 179–81, 192m12–14
 - and telecenters, 150–51, 160t7.4
 - e-laws, 61, 79
 - e-leadership, 34–35, 41n22, 50
 - development of, 52–53
 - institutions for, 77–78
 - pilots, 59b3.1
 - refinements in, 61–62
 - elections, 17, 25, 131n10
 - electronic products industry, 73, 79
 - e-library, 62, 188–89
 - e-mail, 57, 173, 191n2
 - emigration, 76
 - e-motoring, 59b3.1
 - employment
 - access to information, 59b3.1
 - expanding off-farm opportunities for, 176–77
 - in IT industry, 71, 97m3–4
 - in selected industries, 70t4.1
 - end users, and action plan, 92–93
 - English language, 179, 181, 190
 - e-NGO partnerships, 145
 - entrepreneurship, promotion of, 177–78, 191n6, 191n8
 - entry, barriers to, 123
 - entry points, 31–34, 41n19, 97n5
 - e-pensions, 59b3.1
 - e-procurement, 59b3.1
 - e-readiness, 44–47, 64n2
 - e-services, 128
 - e-society programs, 55, 139, 187
 - e-society fund, 28, 41n17
 - grants to, 185, 191n5
 - promotion of, 49, 58–60
 - voucher schemes, 186
 - e-Sri Lanka, 17, 33, 79, 120
 - as brand name, 40n11
 - development objectives and outcome indicators, 48, 48t3.3
 - early implementation and lessons of, 188–90
 - lessons learned from, 4–6, 30–39, 41–42m18–27
 - origins of, 12–19, 39–40m2–4, 40m6–7
 - principles guiding program, 19–30, 40n8, 40m10–12, 41m14–17
 - Program 1 (ICT Policy, Leadership, and Institutional Development), 48, 49–54, 64m5–7
 - Program 2 (Human Resource Development and Industry Promotion), 48, 54

- Program 3 (Regional Telecommunications Network Development), 48, 54–55, 64n8
- Program 4 (Telecenter Development), 49, 55–56
- Program 5 (Reengineering Government), 49, 56–58
- Program 6 (e-Society), 49, 58–60
- program design, 60–63, 64n9
- views of initiative, 20, 40n10
- vision and program of, 47–60, 64nn4–8 and World Bank South Asia regional unit, 18–19
- See also* telecenters and telecenter program
- E-Sri Lanka: An ICT Development Road Map*, 43
- e-strategies, 3–4, 5–6, 7n3
- e-transactions, 79
- European Union (EU), 64n6
- evaluation, 52
- for ICBF, 111–12
- of risk, 112–15
- of telecenters, 136t7.1, 138, 153b7.3
- excellence, program to attain, 103t5.1, 109
- excluded groups, and ICT programs, 157–59, 160t7.4
- expert directory, 105–6
- Export Development Board, 77, 78, 93
- exports
- export market, 84–86, 87f4.2, 98m16–17
 - potential revenues for, 81–82
 - of software and IT-enabled services, 72, 80–81, 86f4.1, 87f4.2, 97n5
 - SWOT analysis of, 96, 97
- F**
- facilities-based gateway licenses, 184
- farmers, 173, 174–75, 176, 177
- farmland, 174–75
- Federation of the Information Technology Industry, 78
- Federation of Thrift and Credit Cooperative Societies, 158b7.5
- feedback mechanisms, 19, 29–30
- fiber backbone network, 123
- financial service institutions, 72, 173–74, 191m3–4
- financial sustainability
- and barriers to use of ICT, 178–84, 192–93nn9–14
 - challenges to, 178–87, 192–93nn9–17
 - and connectivity at an affordable cost, 184, 192–93nn16–17
 - and outreach to poor populations, 185 and stakeholders, 185–87
- fixed-line connections, 123
- Food and Agriculture Organization, 163n4
- foreign investments, 79
- frequency slots, 126
- funding mechanisms, 101–2, 115n1
- funding agencies, 14
- fund-raising, 53
- G**
- gateway licensees, 184, 192–93n16
- GDP. *See* gross domestic product (GDP)
- globalization, 68, 76–77, 98n12
- global network program, under ICBF, 105–6
- governance framework, 33, 57
- government, 72
- collaboration with private sector, 100
 - development of IT infrastructure for, 57–58
 - as ICT user, 150–51, 160t7.4
 - reengineering of, 49, 56–58, 62–63
 - role in promotion of IT industry, 79–80
- government agencies, 134, 180, 185–87, 192n14
- government institutions, 153–54, 160t7.4, 184
- Government Open Code Collaborative Repository, 192n14
- grants, 185, 191n5
- for attaining excellence programs, 109
 - Malaysia, 155, 156b7.4
 - and risk management, 112–13
 - under ICBF, 104–5
- gross domestic product (GDP), 82
- H**
- Hanna, Nagy, 7n1
- hardware manufacture and assembly, 73
- high-speed broadband, 193n17
- Hirschman, Albert, 7n1
- HIV/AIDS, 143
- holistic, long-term, and development-driven strategy, 19, 20–23, 32, 40m10–12
- HTML. *See* Hypertext Markup Language (HTML)
- Human Development Index, 46
- human resources, 16, 48, 54
- Hypertext Markup Language (HTML), 192n12

I

- ICBF. *See* ICT capacity-building and industry promotion fund (ICBF)
- ICBF Board, 110–11, 113
- ICT. *See* information and communication technology (ICT)
- ICT Agency, 43, 60, 129, 179, 182, 186
- building local capacity and ownership, 16–18, 40*n*7
 - collaboration with Ministry of Education, 33, 41*n*20
 - and competencies for chief innovation officers, 53
 - and distance learning centers, 42*n*23
 - and e-laws, 79, 98*n*15
 - and e-Sri Lanka program design, 30–39, 41–42*nn*18–27, 60–63
 - and feedback mechanisms, 19, 29–30
 - and ICBF Board, 109–15
 - and knowledge-based partnerships, 19, 25–26, 41*n*14
 - monitoring and evaluation programs, 52
 - operational costs of, 51–52
 - pilots as learning opportunity for, 28–29
 - refinements in e-leadership and ICT policy, 61–62
 - responsibility for telecenters, 134, 136*t*7.1, 137*f*7.1
 - and role of e-leadership, 50–51
 - structure of, 51*f*3.1
- ICT capacity-building and industry promotion fund (ICBF)
- implementation of, 109–15
 - monitoring, evaluation, and learning under, 111–12
 - objectives and outcome indicators for, 111*t*5.2
 - overview, 100–101
 - Program 1 (Strengthening Management and Professional Skills), 102–6
 - Program 2 (Developing the Workforce), 103*t*5.1, 106–8
 - Program 3 (Promoting the Industry and Creating Markets), 103*t*5.1, 108–9
 - Program 4 (Attaining Excellence), 103*t*5.1, 109
 - rationale for funding mechanism, 101–2, 115*n*1
 - risk management, 112–15
 - role of managing agent, 110
- incentives, 79, 83, 98*n*14, 107
- India, 44, 80, 98*n*17, 144, 163*n*3
- infoDev*, 41*n*17
- information
- categories of, 155*t*7.3
 - promotion of uses of, 154–56, 156*b*7.4, 160*t*7.4
- information and communication technology (ICT), 1, 2, 68, 74, 93, 98*n*9
- barriers to use of, 100, 178–84, 192–93*nn*9–14
 - challenges facing industry, 2–4, 7*n*3
 - creating markets for, 103*t*5.1, 108–9
 - development of, 14, 46–47, 69–70, 86–89
 - and e-leadership, 61–62, 77
 - export market, 84–86, 87*f*4.2, 98*nn*16–17
 - and institutional development, 48, 49–54, 64*nn*5–7
 - integrating into design, 31, 37–39, 42*nn*24–27
 - investments in, 39, 42*n*27
 - labor costs in, 75, 75*t*4.2
 - leadership development, 48, 49–54, 64*nn*5–7
 - lessons learned during design of e-Sri Lanka, 30–39, 41–42*nn*18–27
 - liberalization of to encourage new entrants, 123–25
 - low level of use by public agencies, 45, 64*n*2
 - phases and outcomes of adoption of, 154
 - policies concerning, 48, 49–54, 64*nn*5–7, 142, 145–46, 160*t*7.4
 - potential for growth of, 81–83
 - and poverty reduction, 157–59, 160*t*7.4
 - principles guiding e-Sri Lanka program, 19–30, 40*n*8, 40*nn*10–12, 41*nn*14–17
 - private e-leadership institutions, 77–78
 - promotion of, 12, 24, 103*t*5.1, 108–9
 - prospects for the industry, 80–86, 98*nn*16–17
 - raising awareness of value of, 182–83
 - role of human resource development and industry promotion in, 48, 54
 - service centers, 62
 - and South Asia regional structure, 18–19
 - SWOT analysis of, 94–95
 - working within a strategic partnership, 88–89
- See also* access to ICT-based services; e-readiness; ICT capacity-building and industry promotion fund (ICBF)

- information infrastructure. *See* infrastructure
- information poverty, 15, 39–40n4
- information technology (IT)
- action plan for developing, 89–94
 - awareness of value of, 182
 - SWOT analysis of, 95–97
- infrastructure, 46, 73, 123
- constraints in, 73–76, 97–98m6–10
 - delays and experiments in, 62
 - development of, 57–58, 193n17
 - in rural areas, 123
 - uneven access to, 46
 - See also* connectivity
- initiatives, 63, 90–91b4.2, 115
- innovations
- integrating into design, 31, 37–39, 42m24–27
 - literature concerning, 36, 37, 42n24
 - promotion of, 114
 - for uses of information, 156b7.4
- institutional design, and e-strategies, 3–4, 7n3
- institutions
- building of, 24–25
 - development of, 51–52
 - for e-development, 48, 49–54, 64m5–7
 - for e-leadership, 77–78
 - financial, 72, 173–74, 191m3–4
 - identifying models and telecenter support institutions, 152–53b7.3
 - for implementing telecenter program, 135, 136t7.1
 - mixed policy and institutional environment, 76–80, 98n12, 98m14–15
 - partnerships with, 143–45, 153–54, 160t7.4, 163n3
 - religious, 188, 189
 - securing, 31, 34–35, 41m21–22
 - and telecenters, 134, 136t7.1, 137–38, 137f7.1
 - See also* support institutions
- Intellectual Property Act No. 35 of 2003, 79
- intellectual property rights, 52, 64n7
- interagency cooperation, 186
- interconnections, 124, 125, 128, 130n3, 192–93n16
- International Telecommunication Union, 44
- Internet
- access to, 45, 46, 73–74, 97–98m7–9, 122
 - importance of communication by, 173
 - and promotion of rural entrepreneurship, 177–78, 191n6, 191n8
 - and provision of financial services, 173, 191m3–4
 - service charges, 73–74, 97–98n7
- Internet service providers (ISPs), 74, 78, 124, 126
- interoperability frameworks, 192n14
- investments, 101, 141
- environment for entrants, 124–25
 - and globalization, 76–77, 98n12
 - in ICT, 39, 42n27
 - in R&D, 6, 38
 - trends in, 124, 124f6.1
 - See also* development assistance
- ISPs. *see* Internet service providers (ISPs)
- IT. *see* information technology (IT)
- IT-enabled services industry, 1, 47, 67, 87
- action plan for developing, 89–94
 - building capacity for, 88, 89
 - constraints and opportunities in, 70–80, 97–98m3–15
 - export market, 80–81, 84–86, 87f4.2, 98m16–17
 - Indian market for, 98n17
 - potential for growth of, 69–70, 81–83
 - potential revenues for, 82t4.3
 - promising niches for, 85–86b4.1
 - SWOT analysis of, 95–97
 - volume of business in, 72–73
 - working within a strategic partnership, 88–89
- J**
- Japan Bank for International Cooperation, 14
- Japan Social Development Fund, 141, 151, 152–53b7.3
- K**
- Karnataka, India, 175, 175b8.1
- Kearney, A. T., 98n17
- Kitzis, Ellen S., 41n22
- knowledge
- dissemination of, 152–53b7.3
 - knowledge-based partnerships, 19, 25–26, 41n14
 - promotion of sharing of, 114
- knowledge economy, 33, 41n19
- knowledge management systems, 41n18

Korean language, 192*n*10

Kothmale Internet Community Radio,
147*b*7.1

L

labor and labor market

- constraints in, 73–76, 97–98*nn*6–10
- costs, quality, and availability of, 75–76
- development under ICBF, 103*t*5.1, 106–8
- nonagricultural employment, 176–77

land titling, 143, 174–75, 175*b*8.1

Land Titling and Related Services Project,
Sri Lanka, 143

language

- English, 179, 181, 191
- HTML, 192*n*12
- Korean, 192*n*10
- and local content, 190
- meeting local needs of, 179, 192*nn*9–10

Lankanet, 57

leadership

- and e-development, 45, 48, 49–54,
64*nn*5–7
- importance of, 34–35, 41*n*22
- securing, 31, 34–35, 41*nn*21–22

See also e-leadership

learning

- for ICBF, 111–12
- learning-oriented organizations, 29
- lifelong learning opportunities, 107
- promotion of, 114
- See also* education; trainers and training

least-cost-subsidy auctions, 127, 128, 129,
184, 186, 193*n*17

legal and regulatory framework, 61, 79

- and connectivity, 184, 192–93*nn*16–17
- development of, 52, 64*nn*5–7
- reforms of, 126

lending operations, 14, 18–19, 24, 39*n*3

lessons learned during design of e-Sri Lanka

- entry points, 31–34, 41*n*19
- integrating innovation and ICT into
development assistance, 31, 37–39,
42*nn*24–27
- regional examples, 31, 36–37
- securing leadership and institutions, 31,
34–35, 41*nn*21–22

Licensed Internet Service Providers

Association, 78

licensing, 123–24, 126, 130*n*2, 184

gateway licensees, 184, 192–93*n*16

and least-cost-subsidy auctions, 127, 128

lifelong learning opportunities, 107

Linux, 180*b*8.2, 192*n*13, 192*n*15

literacy rate, 46, 47, 190

M

Malaysia, content development, 155,
156*b*7.4

management

- consulting firms, 41*n*18
- managerial support, 159, 160*t*7.4
- strengthening of skills under ICBF,
102–6

market efficiency gap, 121, 123–26, 130*n*3

markets, 176

- creation and development of, 87,
103*t*5.1, 108–9

domestic market, 81, 83–84

export market, 72, 80–81, 84–86, 87*f*4.2,
98*nn*16–17

information provided to farmers by
telecenters, 173

liberalization of, 121–22

opportunities for, 83–86, 87*f*4.2,
98*nn*16–17

for software and IT-enabled services, 72,
80–81, 86*f*4.1, 87*f*4.2, 97*n*5, 98*n*17,
180*b*8.2

SWOT analysis of, 96, 97

mentor programs, 105

Microsoft, 97*n*4

Millennium Development Goals, 14

minimum subsidy auctions, 121, 130*n*2

Ministry of Education, 16, 23, 33, 40*n*6,
41*n*20

Ministry of Finance, 52

Ministry of Health, 143

Ministry of Higher Education, 23

Ministry of Land Development and Minor
Export Agriculture, 143

Ministry of Plan Implementation, 52

Ministry of Telecommunications, 33, 126

mission creep, 63

mobile operators and services, 98*n*9, 119,
126

mobilization, social, 153

models

- e-library model, 188–89
- for impact and sustainability of
telecenters, 140–41, 163*nn*1–2
- open learning model of development, 32

regional examples, 31, 36–37
 RKC model, 188–89
 Sarvodaya development model, 158*b*7.5
 monitoring, 52, 111–15, 136*t*7.1, 138, 153*b*7.3
 monopolies, 125–26, 130*n*3, 184, 192–93*n*16
 M. S. Swaminathan Research Foundation, 163*n*3
 Multi-Purpose Cooperative Societies, 176

N

nanasala, 62
 narrow-bandwidth services, 128
 National Chamber of Commerce, 12
 National HIV/AIDS Prevention Project, 143
 National Information Technology Council Secretariat, Malaysia, 156*b*7.4
 National Institute for Information Technology, 74–75
 Networked Readiness Index, 44, 44*t*3.1
 networks and networking, 129, 173, 179, 181–82
 global network program, 105–6
 infrastructure for, 123
 network economies, 179, 192*n*11
 personal, 173, 191*n*2
 to promote rural entrepreneurship, 178, 191*n*6
 telecenters, 21
 telecommunications, 129, 136*t*7.1
 new development economics, 19, 30, 40*n*8
 NGOs. *See* nongovernmental organizations (NGOs)
 non-facilities-based gateway licenses, 184
 nongovernmental organizations (NGOs), 153–54
 and action plan, 93
 and challenges to ICT industry ownership, 24
 and financial services, 191*n*3
 and telecenters, 140–41, 145, 158*b*7.5, 191*n*4
 numbering plans, 126

O

OECD. *See* Organisation for Economic Co-operation and Development (OECD)
 online collaboration, 179, 181–82
 online public consultation, 187

open source software, 179–81, 192*m*12–14
 operating costs, 51–52, 169*t*8.2
 Organisation for Economic Co-operation and Development (OECD), 15, 99–100
 outcome indicators
 for e-Sri Lanka, 48, 48*t*3.3
 of universal access programs, 122*t*6.1
 outcomes, 43, 63–64*n*1
 of adoption of ICTs, 154
 of e-society program, 58–59
 of e-Sri Lanka program, 50
 of human resource development and industry promotion, 54
 outsourcing, 67
 ownership, 21
 and building local capacity, 16–18, 49*n*7
 securing local ownership, 19, 23–25

P

Paddy Marketing Board, 176
 parliamentary approval, 16
 partnerships, 5, 53, 115
 building strategic partnerships and communications, 53–54
 e-NGO partnerships, 145
 with government, 143–45, 150–51, 160*t*7.4, 163*n*3
 and holistic approach to e-development, 22
 knowledge-based, 19, 25–26, 41*n*14
 roles of, 79–80, 145, 185–87
 and telecenters, 134, 185–87
 working within a strategic partnership, 88–89
 pay phone operators, 126
 PCs. *See* personal computers (PCs)
 PDAs. *See* personal digital assistants (PDAs)
 pensions, 59*b*3.1
 personal computers (PCs), 9*n*9, 73
 personal digital assistants (PDAs), 98*n*9, 176
 personal networks, 173, 191*n*2
 phone shops, 122
 pilots
 to boost farm productivity, 177
 early implementation of, 60–61, 64*n*9
 e-leadership, 35, 59*b*3.1
 funding quick-results pilots, 19, 28–29
 to improve bargaining power of farmers, 176
 integrating into strategies, 31, 35–36, 42*n*23

- for preparation of e-Sri Lanka program, 19, 28–29
 - policies
 - for e-development, 48, 49–54, 64*nn*5–7
 - and institutional environment, 76–80, 98*n*12, 98*nn*14–15
 - refinements in ICT policy, 61–62
 - political economy, 112
 - political environment, 17, 60
 - and challenges to e-readiness, 45–46, 64*n*2
 - and e-development, 6–7, 25
 - and holistic, long-term, and development-driven strategies, 19, 20–23, 40*nn*10–12
 - and reforms, 131*n*10
 - political patronage, 41*n*21, 93
 - poor populations
 - and ICT programs, 157–59, 160*t*7.4
 - outreach to, 185
 - profile of, 157, 161–62
 - See also* poverty reduction
 - population, as issue in e-development, 5, 191*n*1
 - portals, 57–58, 155–56, 182
 - poverty, causes of, 162, 166, 172*t*8.3
 - poverty profile, Sri Lanka, 157, 161–62
 - poverty reduction, 28, 161, 191*n*5
 - by collaborating with poor people, 157–59, 160*t*7.4
 - and development of IT-enabled services, 70
 - and ICT policies, 142, 145–46, 160*t*7.4
 - mobilizing communities for, 151–53, 160*t*7.4, 163*n*5
 - and need for access, 146–50, 160*t*7.4, 163*n*4
 - overview of principles guiding telecenter program design, 142–45
 - by partnering with government as ICT user, 150–51, 160*t*7.4
 - and partner institutions, 153–54, 160*t*7.4
 - by promotion of information services, 154–56, 160*t*7.4
 - by supporting strategies for, 142, 143–45, 160*t*7.4, 163*n*3
 - and support institutions, 159, 160*t*7.4
 - transforming partner institutions for, 153–54, 160*t*7.4
 - principles guiding preparation of e-Sri Lanka program
 - bottom-up initiatives, 19, 27–28, 41*n*17
 - broad local ownership among key stakeholders, 19, 23–25
 - feedback mechanisms, 19, 29–30
 - holistic, long-term, and development-driven strategy, 19, 20–23, 32, 40*nn*10–12
 - knowledge-based partnerships, 19, 25–26, 41*n*14
 - programmatic flexibility, 19, 26–27, 41*nn*15–16
 - quick-results pilots, 19, 28–29
 - principles guiding telecenter program design for poverty reduction. *See* poverty reduction
 - private sector, 15, 72, 100
 - and action plan, 92
 - and capacity building, 89
 - importance of in action plan, 93–94
 - private e-leadership institutions, 77–78
 - roles of, 99–100, 113–14
 - and telecenter models, 140, 163*n*1
 - procurement, 59*b*3.1, 83
 - productivity, 68, 143, 177
 - Proenza, Francisco J., 163*n*1
 - profits, determinants of, 167*t*8.1
 - programmatic approaches to e-Sri Lanka, 19, 26–27, 41*nn*15–16
 - project management tools, 17
 - pro-poor organizations, 157
 - proprietary software, 180, 180*b*8.2, 181, 192*n*14
 - public agencies, and low level of ICT, 45, 64*n*2
 - public-private partnerships, 53
 - public sector, 71–72, 77, 92, 113–14, 140
- Q**
- quality of life, 151–53
- R**
- R&D. *See* research and development (R&D)
 - readiness index measures, 44–45
 - Record of Rights, Tenancy, and Crops (RTC), 175*b*8.1
 - reengineering programs, 57–58, 62–63, 73
 - reforms, 123–26, 129, 130*n*3, 131*n*10
 - regional networks, 129
 - Regulatory Commission, 33
 - regulatory framework. *See* legal and regulatory framework
 - religious institutions, 188, 189

rents, commercial, 73, 97n6
 research and development (R&D), 6, 18, 38, 93
 residential service, 122
 revenues, 82t4.2, 169t8.2
 risks, management of, 112–15
 RKC. *See* rural knowledge center (RKC)
 RTC. *See* Record of Rights, Tenancy, and Crops (RTC)
 rural areas, 25, 46, 62, 128
 causes of poverty in, 166, 172t8.3
 channeling e-government services to, 171, 172t8.2, 174–78
 computer services to, 175, 176
 gaps in rural services, 120–23, 130n3
 involvement in poverty reduction, 158b7.5
 key determinants of telecenter profits in, 167t8.1
 reforms to bridge market efficiency gap, 123–26, 130n3
 smart subsidies to bridge access gap, 127–28, 130nm8–9
 telecenters operating in, 167, 191n1
 See also telecenters and telecenter program
 rural knowledge center (RKC), 188–89
 rural Poverty Reduction Program, Sri Lanka, 151–53

S

Sanasa, 158b7.5
 São Paulo, Brazil, 181, 192n15
 SAPAP. *See* South Asia Poverty Alleviation Programs (SAPAP)
 Sarvodaya Economic Enterprise Development Services (SEEDS), 191n4
Sarvodaya Shramadana movement, 158b7.5, 191n4
 satellite technology, 55, 64n8, 189, 193n17
 Sathosa Retail, 176
 sector-based reviews, 14
 sectorwide approaches to e-Sri Lanka, 19, 21, 26–27, 41nn15–16
 SEEDS. *See* Sarvodaya Economic Enterprise Development Services (SEEDS)
 seminars, 106
 sequencing issues, 141
 service agreements, 136

service-processing software, 47
 Sewalanka Foundation, 158b7.5
 shared platforms, 16
 short-code-based access, 124
shramadana camps, 158b7.5
 SLICTA. *See* Sri Lankan Information and Communication Technology Association (SLICTA)
 SLT. *See* Sri Lanka Telecom (SLT)
 smart subsidies, 121, 127–28, 130nm8–9
 social development, 28
 social interaction, 191n2
 social mobilization, 153
 software products and services industry, 12, 32, 46, 87, 97n2
 action plan for development of, 89–94
 constraints and opportunities in, 70–80, 97–98nn3–15
 development and promotion of, 47, 179–82, 192nm11–14
 domestic markets for, 71–72, 81–83
 employment in, 71, 97nm3–4
 export market, 72, 80–81, 86f4.1, 87f4.2, 97n5
 potential for growth of, 81–83
 potential revenues for, 82t4.3
 promising niches for, 85–86b4.1
 proprietary software, 180, 180b8.2, 181, 192n14
 software training industry, 74–75
 South Asia Poverty Alleviation Programs (SAPAP), 153, 163n5
 South Asia regional unit, 18
 spot markets, 176
 Sri Lanka
 building local capacity and ownership, 16–18, 40n7
 e-readiness, 44–47, 64n2
 Federation of Thrift and Credit Cooperative Societies, 158b7.5
 first mission to, 13–14, 39n3
 potential for growth of IT sector, 69–70
 poverty profile, 157, 161–62
 as regional model for ICT use, 37
 See also e-Sri Lanka
 Sri Lanka Country Gateway, 155–56
 Sri Lankan Information and Communication Technology Association (SLICTA), 78
 Sri Lanka Telecom (SLT), 73–74, 97–98n7, 123, 192–93n16
 staff, 16–17, 106

- stakeholders, 100, 112
 and action plan, 91–92
 and bottom-up initiatives, 19, 27–28, 41*n*17
 coordination with, 185–87
 and e-Sri Lanka program, 19, 23–25, 27–28
 and local ownership, 19, 23–25
 standards, 51–52, 57
 strategic action plan, 48–49, 64*n*4
 strengths, weaknesses, opportunities, and threats (SWOT) analyses, 94–97
 subsidies, 126, 129, 130
 least-cost-subsidy auctions, 127, 128, 129, 184, 186, 193*n*17
 minimum subsidy auctions, 121, 130*n*2
 and telecenters, 135–37, 168, 170*t*8.2
See also incentives
 substitutions, 154
 support institutions, 136*t*7.1, 137–38, 159, 160*t*7.4
 sustainability, 174
 of access to ICT-based services, 146–50, 160*t*7.4, 163*n*4
 relying on connectivity for, 189–90
 of telecenters and telecenter program, 135–37, 140–41, 163*nn*1–2, 166–71, 191*nn*1–6, 191*n*8
See also financial sustainability
 SWOT. *See* strengths, weaknesses, opportunities, and threats (SWOT)
 synergies, 21–22, 33, 35, 41*n*12, 115
- T**
- tax incentives, 83
 technical assistance and support, 107, 159, 160*t*7.4, 178, 191*n*8
 technology, 30, 147*b*7.1
See also information and communication technology (ICT)
 telecenter operators, 135, 136, 136*t*7.1, 137–38, 182–84
 telecenters and telecenter program, 36, 62, 122, 135, 168
 basic design of, 134–38
 Brazil, 181, 192*n*15
 and building capacity for, 152–53*b*7.3
 categories of telecenter information, 155*t*7.3
 coordinating stakeholders for, 185–87
 deciding on scale and scalability of, 139–40
 development of, 49, 55–56
 early implementation and lessons, 188–90
 elements of good business plan for, 149, 149*b*7.2
 generating relevant content and services, 141–42
 impact and sustainability of, 135–57, 166–71, 171–78, 172*t*8.3, 191*nn*1–6, 191*n*8
 challenges to financial sustainability, 178–87, 192–93*nn*9–17
 models for, 140–41, 163*nn*1–2
 institutional roles and links in, 137*f*7.1
 Japan Social Development Fund, 141, 151, 152–53*b*7.3
 link to telecommunications network development, 55
 mobilizing demand for, 135–37
 monitoring and evaluating of, 138
 objectives of, 144*t*7.2
 and online labor exchange system, 177
 overview, 133–34
 pace and sequencing of, 141
 principles guiding design for poverty reduction, 142–61
 projecting cash flow for, 168–71
 responsibility for, 134, 136*t*7.1, 137*f*7.1
 role of, 134
 services provided by, 134
 telecommunications, 2–3, 13, 46, 122
 access to, 73–74, 97–98*nn*7–9, 120–21
 as constraint to software and IT-enabled services, 73–76, 97–98*nn*6–10
 investment trends in, 124, 124*f*6.1
 monopolies of, 125–26
 networks, 129, 136*t*7.1
 quality of, 74, 98*n*8
 regional network development, 48, 54–55, 64*n*8
 services charges, 73–74, 97–98*n*7
See also access to ICT-based services; information and communication technology (ICT)
 Telecommunications Regulatory Commission (TRC), 125–26, 129, 130*n*3, 131*n*10
 teledensity, 46, 123
 telephone subscriptions, 98*n*9
 telephony, 173
 television sets, 98*n*9

temples, 188, 189
 tenure arrangements, 174–75
 termination revenues, 128
 tertiary education, 74, 98*n*10
 toolkits, 152–53*b*7.3
 tourism, and e-commerce, 144
 Tourism Board, 144
 trainers and training, 16, 58, 107, 108, 152–53*b*7.3
 accreditation of providers of, 108, 115*n*2
 and action plan, 93
 computer literacy training programs, 183
 infrastructure for, 74–75, 98*n*10
 lifelong learning opportunities, 107
 for telecenter operators, 183–84
 voucher schemes, 107–8
 See also education; learning
 transformation phase, 153–54
 TRC. *See* Telecommunications Regulatory Commission (TRC)

U

UNDP. *See* United Nations Development Programme (UNDP)
 United Nations Development Programme (UNDP), Human Development Index, 46
 United States, 97–98*n*7, 98*n*16
 United States Trade Representative, 192–93*n*16
 universal access, 122, 122*t*6.1
 universal service levy (USL), 122*t*6.1
 urban areas, key determinants of
 telecenter profits in, 167*t*8.1
 USAID. *See* U.S. Agency for International Development (USAID)
 U.S. Agency for International Development (USAID), 12, 14, 78
 USL. *See* universal service levy (USL)

V

value-added products and services, 70*t*4.1, 72
 vehicle registry, 59*b*3.1

venture capital industry, 78
 very small aperture terminal (VSAT), 55, 64*n*8, 189, 193*n*17
 videoconferences, 42*n*25
 Virtual Academy of Food Security and Rural Prosperity, India, 144, 163*n*3
 voice communication, 128, 130*n*8
 voice over Internet protocol (VoIP), 155*t*7.3, 173
 voucher schemes, 107–8, 136*t*7.1, 182–83, 186
 VSAT. *See* very small aperture terminal (VSAT)

W

wages, 75
 Web portals, 57
 WIPA. *See* World Intellectual Property Organization (WIPO)
 women's organizations, 157
 World Bank, 128, 139, 174
 building local capacity and ownership, 16–18, 40*n*7
 “E-development: From Excitement to Execution”, 7*n*3
 e-Sri Lanka
 financing of components of, 50*t*3.4
 lessons learned during design of, 30–39, 41–42*m*18–27
 principles guiding, 19–30, 40*n*8, 40*m*10–12, 41*m*14–17
 and first mission to Sri Lanka, 13–14, 38*n*3
 ICT cluster proposal, 12–13
 Improving Relevance and Quality of Undergraduate Education project, 115*n*2
 outcome indicators for ICBF, 111–12
 sector-based lending, 14, 38*n*3
 Sri Lankan management team alliance, 14–16
 World Intellectual Property Organization (WIPO), 52, 64*n*7

ECO-AUDIT

Environmental Benefits Statement

The World Bank is committed to preserving endangered forests and natural resources. The Office of the Publisher has chosen to print *From Envisioning to Designing e-Development* on recycled paper with 30 percent postconsumer fiber in accordance with the recommended standards for paper usage set by the Green Press Initiative, a nonprofit program supporting publishers in using fiber that is not sourced from endangered forests. For more information, visit www.greenpressinitiative.org.

Saved:

- 4 trees
- 3 million BTUs of total energy
- 364 lbs. of net greenhouse gases
- 1,509 gallons of wastewater
- 194 lbs. of solid waste



“Dr. Hanna has impeccably captured the rich experiential learning of this pioneering journey we embarked on together, with clarity and boldness. He offers a brilliant, erudite, and proactive discussion on the issues and forces reshaping the world through e-development. It is essential reading for any serious e-development practitioner or government leader.”

—**Manju Haththotuwa**, *CEO, ICT Agency, Sri Lanka*

“Dr. Hanna has been a true pioneer in identifying the potential of ICT as a key instrument for modernization in developing countries. His prescience, energy, and customer focus enabled this important project, e-Sri Lanka, to move forward and receive World Bank financial support. The book is a must-read for all who are interested in ICT for development.”

—**Juan A. B. Belt**, *Director, Office of Infrastructure and Engineering, United States Agency for International Development (USAID), and former staff, Inter-American Development Bank*

“Nagy Hanna has an important message for development agencies and countries seeking to harness the full potential of ICT: alliances, stakeholder partnerships, and other horizontal actions are critical to integrate sectors and turfs. Dr. Hanna is a true e-leader.”

—**Dr. Peter T. Knight**, *Author and Coordinator, e-Brasil, and President, Telemática e Desenvolvimento Ltda.*

“Nagy Hanna has been a prophet for comprehensive e-development. His inside look at how the e-Sri Lanka program was done is unique in the literature of international development. It should be an invaluable aid to national development planners as well as those interested in best practices of donor-assisted project design.”

—**John Daly**, *ICT4D Editor, the Development Gateway, and former Research Director, USAID*

“Nagy Hanna makes plain the importance of patience, determination, and entrepreneurship of all stakeholders in e-development. Dr. Hanna has proven to be both an academic and an entrepreneur in assisting the Government of Sri Lanka in launching its e-development program.”

—**Dr. Peter R. Scherer**, *President, Infrastructure Services Management, Inc., and former Manager, World Bank*



THE WORLD BANK

ISBN 0-8213-6866-4