The Role of Information and Communication Technology in Post-Conflict Timor-Leste

February 2013
THE ROLE OF INFORMATION & COMMUNICATION TECHNOLOGY IN POST-CONFLICT TIMOR-LESTE

February 2013
The report "The Role of Information and Communications Technology in Post-Conflict Timor-Leste" is available at http://www.infodev.org/en/Publication.1198.html

© 2013 International Bank for Reconstruction and Development / The World Bank
1818 H Street NW, Washington DC 20433
Telephone: 202-473-1000; Internet: www.worldbank.org

Some rights reserved

This work is a product of the staff of The World Bank with external contributions. Note that The World Bank does not necessarily own each component of the content included in the work. The World Bank therefore does not warrant that the use of the content contained in the work will not infringe on the rights of third parties. The risk of claims resulting from such infringement rests solely with you.

The findings, interpretations, and conclusions expressed in this work do not necessarily reflect the views of The World Bank, its Board of Executive Directors, 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 judgment on the part of The World Bank concerning the legal status of any territory or the endorsement or acceptance of such boundaries.

Nothing herein shall constitute or be considered to be a limitation upon or waiver of the privileges and immunities of The World Bank, all of which are specifically reserved.

Rights and Permissions

This work is available under the Creative Commons Attribution 3.0 Unported license (CC BY 3.0) http://creativecommons.org/licenses/by/3.0. Under the Creative Commons Attribution license, you are free to copy, distribute, transmit, and adapt this work, including for commercial purposes, under the following conditions:

Attribution—Please cite the work as follows: The Role of Information and Communications Technology in Post-Conflict Timor-Leste; website: http://www.infodev.org/en/Publication.1198.html
License: Creative Commons Attribution CC BY 3.0

Translations—If you create a translation of this work, please add the following disclaimer along with the attribution. This translation was not created by The World Bank and should not be considered an official World Bank translation. The World Bank shall not be liable for any content or error in this translation.

All queries on rights and licenses should be addressed to the Office of the Publisher, The World Bank, 1818 H Street NW, Washington, DC 20433, USA; fax: 202-522-2625; e-mail: pubrights@worldbank.org.

Cover photograph: Chanuka Wattegama
Cover design: infoDev
ABOUT INFODEV

infoDev is a global partnership program within the World Bank Group which works at the intersection of innovation, technology, and entrepreneurship to create opportunities for inclusive growth, job creation and poverty reduction. infoDev assists governments and technology-focused small and medium sized enterprises (SMEs) to grow jobs, improve capacity and skills, increase access to finance and markets, ensure the appropriate enabling policy and regulatory environment for business to flourish, and test out innovative solutions in developing country markets. We do this in partnership with other development programs, with World Bank/IFC colleagues, and with stakeholders from the public, private and civil society sectors in the developing world.

For more information visit www.infoDev.org or send an email to infoDev@worldbank.org
ACKNOWLEDGEMENTS

This review of the role of ICTs for Post-Conflict Reconstruction in Timor-Leste was commissioned by infoDev, a Global Public Partnership of the World Bank. The report adds to four case studies on the use of ICTs for post conflict reconstruction, covering Afghanistan, Liberia, Rwanda, and Tunisia. The studies, when complete, will be posted on the website at http://www.infodev.org/en/Article.917.html. The project will conclude with an overview report of the case studies, synthesizing early lessons of this emerging research topic.

The study was conducted by Chanuka Wattegama with assistance from Nalaka Gunawardene.

The authors would like to thank Luis Constantino, Country Manager - Timor-Leste, World Bank and his team, David Hook, Governance Specialist, Hans Anand Beck, Senior Economist, Felix Maia, Pamela Dale, Maria E. Belo Leite and Vicente Soares; Mikiko Tanaka, Country Director, UNDP Timor-Leste and her team including Farhan Sabih, Assistant Country Director and Andre Piazza, Consultant; Fernando Carvalho da Cruz, Ministry of Infrastructure, Abel Pires da Silva, President of the East Timor ICT Association, Hyeun-Suk Rhee, Director, UN-APCICT/ESCAP and Phet Sayo, IDRC.

From the infoDev side, the project was managed by Dr Tim Kelly, Lead ICT Policy Specialist and Nicolas Friederici (Research Analyst). Peer review was carried out by Natasha Beschorner (Regional Coordinator, East Asia and Pacific, ICT Sector Unit), Kevin Donovan (University of Cape Town) and David Satola (World Bank, Lead Counsel, Finance, Private Sector Development and Infrastructure). The team thanks Elizabeth Swinn for copy-editing.

The project was funded by UKaid under a trust fund managed by infoDev.

For further information contact:

infoDev / World Bank  
1818 H Street NW  
Washington, DC 20433  
United States  
www.infodev.org
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF FIGURES, TABLES AND BOXES</td>
<td>7</td>
</tr>
<tr>
<td>ABBREVIATIONS</td>
<td>8</td>
</tr>
<tr>
<td>EXECUTIVE SUMMARY</td>
<td>10</td>
</tr>
<tr>
<td>1. A BRIEF HISTORY OF TIMORESE CONFLICT</td>
<td>14</td>
</tr>
<tr>
<td>2. BITS AND BYTES: INFORMATION AND COMMUNICATION TECHNOLOGY IN TIMOR-LESTE</td>
<td>16</td>
</tr>
<tr>
<td>2.1. Telecom—Voice Sector</td>
<td>17</td>
</tr>
<tr>
<td>2.2. Telecom—Data Sector</td>
<td>20</td>
</tr>
<tr>
<td>2.3. History of Regulatory Environment</td>
<td>21</td>
</tr>
<tr>
<td>2.4. Liberalization of the Telecom Sector and the Birth of a New Regulatory Authority</td>
<td>22</td>
</tr>
<tr>
<td>2.5. Network Information</td>
<td>24</td>
</tr>
<tr>
<td>2.6. Telecom services quality</td>
<td>26</td>
</tr>
<tr>
<td>2.7. Content development, Business Process Outsourcing, IT-Enabled Services and E-commerce</td>
<td>26</td>
</tr>
<tr>
<td>3. ICT AND RECONCILIATION</td>
<td>28</td>
</tr>
<tr>
<td>3.1. Reconciliation through Media</td>
<td>28</td>
</tr>
<tr>
<td>3.2. Reconciliation through Education</td>
<td>29</td>
</tr>
<tr>
<td>4. ICT FOR GOVERNANCE</td>
<td>31</td>
</tr>
<tr>
<td>4.1. ICT Solution for Administrative Challenges</td>
<td>31</td>
</tr>
<tr>
<td>4.2. ICT Solutions for Transparency Challenges</td>
<td>35</td>
</tr>
<tr>
<td>5. ICT FOR HUMAN DEVELOPMENT</td>
<td>36</td>
</tr>
<tr>
<td>5.1. ICTs for the Development of Non-oil Economy</td>
<td>38</td>
</tr>
<tr>
<td>5.2 Human Development in Timor-Leste</td>
<td>39</td>
</tr>
<tr>
<td>5.3 Millennium Development Goals and the Role of ICTs</td>
<td>39</td>
</tr>
<tr>
<td>5.3.1 Role of ICTs in Eradicating Extreme Poverty and Hunger</td>
<td>39</td>
</tr>
<tr>
<td>5.3.2 The Role of ICTs in Education, Gender Equality and Women’s Empowerment</td>
<td>41</td>
</tr>
<tr>
<td>5.3.3 Role of ICTs in Health and Environment</td>
<td>45</td>
</tr>
<tr>
<td>6. THE WAY FORWARD</td>
<td>46</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>48</td>
</tr>
<tr>
<td>ANNEX 1: TELECOM PRICES IN TIMOR-LESTE</td>
<td>51</td>
</tr>
</tbody>
</table>
LIST OF FIGURES, TABLES AND BOXES

FIGURES

Figure 1: Map of Timor-Leste ........................................................................................................................................ 13
Figure 2: An administrative building damaged during violence in 1999. ................................................................. 14
Figure 3: Timor Telecom financial performance and cellular penetration ............................................................... 15
Figure 4: Timor Telecom is perhaps the most visible company in the country .......................................................... 16
Figure 5: Increase in cellular connections [2006-2011]. .............................................................................................. 17
Figure 6: A Timorese vendor uses his mobile at Dili vegetable market .................................................................. 17
Figure 7: Pay phones are almost non-existent in Timor-Leste ................................................................................. 18
Figure 8: An Internet café in Dili ............................................................................................................................... 20
Figure 9: Submarine cables serving the South East Asia and Pacific Region ............................................................. 24
Figure 10: Nearest connectivity points to Timor-Leste .............................................................................................. 24
Figure 11: Connectivity option-1 - Connecting Dili to Atambua/Kupang in West Timor .................................... 25
Figure 12: President Tour Matan Ruak's Facebook Page ........................................................................................... 27
Figure 13: Satellite dishes to capture Indonesian channels ....................................................................................... 29
Figure 14: Indonesian books sold in Dili ..................................................................................................................... 30
Figure 15: The data center of the Ministry, Timor-Leste with Systems Manager, Jose Manuel Araujo ..................... 32
Figure 16: Timor-Leste Budget Transparency Portal) ................................................................................................ 35
Figure 17: Non-oil real gross domestic product (GDP) of Timor-Leste at current prices in millions of USA and GDP per capita 36
Figure 18: Joint Petroleum Development Area (JPDA) in the Timor Sea ................................................................. 37
Figure 19: East Timor Peace Coffee Club advertising in Facebook for its Japanese consumers ........................... 38
Figure 20: Small scale mobile phone sellers in the streets ......................................................................................... 41

TABLES

Table 1: Progress made by Timor-Leste on MDG Indicators: Goal 1. (Source: UNDP, 2011) ................................. 40
Table 2: Progress made by Timor-Leste on MDGs Indicators: Goals 2 & 3. (Source: UNDP, 2011) ......................... 42

BOXES

Box 1: A New Telecom Regulator Gets a New Mandate ............................................................................................ 23
Box 2: Social Media in Timor-Leste ......................................................................................................................... 28
Box 3: United Nations Peacekeeping Missions in Timor-Leste ............................................................................ 32
Box 4: One Country, Many Tongues: The Issue of Language .............................................................................. 35
Box 5: Distance Learning for Local Education ......................................................................................................... 44
Box 6: Priorities in Information Technology Education in Timor-Leste ............................................................... 45
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>3G</td>
<td>Third-Generation (mobile telecommunications systems)</td>
</tr>
<tr>
<td>AKAKOM</td>
<td>Akademi Komputer (institute)</td>
</tr>
<tr>
<td>ANC</td>
<td>Autoridade Nacional de Comunicações (National Communications Authority)</td>
</tr>
<tr>
<td>ARCOM</td>
<td>Autoridade Reguladora das Comunicações (Communications Regulatory Authority)</td>
</tr>
<tr>
<td>BOT</td>
<td>Build-Operate-Transfer</td>
</tr>
<tr>
<td>BPO</td>
<td>Business Process Outsourcing</td>
</tr>
<tr>
<td>BRTI</td>
<td>Badan Regulasi Telekomunikasi Indonesia (Telecommunication Regulatory Commission of Indonesia)</td>
</tr>
<tr>
<td>CBTL</td>
<td>Central Bank of Timor-Leste</td>
</tr>
<tr>
<td>CCNP</td>
<td>Cisco Certified Network Professional (certificate)</td>
</tr>
<tr>
<td>CCNA</td>
<td>Cisco Certified Network Associate (certificate)</td>
</tr>
<tr>
<td>CCT</td>
<td>Cooperative Café Timor</td>
</tr>
<tr>
<td>CET</td>
<td>Connect East Timor (Non government organization)</td>
</tr>
<tr>
<td>CIA</td>
<td>Central Intelligence Agency (of United States)</td>
</tr>
<tr>
<td>CompTIA</td>
<td>Computing Technology Industry Association (certificate)</td>
</tr>
<tr>
<td>CTF</td>
<td>Commission of Truth and Friendship</td>
</tr>
<tr>
<td>DDLC</td>
<td>Dili Distance Learning Center</td>
</tr>
<tr>
<td>DONP-M</td>
<td>Department of National Planning of Maldives</td>
</tr>
<tr>
<td>GDLN</td>
<td>Global Development Learning Network</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information Systems</td>
</tr>
<tr>
<td>GSM</td>
<td>Global System for Mobile communications (mobile communication standard)</td>
</tr>
<tr>
<td>HDI</td>
<td>Human Development Index</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communications Technology</td>
</tr>
<tr>
<td>IDP</td>
<td>Internally Displaced Person</td>
</tr>
<tr>
<td>IMF</td>
<td>International Monetary Fund</td>
</tr>
<tr>
<td>INTERFET</td>
<td>International Force for East Timor</td>
</tr>
<tr>
<td>IOB</td>
<td>Institute of Business (of Timor-Leste)</td>
</tr>
<tr>
<td>ISDN</td>
<td>Integrated Service Data Network</td>
</tr>
<tr>
<td>ISP</td>
<td>Internet Service Provider</td>
</tr>
<tr>
<td>ITES</td>
<td>Information Technology Enabled Services</td>
</tr>
<tr>
<td>ITIL</td>
<td>Information Technology Infrastructure Library (certificate)</td>
</tr>
<tr>
<td>ITSM</td>
<td>Information Technology Service Management</td>
</tr>
<tr>
<td>ITU</td>
<td>International Telecommunication Union</td>
</tr>
<tr>
<td>JPDA</td>
<td>Joint Petroleum Development Area</td>
</tr>
<tr>
<td>Kbps</td>
<td>Kilobits per second</td>
</tr>
<tr>
<td>MB</td>
<td>Megabytes</td>
</tr>
<tr>
<td>Mbps</td>
<td>Megabits per second</td>
</tr>
<tr>
<td>MDG</td>
<td>Millennium Development Goal</td>
</tr>
<tr>
<td>MHz</td>
<td>Megahertz</td>
</tr>
<tr>
<td>MIS</td>
<td>Management Information Systems</td>
</tr>
<tr>
<td>MOF</td>
<td>Ministry of Finance</td>
</tr>
<tr>
<td>MVNO</td>
<td>Mobile Virtual Network Operator</td>
</tr>
<tr>
<td>NGO</td>
<td>Non Government Organization</td>
</tr>
<tr>
<td>NHDR</td>
<td>National Human Development Report</td>
</tr>
<tr>
<td>ODL</td>
<td>Open and Distance Learning</td>
</tr>
<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
</tr>
<tr>
<td>PALOPS</td>
<td>Países Africanos de Língua Oficial Portuguesa (Portuguese-speaking African countries)</td>
</tr>
<tr>
<td>PEI</td>
<td>Poverty Environment Initiative</td>
</tr>
<tr>
<td>PMIS</td>
<td>Personnel Management Information System</td>
</tr>
<tr>
<td>PPP</td>
<td>Purchasing Power Parity</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>QoS</td>
<td>Quality of Service</td>
</tr>
<tr>
<td>RFA</td>
<td>Request for Applications</td>
</tr>
<tr>
<td>RTL</td>
<td>Radio Timor-Leste</td>
</tr>
<tr>
<td>SDH</td>
<td>Synchronous Digital Hierarchy</td>
</tr>
<tr>
<td>SIM</td>
<td>Subscriber Identity Module (card)</td>
</tr>
<tr>
<td>SMP</td>
<td>Significant Market Power</td>
</tr>
<tr>
<td>SMS</td>
<td>Short Message Service</td>
</tr>
<tr>
<td>STL</td>
<td>Suara Timor Lorosae (Voice of Timor-Leste)</td>
</tr>
<tr>
<td>TLDHS</td>
<td>Timor-Leste Demographic and Health Survey</td>
</tr>
<tr>
<td>TLTL</td>
<td>Telecom Liberalisation Timor-Leste</td>
</tr>
<tr>
<td>TV</td>
<td>Television</td>
</tr>
<tr>
<td>TVRO</td>
<td>Television Receive Only</td>
</tr>
<tr>
<td>TVTL</td>
<td>Televizaun de Timor-Leste (Timor-Leste Television)</td>
</tr>
<tr>
<td>UCL</td>
<td>Unified Carrier License</td>
</tr>
<tr>
<td>UDT</td>
<td>União Democrática Timorense (Timorese Democratic Union)</td>
</tr>
<tr>
<td>UN</td>
<td>United Nations</td>
</tr>
<tr>
<td>UNAMET</td>
<td>United Nations Mission in East Timor</td>
</tr>
<tr>
<td>UN-APCICT</td>
<td>United Nations’ Asia and Pacific Training Center for Information and Communication Technology</td>
</tr>
<tr>
<td>UNDP</td>
<td>United Nations Development Programme</td>
</tr>
<tr>
<td>UNEP</td>
<td>United Nations Environment Programme</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
</tr>
<tr>
<td>UNMISSET</td>
<td>United Nations Mission of Support in East Timor</td>
</tr>
<tr>
<td>UNMIT</td>
<td>United Nations Integrated Mission in Timor-Leste</td>
</tr>
<tr>
<td>UNOTIL</td>
<td>United Nations Office in Timor-Leste</td>
</tr>
<tr>
<td>UNTAET</td>
<td>United Nations Transitional Administration in East Timor</td>
</tr>
<tr>
<td>UNTL</td>
<td>Universidade Nacional de Timor-Leste (Timor-Leste National University)</td>
</tr>
<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
</tr>
<tr>
<td>USD</td>
<td>United States Dollar</td>
</tr>
<tr>
<td>UT</td>
<td>Universitas Terbuka (Indonesia Open University)</td>
</tr>
<tr>
<td>VCD</td>
<td>Video Compact Disc</td>
</tr>
<tr>
<td>VoIP</td>
<td>Voice Over Internet Protocol</td>
</tr>
<tr>
<td>VSAT</td>
<td>Very Small Aperture Terminals (satellite)</td>
</tr>
<tr>
<td>WAN</td>
<td>Wide Area Network</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organisation</td>
</tr>
</tbody>
</table>

*All dollar amounts are U.S. dollars unless otherwise indicated.*
Executive Summary

“We want good communication facilities throughout the country, with access to postal services, telephone, Internet, radio and television.”

This was the broad vision declared by the Government of Timor-Leste in the National Development Plan of 2002. A decade later, much has been accomplished in spite of various challenges, and today, information and communications technologies (ICTs) play an increasingly significant role in this young nation’s development and national integration.

Timor-Leste is a small country located between two large neighbors, Australia and Indonesia. It is one of the 48 least developed countries (LDCs) in the world, as well as one of 52 small-island developing states (SIDS) — two factors that make it vulnerable in a number of ways. Its vulnerability is enhanced by the legacy of recent conflict, which destroyed much of the economic infrastructure and also left deep scars in the collective psyche of the people.

The country has seen considerable rebuilding during the past decade, thanks to sound policy choices made by the government and substantial development assistance provided by bilateral and multilateral aid donors. Although the post-conflict recovery is a long-term and multi-faceted process, this report focuses on one specific area: the role of ICTs.

The scope of ICTs in economic development and human development has expanded significantly in recent years. "Information" — in the form of structured and timely data — is widely recognized as central to economic activity, even in traditional sectors such as agriculture and manufacturing. Communication technologies facilitate development at both individual and societal levels. In this sense, ICTs are akin to the arteries of the information economy. Beyond physical growth, ICTs can also contribute to the development of social capital and trust — vital elements in any society, and especially in post-conflict societies such as Timor-Leste’s.

Timor-Leste, embarking on physical reconstruction as well as nation building at the beginning of the twenty-first century, can now take advantage of the more advanced ICTs — such as broadband Internet and 3G mobile telecommunications networks — and bypass the early and cumbersome stages of ICT infrastructure. Timor-Leste can also benefit from the many documented experiences of other small developing countries in harnessing the potential of ICTs for economic growth, as well as national integration.

As cross-cutting infrastructure, ICTs can help address many challenges in development and integration. The relatively small size of the population and land area make it easier to create a networked economy, but limited market potential and very limited skills base present formidable obstacles.

ICTs have great potential to support Timor-Leste’s national development, as well as its pursuit of a coherent national identity overcoming the recent violent past. Realizing this potential will require addressing 3 main challenges: (a) establishing and maintaining an effective regulatory capacity; (b) establishing and maintaining ICT policy capability in the Government given the cross cutting nature of ICT, potential of ICT to improve delivery of government and other services and potential contribution to growth; and (c) improving international connectivity.
REGULATORY ENVIRONMENT

This study coincided with a rapidly evolving liberalization of the Timor-Leste telecommunications sector in 2011-12. Telecommunications Decree-law No 15/2012 of 28 March 2012 established a new regulatory authority named the Autoridade Nacional de Comunicações (ANC). It is charged with greater responsibilities than its predecessor, and will be in a position to charter a new course for a liberalized and competitive telecommunications sector.

In late 2011, the Government signed a settlement agreement with Timor Telecom, the monopoly operator since 2002, to terminate the latter’s exclusivity which paved the way for market competition. After an international bidding process, two new licenses were granted in July 2012 for GSM mobile telephony and 3G internet-access services. These two operators are expected to commence their services in the first quarter of 2013.

As seen in other developing country markets, properly regulated competition should expand telecom service coverage and lower the prices. At the moment, only half the Timorese population of around 1 million people have access to mobile phones; over two thirds of them live in the capital, Dili. Fixed phones are a rarity. The majority of people in rural areas are not connected due to high costs and/or lack of service coverage.

ICT POLICY CAPABILITY

The national telecommunications policy, adopted in mid 2011, offers guidance to encourage competition, consumer protection and infrastructure sharing. It says the Government will interfere minimally in the market, allowing market forces to drive the sector towards higher efficiency, lower prices, greater responsiveness to user needs and better quality services.

In the future, the Government will be barred from intervening in pricing, except to review prices in the event of market failures. The new telecommunications legislation also addresses interconnection, and may require operators to publish reference interconnection offers. The country has also defined universal service goals, i.e. to provide voice-service access to all citizens, and to provide broadband Internet access to all district capitals in the near term. To achieve this, the Government plans to establish the Telecom Fund of Timor-Leste (TFTL), which will be financed from levies, donor funding and government grants. Successful implementation of these progressive policies will reach strengthened technical capabilities within the relevant governmental bodies.

INTERNATIONAL CONNECTIVITY

The growth of Timor-Leste’s ICT sector is also constrained by limitations in international broadband connectivity, which is currently provided only through satellite links. Timor-Leste is far from any submarine fiber links serving the Pacific or Southeast Asian regions. Terrestrial local cables are available in Indonesia and Australia.

As at end 2012, PT Telekomunikasi Indonesia International (Telin), a subsidiary of Indonesia’s oldest and largest network operator, was planning to connect its new TL backbone to PT Telkom’s fiber backbone at Atambua, which connects to the main fiber at Kupang in West Timor. If Timor-Leste could negotiate the extension of this cable to Dili, which is located only 100km away, it would immediately enhance international connectivity and lower costs.

Resolving this bottleneck can unleash a rapid expansion in broadband use and a resulting surge in digital content creation and use. With less than one per cent of the population accessing the Internet in 2011 (around 6,000 subscribers), Timor-Leste’s online community is currently small. As connectivity improves, locally relevant online content and virtual communities can be expected to expand and proliferate. When indigenous digital content grows in Timor-Leste, it would also be prudent to evolve guidelines for aspects such as intellectual property and freedom of expression online.

With regulatory and infrastructure changes gathering pace, Timor-Leste can expect ICT services to become available and more accessible to more citizens in the coming decade.

How can this enhanced ICT availability support national development, reconciliation and governance? This report briefly explores these aspects.

Development Imperative: As with other similarly positioned countries, Timor-Leste also has several ICTs for development projects that remain dependent on external funds and expertise. Building local capacity and expanding the market in the medium to long terms is the best strategy to mainstream ICT in the economy and society.
Timor-Leste’s substantial mineral wealth is not reflected in its human development indicators. The country remains one of the poorest countries in the world, heavily dependent upon oil revenues. In 2009, petroleum income accounted for about 95 per cent of total government revenue and almost 80 per cent of gross national income (GNI).

Where the Millennium Development Goals (MDGs) are concerned, Timor-Leste’s progress has been mixed: among 22 of the 32 comparable indicators where data is available, five have been achieved, seven on track and the balance 10 off-track. However, considering the very low baseline from which socio-economic development started in 2002, these achievements are commendable.

Improved access to telecommunications services in Timor-Leste is likely to benefit many aspects of the economy. Since there is a positive correlation between ICT and economic growth, such growth in turn could enhance livelihoods and incomes, and help reduce poverty. However, this partly relies on external factors that determine, for example, the export market for the country’s agricultural produce.

Where economic growth is concerned, this study confirms what others have already concluded: that Timor-Leste can gain much from a dynamic economic interaction with Indonesia, which is a huge market at their doorstep (2011 population: 242 million; per capita GNI: $2,940).

Reconciliation Imperative: Indonesia is also the biggest factor where reconciliation is concerned. During the first decade since independence, Timor-Leste has gone through a formal process of truth and reconciliation that ended in 2008. While political leaders in both Indonesia and Timor-Leste have acknowledged atrocities of the past, any further action is unlikely.

As this report documents, informal reconciliation is taking place between the two societies through shared popular culture products, mass media content and educational services. Governments of either country do not have to invest public funds in these market-driven processes; their main role is to create an enabling policy environment and infrastructure where content sharing, adaptation and application can accelerate to meet people’s needs and wants.

Governance Imperative: Driven by an idealistic vision of its founders, and assisted by the international community, Timor-Leste has been building democratic institutions and systems of governance for a decade. This process continues to mature, and has survived a period of volatility in 2006. As petroleum revenue increases and the people’s aspirations grow, the young nation state needs to enhance transparency and accountability in public administration, judiciary, electoral processes and other aspects of governance.

Governance during the first decade has been constrained by nascent institutions and a serious shortage of skilled and experienced personnel. As these factors improve with time and investment, and as literacy and education levels rise, Timor-Leste can now create more opportunities for greater public participation in policy formulation and civil administration. This report shows how ICTs can be part of this maturing process, and highlights how online information sharing is already happening on public sector procurements.

SCOPE AND COVERAGE OF THE STUDY

This study was commissioned as part of a six-country research effort to explore the ways that ICTs can have a transformative role in post-conflict societies that confront the need to bring relief and stability quickly, through good governance matched with rising living standards, in order to create the right conditions for nation building.

This report looks at current status, promising initiatives and future challenges related to using ICT for economic growth, social development and post-conflict reconciliation in Timor-Leste. The report draws on in-country research and interviews with key players in government, the private sector and development agencies, and builds on existing analyses on the economic and socio-economic aspects of such technologies in Timor-Leste and elsewhere in the developing world.

Information gathering and analysis was done during the first half of 2012, and peer review process completed by end 2012. Every effort was made to incorporate the latest developments, especially on the regulatory front where progress has been swift during 2012.

The report is structured as follows:

**Chapter 1** provides an overview of Timor-Leste’s recent political history and conflict, and recounts the events that led to independence in 2002 through a UN-mediated process.

**Chapter 2** surveys the ICT and telecommunications sectors, with particular focus on the recent proliferation of mobile telephony and a discussion of price and quality issues for voice and data services.

**Chapter 3** reviews the process of reconciliation, and how a broad range of ICTs are being used to build cross-cultural exchanges and understanding within the country, as well as with neighboring Indonesia.
Chapter 4 discusses recent and current uses of ICTs, particularly in governance-related areas, and identifies an urgent need to build both human and technical capacity, and to increase transparency and accountability in public administration.

Chapter 5 turns to the developmental challenges facing Timor-Leste and considers how ICT can make a difference in economic growth and poverty reduction. To reduce the excessive dependence on petroleum income, ICT can be used to develop non-oil economic sectors such as agriculture and tourism.

Chapter 6 summarizes key findings and recommendations on how ICT can be used to create a more resilient economy and a more open, inclusive and vibrant society for all Timorese people.

If ICTs played a subsidiary role during the first decade following Timor-Leste’s independence, they are likely to play a more pivotal role in the next decade. As mentioned in this report, while Timor-Leste’s ICT sector is still in the early stages of development, it holds considerable potential to grow as a key economic sector, and also to provide cross-sectoral support for economic growth, sustainable human development and good governance.

Harnessing this potential requires sustained implementation of the progressive policies, for which right regulatory environment is now in place. The challenges it faces and potential benefits to be derived from ICT make Timor-Leste an important case study for ICT researchers and development analysts to watch over the next decade.
1. A Brief History of Timorese Conflict

“Timor-Leste, the world’s newest nation, was created out of ashes... An estimated 70 per cent of private homes and public buildings were burned to the ground. Bridges and power lines were demolished, and the telecommunications system was rendered inoperable. Valuable files, including land and property titles, civil registry, and education records were destroyed. Following the ballot, most Indonesian citizens left the territory, resulting in a severe shortage of qualified and experienced professionals.”

- World Bank, Country Assistance Strategy, Timor-Leste, 2005

Timor-Leste (also known as East Timor or Timor Timur) is a small country in Southeast Asia. It was the newest independent nation in the world until South Sudan emerged in 2011. It comprises the eastern half of the island of Timor, the nearby islands of Atauro and Jaco, and an exclave on the northwestern side of the island Oecusse within Indonesian West Timor. The country has a total land area of about 15,000 square km and is located around 640 km northwest of Darwin, Australia (Figure 1).

The Portuguese began trade with the region in the early 16th century and colonized it in the middle of that century. In 1859 prolonged conflicts with the Dutch eventually resulted in a treaty in which Portugal ceded the western portion of the island. The Portuguese ruled Timor-Leste for over four centuries, except for a short period when Japan occupied it from 1942 to 1945. Portugal resumed colonial authority after the Japanese defeat in World War II (CIA, 2012). East Timorese independence came in November 1975, following the ‘Carnation Revolution’ in Portugal the year before. But only nine days later, Indonesian forces occupied the new nation.

In July 1976, Indonesia incorporated East Timor as its 27th province, named ‘Timor Timur’ or ‘Tim Tim.’ By that time, over 35,000 Indonesian army soldiers were based in East Timor. The period that followed was marked by continued conflict, during which an estimated 100,000 to 250,000 individuals lost their lives.2 (CIA, 2012)

In 1996, the Norwegian Nobel Peace Prize Committee awarded Carlos Felipe Ximenes Belo and José Ramos-Horta prizes “for their work towards a just and peaceful solution to the conflict in East Timor.” Belo and Ramos-Horta had been involved with the effort to reach a non-violent settlement. In the 1990s, the effort accelerated, although it was marked by tragedy.

1 ‘Timor’ in Bahasa stands for ‘East’; so literally ‘East Timor’ or ‘Timor-Leste’ (in Portuguese) means ‘East East.’
2 These numbers, as happens in many conflicts, are controversial and contested. An independent report commissioned by the UN transitional administration in East Timor said that at least 100,000 Timorese died as a result of Indonesia’s 25-year occupation, which ended in 1999.
In August 1999, in a referendum conducted by the UN, an overwhelming majority of the people in Timor-Leste (78.5 per cent) voted for independence from Indonesia. However, following the referendum, anti-independence Timorese militias—many supported and organized by occupying forces—commenced a large-scale campaign of retribution. The militias killed approximately 1,400 Timorese and forcibly pushed 300,000 people into western Timor as refugees. Most of the country’s infrastructure—including homes, irrigation systems, water supply systems and schools, as well as nearly 100 per cent of the country’s electrical grid and telecommunication system—was destroyed (CIA, 2012). Indeed, the worst phase of the conflict occurred during the short period between the referendum and the arrival of a multinational peacekeeping force in late September 1999.

The Australian-led peacekeeping troops of the International Force for East Timor (INTERFET) brought the violence to an end. Even then, it took nearly three years to restore normalcy.

On 20 May 2002, Timor-Leste gained international recognition as an independent state. In 2006, for a brief period, internal tensions threatened the new nation’s security when a military strike led to violence and a breakdown of law and order. Following this event, the UN Security Council established the UN Integrated Mission in Timor-Leste (UNMIT), which included an authorized police presence of over 1,600 personnel. The presidential and parliamentary elections were conducted in 2007 in a largely peaceful atmosphere. Apart from an unsuccessful attack against the president and prime minister by rebels in February 2008, the country has remained peaceful (CIA 2012).

As one of Asia’s poorest nations, Timor-Leste has relied on outside help for many years. The infrastructure is largely undeveloped and the country is drought-prone. It could not have survived the first few years of independence without the substantial assistance of international donors. Recently, vast offshore oil and gas fields in the Timor Sea have started generating much-needed revenue, which is shared between Timor-Leste and Australia.

On 19 May 2012, a day before its 10th independence celebration, Timor-Leste’s president-elect, the former military chief Taur Matan Ruak, was sworn in as the new President. He succeeded President Jose Ramos-Horta.
2. Bits and Bytes: Information and Communication Technology in Timor-Leste

"The Information and Communication Technology (ICT) sector [in Timor-Leste] has great potential to support the national development process. But greater advocacy efforts are required to promote better understanding of this potential among the government members of the parliament and the general public. The lack of proper legal infrastructure for the ICT sector reflects the lack of an integrated national policy in this area. The sector is also characterized by very limited human resources and inadequate ICT and power supply infrastructure in the country’s capital Dili and especially in the rural areas where power and telecommunication infrastructure are non-existent."

– Abel Pires da Silva, Digital Review of Asia Pacific 2009–2010

There is little reason to trace the history of ICT in Timor-Leste beyond the past decade: The entire telecommunication network and the electrical power system were destroyed as a result of the violence that followed the 1999 referendum. It has since been rebuilt with private sector investment and international funding.

At the end of 2011, the only telecom provider in the country was Timor Telecom, a private consortium with a majority shareholding by Portugal Telecom. Since March 2002, Timor Telecom had provided fixed and mobile phone service as well as mobile broadband. It was granted a Telecommunication Concession Contract (since superseded, see below), a 15-year monopoly in the form of a build-operate-transfer (BOT) arrangement.

From 2002–2010, Timor Telecom invested over $75 million in the establishment and modernization of its network. It also launched new services such as credit transfer and roaming (ITU, 2011). The largest Timorese company by capital, Timor Telecom employs a few hundred staff (Timor Telecom, 2012). Figure 3 shows the company’s growth over the last six years.

![Figure 3: Timor Telecom financial performance and cellular penetration. Source: www.telecom.pt.](image-url)

3 The Timorese State has a 21% share while VDT, Holding Limited has 17%, Oscar Lima 4.25% and Julio Alfaro 4.25%.
The Council of Ministers adopted a new ICT policy in June 2011 which paved the way for market liberalization. Following a negotiated settlement, competition for Timor Telecom was introduced in March 2012, ending exclusivity by April 2012 (TLTL, 2012b). On 12 April, the Ministry of Infrastructure issued a Request for Applications (RFA) for radio spectrum licenses in the 850 MHz, 900 MHz, 1800 MHz and 2.1 GHz bands and Service Provider Registration. The Ministry of Infrastructure received applications from four entities:

- Digicel Pacific Limited, a firm providing mobile services in about 30 countries globally;
- PT Gapura Caraka Kencana, a relative newcomer;
- PT Telekomunikasi Indonesia International (Telin), a subsidiary of Indonesia’s oldest and largest network operator; and

In July 2012, licenses were awarded to PT Telekomunikasi Indonesia International and Viettel Global Investment. The latter was awarded after Digicel Pacific Limited (Digicel), which was initially announced as a winner, withdrew its application. Telin is expected to commence services within six months of receiving its license (expected Jan 2013), with a commitment to cover 94 per cent of the population with GSM mobile telephony and 3G internet access services. Viettel has committed to provide GSM and 3G services to 93 per cent of the public, increasing to 95 per cent within three years. This is expected to launch in Q1 2013. (Telegeography, 2012)

2.1. Telecom—Voice Sector

Voice telecommunications in Timor-Leste is largely mobile. Although their use is not as widespread as in neighboring countries, mobile phones are no longer the exclusive remit of the wealthy, and many of even the poorest citizens have access. As of the end of 2011, Timor Telecom has provided 602,481 mobile connections, 598,025 for voice and 4,456 for broadband. This number accounts for nearly 55 per cent of the current population. Ninety-nine per cent of those subscriptions are prepaid. Mobile voice coverage is available in all 13 districts—covering 92.5 per cent of the population—through 131 base stations (TLTL, 2012c).
Figure 5: Increase in cellular connections (2006-2011). Source: TLTL, 2012a.

Figure 6: A Timorese vendor uses his mobile at Dili vegetable market. Source: Author.
In contrast, the number of fixed phones is not significant, and has risen only marginally since Timorese independence. At the end of 2011 there were 4,034 fixed phone connections, accounting for less than 1 per cent of the population (TLTL, 2012c). Notably, more than one thousand of those fixed lines are used for Internet connectivity. They are used mainly in governmental, corporate, and NGO offices in Dili, as well as in some private homes. A few of the lines are used in cyber cafes.

According to da Silva (2009), two factors explain the low fixed-phone penetration. First, there are network limitations. Timor Telecom has not tried to develop its network inside or outside the capital. It also charges almost the same rate for calls, whether from fixed or mobile phones (unless it is a fixed-to-fixed call, which is rare). As a result, Timorese opt for mobile phones due to their greater flexibility and mobility and better service. A fixed phone also incurs a sizable upfront cost as well as a fixed monthly charge, which discourages moderate-income users. Many users complain about Timor Telecom’s charges, which are displayed in tables 1 to 6 in Annex-1.4

The high prices are more apparent in international call charges. As seen in Table 7 in Annex 1, it costs around $1 per minute to call certain countries, which is very high in comparison to rates prevailing in neighboring Indonesia. However, one can also argue that Indonesia, with a relatively developed and large telecom market is not a proper comparison – telecom prices should be compared with those of other Pacific islands, with no international fiber connectivity. This argument is valid, but that does not negate the fact that the charges are too high for the local population.

High prices can be attributed to a variety of reasons, in addition to lack of competition. Unlike larger markets, which have high user volume and diverse package offerings, Timor-Leste’s market is small and nascent, so that fewer people are paying for the fixed costs of the system. Additionally, macro-economic policies, such as the tax regime, influence costs. For example, taxes on telecommunications were reduced by 5 per cent in July 2008, precipitating a 10 per cent drop in prices from Timor Telecom. Timor Telecom claims not to have increased its rates since 2003, despite approximately 20 per cent cumulative inflation during the 2003–2007 period (Timor Telecom, 2007).

Figure 7: Pay phones are almost non-existent in Timor-Leste. Here, some non-operational ones stand outside the Ministry of Infrastructure. Source: Author.

---

4 These were the rates as of May 2012. They are expected to drop after the entry of the new telecom players.
2.2. Telecom—Data Sector

Internet in Timor-Leste is still in its infancy. As the sole telecom provider, Timor Telecom is also the only fully pledged Internet Service Provider (ISP), but the Australian-owned iNet ISP also operates in Dili. iNet was established in 2003 and uses infrastructure provided by Timor Telecom, including international data connectivity and leased lines (da Silva, 2009). In 2010, Timor Telecom started offering 3G based broadband services in selected parts of the country (Timor Telecom, 2012).

The number of Internet subscribers is low. As of end 2011, there were 4,456 mobile and 1,068 fixed connections. Combined, their penetration is less than 0.5 per cent of the market, and they likely belong predominantly to expatriate staff of international agencies working in the country, or schools with access financed through donor support. The number of business and home users in Dili too has increased, though not drastically, over the last few years. It is unlikely that the Internet is reaching rural users, given the lack of rural electrification and ICT literacy.

The high cost of data communication is another constraint on Internet usage, but Internet users may be relatively wealthier, and willing to pay higher rates. The packages on offer include 128, 256 and 512 kpbs for monthly fixed fees of $49, $99 and $199 respectively.

Internet at these speeds—even when delivered as advertised—is adequate only for a limited set of applications like ordinary browsing, basic email and low quality video. VoIP telephony is uneven or erratic. More complex but appropriate services like basic medical file sharing, basic remote diagnosis and remote education require speeds between 5–10 Mbps. Fully pledged telemedicine services, telecommuting and video broadcasting require yet higher speeds (Kelly & Rossotto, 2012). Dial-up is still available for those who cannot or do not want to use broadband. Pricing is based on usage, not speed.

UN agencies, embassies, some government offices and a few international NGOs operating in Timor-Leste do not rely fully on Timor-Leste’s domestic telecom links. They maintain their own private satellite connection via Very Small Aperture Terminals (VSATs). There are also a few ISDN services in operation. The national broadcaster, Televizaun de Timor-Leste (TVTL), chose not to use Timor Telecom links for its international transmission; in 2007 it entered an agreement with an Indonesian satellite provider (da Silva, 2009).

INTERNET CAFES

The first Internet cafes were started by the ISPs themselves. This might have been aimed at the staff of international organizations, who have been present in large numbers from 2002 onwards. Internet rates have decreased since then. Timor Telecom now charges $1 per hour of usage, even if a client brings his or her own laptop (Timor Telecom, 2012). This is the same rate charged at other Internet cafes in Dili. If the large number and the diversity of Internet cafes in Dili is any indication, the businesses are doing well.

Figure 8 shows an example of a cybercafé. Although this café looks deserted from the outside, it is popular among locals. Like many others, it is located in a residential (and largely poor) area of the capital. It is surrounded by other shops typically seen in rural areas.

---

5 Lower-than-advertised bandwidth is a common experience in many developing countries.
6 Integrated Services Digital Network (ISDN) is a set of communications standards for simultaneous digital transmission of voice and data services over public switched telephone networks. The advent of broadband has made ISDN largely obsolete.
There have been some novel attempts to support rural connectivity. An example is Connect East Timor (CET), a community-based campaign supported by an NGO named Palms Australia, which tried to address the lack of telecommunications infrastructure in rural and remote areas of Timor-Leste. In June 2005, CET was successfully piloted in two sub districts—Balibo and Lacluta. About 20,000 people were provided with affordable access to basic, solar-powered communications facilities. Specifically, the project enabled the following:

The Balibo Sub-district Administrator’s office was networked to eight major villages via a new radio signal repeater.

The Lacluta Sub-district Administrator’s office was linked to the District Administrator in Viqueque and networked to seven major villages via a new radio signal repeater constructed on a bare site. Two villages that were only accessible on foot had radio equipment carried to them (da Silva, 2009).

However, there is no evidence that the campaign has continued beyond 2009. The last news item on its website, posted in 2009, indicates disappointment over the lack of progress in 2008, particularly the inability of Timor-Leste’s government to continue the campaign, but promises to continue the commitment (Connect East Timor, 2009). Attempts to confirm that the campaign is continuing failed.

2.3. History of Regulatory Environment

Initially, the Department of Transport and Telecommunications was responsible for telecommunications policy. But under the new government in 2007, a separate Department of Infrastructure was established. The new department covers public works, electricity, water...
and urban planning, telecommunications and transportation. It is responsible for setting aspirations for each sector’s development, reviewing the market, coordinating cross-sector efforts with other branches of government, and proposing legislative change.7

Meanwhile, an ICT regulatory agency that was also established had been less active. The Autoridade Reguladora das Comunicações (ARCOM), or the Communications Regulatory Authority, was set up in 2003 to regulate, supervise and represent the telecommunications sector. However, the stipulation that ARCOM’s Board of Directors be appointed within 90 days of its entry into force was not followed, and ARCOM continues to operate as a government sub-department.

Financial dependence on the government limits ARCOM’s ability to behave as an independent regulator (da Silva, 2009). These limitations have not been seriously felt by the industry, with just one operator. However, most telecom users are unaware that they can make complaints about quality of service issues to the regulator.8 ARCOM’s long gestation period, as well as resource limitations, might explain why it has not yet been able to assert itself fully. Another major limitation was in the old Decree Laws 11 and 12 which basically did not give ARCOM effective powers.

Finally, the Comissão Consultativa (Consultative Commission), consisting of representatives of the government, operators and consumers, was mandated to provide guidance and advice to ARCOM, but has never commenced operations (da Silva, 2009).

2.4. Liberalization of the Telecom Sector and the Birth of a New Regulatory Authority

While this study was conducted, Timor-Leste’s telecom sector was undergoing the most dramatic policy and regulatory transition in its history. The Timorese government has implemented its policy of liberalizing the telecommunications sector, ending the exclusive rights of Timor Telecom. This change has attracted the interest of the regional telecommunications industry, suggesting that in the future a more competitive industry will emerge.

Under the Telecommunications Decree-law no. 15/2012 of 28 March 2012, the Autoridade Nacional de Comunicações (ANC) replaces ARCOM. This is more than a name change. The ANC will take on greater responsibilities, including: overseeing registration of service providers; granting radio spectrum licenses; monitoring compliance with legislation, regulations and licenses; regulating interconnection, competition and consumer protection; resolving disputes among and between operators and service providers; and allocating, assigning and supervising the use of radio spectrum and numbering, among other responsibilities (TLTL, 2012d).

Timor-Leste has begun preparations for the new regulator, including its design, funding and staffing. The ANC will be funded mainly from license and other fees from telecommunications service providers. It will be accountable for its budget and required to report annually to the Council of Ministers on its activities and finances. Appointments to the ANC’s board (made by the Minister upon approval of the Council of Ministers) should ensure ANC’s independence from political influence in executing its statutory powers and responsibilities. Whether and to what degree this goal will be achieved remains to be seen. Board member terms will be staggered to ensure continuity. As of April 2012, vacancies had been advertised for senior management positions at ANC (TLTL, 2012d).

As of November 2012 no ANC Board or staff appointments had been made. The Government is currently discussing the engagement of external specialists (regulatory specialist, organizational specialist) to provide technical support to the ANC on a transitional basis, to be financed by AusAID bilateral resources.

The national telecommunications policy offers further guidance to encourage competition, consumer protection and infrastructure sharing. The government will interfere minimally in the market, allowing market forces to drive the sector towards higher efficiency, lower prices, greater responsiveness to user needs and better quality services. Licenses will be required for the provision of different telecommunications services, and a new license will be granted to Timor Telecom to replace the existing concession. In the future, the Government will be barred from intervening in pricing, except to review prices in the event of market failures. The new telecommunications legislation also addresses interconnection, and may require operators to publish reference interconnection offers (TLTL, 2012d).

The law also includes universal service goals, that is, to provide voice-service access to all citizens of Timor-Leste, and to provide broadband Internet access to all district capitals in the near term. To achieve this, the government plans to establish the Telecom Fund of Timor-Leste (TFTL), which will be financed from levies, donor funding and government grants. The TFTL will be administered by the new

---

7 Some critics claim that the diverse mandate is an indication of the low priority given by the government to the development of the ICT sector (da Silva, 2010); nevertheless, key developments related to ICT policy did take place during this period.
8 Indeed, its website remained unavailable throughout the period of study.

THE ROLE OF ICT IN POST-CONFLICT TIMOR-LESTE
regulatory body and used to subsidize the extension of coverage to areas that would not otherwise be served because such coverage would not be economically viable for the providers (TLTL, 2012d).9

The World Bank has offered significant support to the government of Timor-Leste by providing technical assistance to the Ministry of Infrastructure in devising the new telecommunications policy. The World Bank has also advised the government of Timor-Leste on the development of new telecommunications legislation to support effective regulation of the newly-competitive telecommunication market. The World Bank, as of November 2012 was discussing a proposed medium-term support program on ICT regulatory and policy issues, in partnership with AusAID, as part of its new Country Partnership Strategy (CPS) for Timor-Leste. As he congratulated the Timorese government on the reforms it has initiated, Luis Constantino, Country Manager of the World Bank in Timor-Leste, also noted the global experience of increased competition, which leads to lower costs for mobile phone users and better quality of services (World Bank, 2012e).

---

**Box 1: A New Telecom Regulator Gets a New Mandate**

The new legislation has a number of salient features:

- **Registration of service providers**: Once registered, service providers will be required to report regularly on their activities and finances. The ANC has the power to amend, suspend or revoke registrations in case of non-compliance.
- **Competition**: The ANC will periodically review the telecommunications market to ensure its competitiveness. Any anti-competitive contract, informal agreement or conduct is prohibited. Mergers and acquisitions will be controlled to prevent the concentration of significant market power in one or a few entities, unless user benefits exceed the negative impact.
- **Price regulation**: Prices (wholesale and retail) will be subject to regulation only in case of a significant market player. Prices will be principally based on international benchmarks, but may also consider costs. No ex-ante retail mobile price regulation will be allowed for two years after the introduction of services.
- **Interconnection, cell-site sharing and access**: Service providers should negotiate and agree on interconnection, cell-site sharing and access to facilities. The ANC may require providers to respond to reasonable requests for access. Furthermore, if international fiber-optic cables are installed, capacity shall be provided to others on non-discriminative and cost-oriented prices.
- **Dispute resolution**: The dispute resolution process is designed to promote speed, quality and effectiveness in the case of competition, interconnection, or other disputes between operators.
- **Consumer protection**: Service providers establish provide complaint and dispute resolution procedures. They should also establish and maintain emergency services, operator assistance services and customer call centre services. Introduction of a mobile number portability requirement will be reviewed in 18 months.
- **Fees**: Beginning in 2013, all service providers will pay a regulatory fee, a per centage of gross revenues capped at 2 per cent. Mobile service providers will pay a minimum $200,000 fee per annum. There will be no license application numbering fees. Operators can use state-owned land free for five years and at a nominal fee afterwards. New entrants will not pay radio spectrum fees for the GSM and 3G spectrum.
- **Universal access programme and levies**: Two years after liberalization, ANC will propose a universal access program for voice and Internet. Levies on operators to create the fund will be no more than 1 per cent of gross revenues.
- **Radio spectrum**: The government will publish allocations and usage details; licenses are valid for 15 years.
- **Contraventions and administrative penalties**: ANC can impose penalties of up to $2 million for most violations.

**Source**: TLTL, 2012f.

---

9 It is not clear whether this would work as intended and planned: universal service funds in many countries—including nearby Indonesia—have failed to achieve their objectives. Nevertheless, the existence of a long term plan is, by itself, encouraging.
2.5. Network Information

Timor Telecom currently operates 900 MHz and 1800 MHz GSM networks. In March 2010, it introduced 3G mobile Internet services, using the 2100 MHz band in Dili and the 850 MHz band elsewhere. It reported 2,363 subscribers at the end of 2010, when services were available in all 13 district capitals. In December 2010, Timor Telecom activated the 60 kilometer Dili Metropolitan Network, which consists of fiber optic rings and SDH equipment. This high-capacity fiber-optic transmission network traverses the capital in a series of rings (TLTL, 2012e).

At the time of the study international connectivity is provided only through satellite links. Timor-Leste is far from any submarine fiber links serving the Pacific or Southeast Asian regions. (Figure 9) This rules out the direct connection option to any international fiber link. Terrestrial local cable links are terminated relatively closer, in Kupang, West Timor, Indonesia (about 300 km) and Darwin Australia (about 750 km) as shown in Figure 10.

In February 2009, the World Bank released a detailed report on Pacific Connectivity options. This study did population forecasts and respective demand projections till 2032. Timor-Leste was classified as a country with a demand for ‘medium bandwidth’.10 For a country in this category, although satellite is still cheaper in the short term, a cable infrastructure will be essential with the growing demand. If demand remains low, satellite remains more cost effective but a cable infrastructure was found to be more cost effective if were to grow. The study recommended the cable construction before 2013 (World Bank, 2009).

---

10 In this classification Timor-Leste stood with along with Samoa, Solomon Islands, Vanuatu, Tonga, and American Samoa, despite it being the second most populous country considered under study, just next to Papua New Guinea with a population with a population of more than 6 million. Apart from PNG, countries like Fiji, PNG, French Polynesia and New-Caledonia, with less population were classified under ‘high bandwidth demand’. The landscape has since changed.
Three international connectivity options are possible. The most cost effective option is to connect to nearby Kupang or Atambua in West Timor. (Figure 11) Kupang is already connected by the Mataram-Kupang cable system maintained by PT-Telkom, Indonesia. Atambua (less than 100 km from Dili) is due to be connected to Kupang by fiber optic land cable in 2013. Capital expenditures of connectivity is estimated to be $11.6 million to Atambua and $16.5 to Kupang. The other options are to connect Darwin, Australia via Suai at a cost of $68 million or a 3750km long cable to Singapore for $133 million. (Satola & du Souich, 2012)

At the time of the study, one of the new Licensees (Telin) has already made plans to connect its new domestic backbone to Atambua. This will not necessary leave the other options out.
2.6. Telecom services quality

Quality of Service (QoS) information across the country is not available. This is not surprising, given that the entire telecom infrastructure in only a decade old, and user numbers have been relatively small until recently. Neither ANC nor any independent party measures QoS on a regular basis.

2.7. Content development, Business Process Outsourcing, IT-Enabled Services and E-commerce

Timor-Leste still depends almost entirely on imports from other nations for IT hardware and software. It produces little local digital and online content, as might be expected given the low level of Internet usage. Most internally-produced websites cater to the needs of foreigners rather than locals. There are only a few websites that use the country’s two official languages, Portuguese and Tetun.

The number of websites in Tetun is small. One of these, www.suaratimorlorosae.com, was maintained by the Suara Timor Lorosae (STL) or Voice of Timor-Leste. This bilingual website (it used both Indonesian and Tetun) was the only online newspaper in Timor-Leste, although most of the website’s content is derived from the print version circulated in Timor-Leste (da Silva, 2009). However, this site is no longer functional. Similarly, although the Timor Post, the second largest circulating newspaper (www.timorpost.com), has announced that it will produce an online version in Tetun, this has so far not materialized. One functional website that does offer Tetun as a language option is the United Nations Integrated Mission in Timor-Leste (UNMIT) website, www.unmit.org.

It is too early to discuss an IT-enabled services (ITES) industry. Many reasons make business process outsourcing (BPO), ITES or industries impossible right now. BPO is more specialized and faces considerable constraints locally, in addition to the fact that there is major competition worldwide in this sector and Timor-Leste appears to have little/no comparative advantage. First, capacity is lacking. Second, the country does not have enough skilled IT professionals to run a developed ICT industry. Skilled workers overseas aren’t attracted to Timor-Leste, because its market size is so small.

Even if these two barriers could be overcome, the difficulty of getting and maintaining infrastructure facilities would still remain. According to da Silva (2009), the unstable electricity supply (even in Dili) is another reason that an ICT industry won’t emerge in the near future. Any organization or individual willing to maintain a web server locally would almost certainly have to purchase an electricity generator, leading to higher capital and operational costs. The only three commercial banks operating locally have not shown any interest in issuing local credit cards.

As connectivity grows, however, it will be important to develop the legal and regulatory frameworks related to trust and privacy issues. Already in 2007, privacy issues emerged when some high-ranking state officials found that their private mobile phone conversations had been recorded without their knowledge or consent, and later made public (da Silva 2009).11

11 For information on content regulation in a broadband era, see Chapter 3 of the Broadband Strategies Handbook, available at http://www.infodev.org/en/Publication.1118.html
Box 2: Social Media in Timor-Leste

It is unrealistic to expect widespread use of social media in a country where less than half a per cent of the population has access to the Internet. Low mobility and limited communication technology, as Dale (2011) points out, tend to make networks in Timor-Leste geographically limited, despite a high level of interaction among those who belong to such networks.

Despite these access difficulties and low usage, however, Timor-Leste has its own share of Web 2.0. José Maria Vasconcelos, the newly elected President of Timor-Leste (popularly known as Taur Matan Ruak), had 4,989 Facebook friends on 19 May 2012, the day he took office—just a little below the maximum number possible.

![Figure 12: President Taur Matan Ruak's Facebook Page](image)

The Timor-Leste Presidential election of April 2012 had its electronic parallel on Facebook. The groups supporting Taur Matan Ruak for President had 1,220 members while Suporta Taur Matan Ruak Ba Presidente Republica, a forum in Portuguese, had 5,499 (as of election day).

Former President Jose Ramos-Horta is less active on Facebook. His largest group has only 2,699 members. The number of popular nonpolitical Facebook groups is limited. The Timor-Leste Management Society has 1,151 members, while UNDP Timor-Leste numbers 1,493 (Facebook, 2012b). It is not possible, without administrator access to these groups, to determine the demographics, geographical distribution or characteristics of those who have joined them. Deeper analysis of constantly changing social media groups has limited scholarly value in any case.

Usage of other popular social networking services is still at its inception.
3. ICT and Reconciliation

“We need to learn from this, and to take inspiration from the efforts of East Timorese peacemakers. In the future, there will always be differences of view in our society and with our neighbors. We will be faced with choices, at the local, national and international levels, about how we approach these differences. The experience of the past shows that we must always choose the path of peace. That way we can secure our future, and we can become a shining light to the world. Our knowledge of our past can help us shape a peaceful future.”

− Commission for Reception, Truth and Reconciliation in East Timor

The United Nations recognizes the necessity of post-conflict reconciliation to prevent the resurgence of conflict and to create the conditions necessary for sustainable peace in war-torn societies (UN, 1999). Reconciliation is a long-term process that requires much resolve, effort and persistence. It relies on political and other opinion leaders who are willing and able to rise above the grievances of the past.

Following the famous example of South Africa’s Truth and Reconciliation Commission, the Indonesia-Timor-Leste Commission of Truth and Friendship (CTF)12 was established in August 2005. Its mandate was to investigate human rights violations by Indonesia and its armed forces during the occupation of East Timor, particularly the events and atrocities leading up to and surrounding the 1999 referendum on East Timor’s independence, and the process of independence.

The terms of reference of the CTF describe it as a mechanism to promote friendship and cooperation between the governments and peoples of the two countries, as well to advocate for intra and inter-communal reconciliation to heal the wounds of the past (CTF, 2011). A salient feature was limiting its mandate to post-1999 events, thus excluding a longer history of conflict.

The final report of the CTF was handed to Indonesian President Susilo Bambang Yudhoyono and Timorese President Jose Ramos-Horta at a ceremony on Bali, Indonesia, on July 15, 2008. The report neither named individuals nor recommended further judicial processes. As the Indonesian President put it, the intention was “only to uncover the truth so that the two sides could move forward in promoting friendship and reconciliation” (Jakarta Post, 2008). President Yudhoyono said he “deeply regrets” the atrocities and will follow the report’s recommendations. However, he did not apologize for them, in spite of the report’s recommendation that Indonesia apologize for the immeasurable pain and suffering its armed forces had caused (Jakarta Post, 2008). Likewise, prosecution and other formal efforts seem unlikely.

This does not mean the reconciliation itself is not happening; only that it happens more informally. For example, the two countries cooperate in trade. The electronic industry in Timor-Leste is dominated by Indonesians. While they are not legal tender, Indonesian rupiah notes are widely used in Timor-Leste. Two Indonesian airlines, Merpati Nusantara and Batavia, fly between Dili and Bali everyday—making the latter the only location from which a daily flight operates to the Timorese capital.

3.1. Reconciliation through Media

Similarly, informal bridge-building is happening at the people-to-people or community level, especially through the electronic media and popular culture where much sharing is taking place.

Radio is the most widespread form of mass media in Timor-Leste. It is used in urban as well as rural environments, despite the poor electricity supply. Nearly half the population has a radio receiver at home, most of them powered by batteries. Nearly two in three Timorese say they occasionally listen to radio, compared to about one in three who say they occasionally read a newspaper. The content originates from Radio Timor-Leste (RTL), the public broadcaster, a number of Dili-based community/commercial hybrid stations, and community radio stations at the district level.

12 This is different from the Commission for Reception, Truth and Reconciliation in East Timor, CAVR, which is UN-sanctioned, while CTF was largely a civil-society driven initiative.
Faced with the challenge of commercial sustainability, the number of radio stations is decreasing. Of the 15 stations set up during the transitional government period, only six were active in 2006 (Kaltenborn-Stachau, 2008). Community radios also face a range of challenges. Many are dependent on development donor funding, and have not integrated well into their communities.

Although it is popular, Timorese broadcast television has limited reach. The television arm of RTL, Televisão Timor-Leste (TVTL), enjoys a local monopoly on terrestrial TV transmission, and broadcasts programs in Tetun, Portuguese and Indonesian. However, few rural households can access it. Local television is not popular, except for the news.

Interestingly, Indonesian channels received via satellite fill this void. Almost every TV watcher in Timor-Leste spends more time watching TV channels from their neighboring country than their own domestic transmissions. As a result, Indonesian popular culture is pervasive in this nation.

TVRO (Television Receive Only) satellite dish antennas that capture Indonesian broadcasts can be seen in front of most houses in Dili. Some are amateurishly made with thin sheets of metal and rusted pipes. The Timorese augment their diet of Indonesian satellite broadcasts with cheap video compact discs (VCDs) containing Indonesian pop culture content.

The choice of this source for pop entertainment at first seems puzzling. As one researcher has written: “Why is Indonesian pop culture so popular with people, young and old, who fought hard for independence from Indonesia? Aziby and Xisto, emerging artists from the Arte Moris Free Art School in Dili, explained that Indonesian popular culture is something everybody can relate to... Timorese can understand the words of Indonesian music and television, which is less often the case with similar Portuguese pop. For these reasons Indonesian popular culture provides a form of entertainment” (Sloman, 2009).

The growth of cross-cultural contact in the information age, especially between historically troubled neighbors, has implications not fully understood at this time. The flow of electronic media and popular culture in Timor-Leste, though, is prevalent and will influence the relationship between Indonesia and its smaller neighbor.

**Figure 13: Satellite dishes to capture Indonesian channels. Source: Author.**

### 3.2. Reconciliation through Education

Cultural interaction can easily influence sectors such as education. Bahasa Indonesia is widely spoken by both pupils and educators, with a wide supply of educational content available. Given the large market in Indonesia, if the correct ICT infrastructure can be deployed in Timor-Leste, its students will be able to benefit from digital Indonesian educational content, as well.
Information and educational resources already developed in Bahasa Indonesia can be used in both formal and non-formal education. For any Timorese student or citizen in search of knowledge and information, the range of sources increases enormously if he or she is proficient in Bahasa Indonesia. For example, Bahasa Indonesia is the 22nd most widely used language on Wikipedia, with 188,989 articles, 32,486 images and 357,780 users (as of May 2012). Tetun, in comparison, is in 231st place, with only 655 articles and 2,485 users. With the right attitudes, educational policies, ICT infrastructure and countrywide ICT literacy, Bahasa Indonesia’s vast virtual library can be accessed by Timorese students.

The United Nations Asia and Pacific Training Center for Information and Communication Technology (UN-APCICT), a regional institute of the UN whose mission is to strengthen the efforts of the Asia Pacific countries to use ICT in their socio-economic development through human and institutional capacity building, has piggybacked on this notion of using Indonesian resources to build capacity in Timor-Leste. It has conducted multiple ICT development training programs for Timorese in Bahasa.

For instance, it ran national workshops on “Academy of ICT Essentials for Government Leaders” in Dili in July 2009, April 2010 and August, 2011, in partnership with Directorate National for ICT in the Ministry of Infrastructure. Over 50 senior government officials across ministries and districts attended each workshop. Bahasa Indonesia versions of UN-APCICT’s academy modules were used in this training. The resource persons were from University of Indonesia. Participants from National University of Timor-Leste (UNTL) were also given the opportunity to attend the workshops in Jakarta, Indonesia.

Similarly, Timor-Leste can benefit from course materials developed by Universitas Terbuka (UT), the Indonesian open university, which uses open and distance learning systems to widen access to higher education to all Indonesian citizens, including those who live in remote islands throughout the country as well as in other parts of the world. It has a total student body of more than 460,000, and distributes content both via satellite TV and the web (UT, 2012).
4. ICT for Governance

“Timor-Leste has, in recent years, taken promising steps to address corruption. In its favor, the country has developed a steady flow of anti-corruption legislation, a free media environment, and a strong opposition party.”

− Fostering Justice in Timor-Leste, USAID, 2009

“Administrative service in Timor-Leste is still not properly organized. Some officers’ backgrounds remain a mystery. Nobody knows their previous experience, where they have worked, where they were educated or even whether they were educated at all. It takes time to address these issues.”

− A senior UNDP official, in conversation with the authors, 2012

Timor-Leste’s history of colonialism and occupation has endowed it with a relatively limited base of administrative capacity. Both “soft” endowments—such as well-designed institutions and experienced bureaucrats—as well as “hard” ones—such as government records and infrastructure—have been limited or lost because of conflict.

Given these severe limitations of administrative capacity and knowledge, the United Nations Transitional Administration in East Timor (UNTAET) provided an interim civil administration following independence, from October 1999 to May 2002. The process of rebuilding often had to start from scratch. Timor-Leste is still heavily reliant upon outside assistance from donors and the United Nations (which, for example, still provides defense).

4.1. ICT Solution for Administrative Challenges

Avoiding falling into the trap of the “resource curse” of oil reserves requires strong and capable institutions. The UNDP’s (2011) National Human Development Report specifically noted the need to address complaints of corruption and difficult administrative procedures. Additionally, creating an inclusive political and social environment that broadens participation is essential. The influence of ICT within these variegated processes is complex and difficult to isolate, but an ongoing project for computerization of Justice Ministry functions suggests some insights.

Box 3: United Nations Peacekeeping Missions in Timor-Leste

The United Nations peacekeeping effort has been active in Timor-Leste since 1999, including:

i. The United Nations Mission in East Timor (UNAMET) (June—October 1999): A political mission to organize and conduct a popular consultation to ascertain whether the East Timorese people accepted or rejected a special autonomy within Indonesia.

ii. The United Nations Transitional Administration in East Timor (UNTAET) (October 1999—May 2002): A peacekeeping operation established by the UN Security Council that exercised administrative authority over East Timor during the transition to independence.

iii. The United Nations Mission of Support in East Timor (UNMISET) (May 2002—May 2005): A peacekeeping mission to provide assistance to the newly independent nation until administrative capacity was established.

iv. United Nations Office in Timor-Leste (UNOTIL) (May 2005—August 2006): A political mission to assist with critical state institutions (e.g. security) in the transition to democracy.


13 In March 2011, the UN handed off operational control of the police force to the East Timor authorities, but more than 1,200 UN police officers still patrol the streets. After the 2012 presidential election, the missions are scheduled to end—Bignews Network (2012).
Among the key objectives of this UNDP supported effort is to develop the IT capacities of staff across law and justice-related institutions (National Police, Ministry of Justice, Courts, Public Defenders, Prosecutors Office and Prisons). According to the data collected for this study, this project annually trains about 20 IT professionals from those institutions. In 2012, this number was increased to 30. It has so far produced around 60 national IT professionals. This is notable in a country with very few IT training institutions, none of which operate at full capacity.

The project trains professionals in theory and practice. The training follows a curriculum based on technology for the justice sector. The next step is training and mentoring through on-the-job training by UNDP-assigned IT Specialists. In line with the government’s wishes and public statements, modern but user-friendly technologies are being used to leapfrog into advanced IT capability. As such, the program is providing the indigenous skills which are needed to reduce Timorese dependence on outside assistance.

Figure 15: The data center of the Ministry, Timor-Leste with Systems Manager, Jose Manuel Araujo. Source: Timor-Leste Ministry of Justice.
The next phase is to certify Timorese administrators in certain globally-recognized IT areas such as CCNA, ITIL, CompTIA and Network+.\textsuperscript{14} This is treated as the training of trainers. Only a small group is selected for overseas training. Once back in Timor-Leste, they are expected to transfer their acquired knowledge and skill to others. Despite the high initial investment for instructing trainers, this approach appears to be the only sustainable and practical one. Not everybody can be sent for overseas training.\textsuperscript{15} Using trained locals to train others addresses the language barriers too. These efforts to build a cadre of savvy technologists will enable further institutional innovations in Timor-Leste.

This is not the only UNDP-supported government project that promotes ICT use. Implementation of the Personnel Management Information System (PMIS) for government was launched in October 2007. This will facilitate human resource management and provide a base for the elaboration of human resource policies. It will allow the government to formulate a gamut of management indicators for the administrative service. However, the project faces multiple challenges. No network connectivity exists between government offices and departments, and email is a rarity (although short message service, or SMS, is apparently a growing channel for public officials). Government institutions use different standards for software and hardware, which makes integration difficult if not impossible (da Silva, 2009).

Non-ICT challenges to the PMIS program are probably even more prominent. Within administrative services a significant fraction of temporary employees are war veterans—those who took part in the armed struggle for independence. Their qualifications, if any, are rarely matched with their posts. A straightforward approach to rectifying the problem is not feasible, given their political influence. A more practical solution is delaying strict adherence to the systems until capacity-building takes root.

The work on a communication network that links the government institutes together was launched in 2009 under the ‘National Connectivity Project’. In this project Timorese government through the Ministry of Infrastructure, is in the process of building a converged network of data, voice and video services to all the district capitals. This incorporates the implementation of a national internet backbone that provides last mile connectivity for government offices, departments and schools (Neves, 2009).

The connectivity is based on WiMax (inner city) and VSAT (among districts). The success of the network is questionable. It works fine where implemented, but the coverage is not broad. The poor data transfer speeds, inter alia, have discouraged its use by government officers.

In addition, research has indicated that policymaking in general suffers from a lack of transparency and public participation. Many decisions are made with limited consultation, thus impairing important changes. In addition to formally allowing participation, a culture of openness must be fostered through letting the public know of its right to information. In many cases, important documents are not sufficiently disclosed to the public. There is no public information center at Parliament, and the official gazette, Journal of the Republic, is published infrequently and only in Portuguese. Openness in rhetoric and practice is key to the institution building and social cohesion needed in post-conflict countries (Kaltenborn-Stachau, 2008).

\textsuperscript{14} See Box 6 for details.
\textsuperscript{15} The training costs are high. For example, CCNA training in Singapore costs between $2,500—3,000 per participant, just for tuition fees. It must be supplemented with airfare, accommodation and per diems.
Box 4: One Country, Many Tongues: The Issue of Language

Human languages play an important role in ICTs. While the information systems can, theoretically, interact with humans in multiple languages, the use of one language always solve serious interoperability issues. Unfortunately, this is easier said than done in the case of Timor-Leste.

The issue of official language is highly controversial. Timor-Leste's population of little over one million includes a number of distinct ethnic groups, most of whom are of mixed Malayo-Polynesian and Melanesian/Papuan descent. They speak over 30 local languages at different stages of development. The most prominent language is Tetun. It is the mother tongue of only 13 per cent of the people, but spoken and understood by 80 per cent of the population. Three foreign languages—Portuguese, Bahasa Indonesia and English—are also spoken.

Independence prompted a difficult question: What would become the official language? Tetun is only a spoken language, without its own script. It is also not spoken anywhere else in the world, except by a tiny minority of people in west Timor. A second international language was necessary. The above three candidates each had its own drawbacks.

Portuguese was the official language for over 400 years of colonial rule, but after 25 years of neglect, the number of Portuguese speakers had declined to 5 per cent of the population, from 15 per cent during the Portuguese period. Too, they were mostly elderly.

At least 60 per cent of Timorese spoke Bahasa Indonesia, as a result of Indonesian efforts to teach their language in Timor-Leste during the occupation. It is also essentially the language of trade and the one spoken most widely in the Indonesian archipelago. Despite these advantages, negative feelings among Timorese for anything Indonesian meant that it could not be the official language.

English, while a prime candidate, was very limited in its spread.

In the end, the government decided to adopt Tetun and Portuguese as official languages. This has introduced more problems than it solved. If the Timorese government were to use only Portuguese, its entire computer and communication system would have to be in Portuguese. This has made introducing new systems and training more difficult. Another practical problem is the deficiency of Portuguese speakers outside government. The processes of trade and education still happen largely in Bahasa.

The choice of Portuguese as the state language has to some extent made Timor-Leste more dependent on Portuguese-speaking countries for its IT needs. For example, some Brazilian IT professionals work there at present. A positive externality of this is the wide use of open source software16, both as system and application—a popular practice in Brazil. While the community of open source users in Timor-Leste is small, use of the Linux version of Ubuntu is becoming a trend. The pioneers in using this Linux distribution are an Australian government-supported project, Info Exchange East Timor (http://www.technology.tl/about-us), and the Department of Justice (da Silva, 2009).

Hardware also has its challenges. Although the situation of a few years ago—when all purchases needed to be imported de novo—has changed with the growth of computer and accessory shops in Dili, maintenance is still a challenge, with replacement parts taking two weeks to arrive.

Retaining trained IT staff is another problem the government faces. Over the last three years, it has lost about ten trained professionals to the private sector (Timor Telecom), foreign embassies and aid agencies. Measures have been taken to minimize this internal brain drain. Previously, IT professionals were in Level E in government—the lowest level, with a monthly salary of $180. Now, most of them are placed in Grade C (paid $290 a month) or B ($340 a month). Still, the private sector offers these professionals much higher salaries, around $500 to $700 per month.

16 Open source software has emerged as an alternative to its more popular and widely used proprietary counterparts. The popular myth surrounding open source software is that it is always “free”—that is, free of charge. To a certain degree this is true, but in some cases a maintenance cost is involved. On a licensing cost basis, open source software applications are almost always cheaper than proprietary software. The most widely used open source applications include Linux distributions (Red Hat, SuSE, Debian, etc.) and Open Office, an alternative to Microsoft Office applications. Open Source software is recommended when there are serious budget constraints.
4.2. ICT Solutions for Transparency Challenges

Transparency International ranks Timor-Leste’s corruption as relatively high: the nation’s Corruption Perception Index was 2.4 out of 10, placing it 143 out of 183 countries in 2011. The transparency portal [http://www.transparency.gov.tl] launched in March 2011 is a response to this problem. It enables the public to search, evaluate and analyze state expenditures in real time.

According to the Ministry of Finance, by using the web portal a user can:

• get complete financial information on how the national budget is being spent;
• access historical and recent data; and
• monitor the progress of Timor-Leste Government’s budget execution (MOF, 2012)

The goal is to improve citizen information and participation, as well as reduce corruption through transparency, thus boosting citizen and investor confidence.

The e-Procurement sub-portal is an integral part of the transparency portal. It enables web users to interactively access and review open government tenders. These tenders are grouped into business types to assist users, and prospective bidders are able to download bidding documents. The previously awarded tenders are also electronically archived.

These steps are commendable, but there are challenges to be overcome before they be truly effective. The wide gap between this portal and its audience cannot be ignored. Language, connectivity and awareness issues limit public access to the portal to such an extent that it can hardly serve its objective. Ideally, the content should be in a language understandable to the local population, who should also be able to use it effectively.
5. ICT for Human Development

“The World Development Report 2011 found that on average post-conflict countries take between 15 and 30 years—a full generation—to transition out of fragility and to build resilience. It is against this backdrop that social and economic development in Timor-Leste can be seen as remarkable. The 2011 budget provides a strong indication of priorities for the government’s Strategic Development Plan. The investment strategy is expected to focus strongly on major infrastructure, skills, and other structural gaps, seeking to generate increased and sustainable private sector investment as a means to enhance job opportunities and reduce poverty for the people of Timor-Leste.”


Timor-Leste’s economy is at crossroads. Once known as the poorest and least-developed nation in Asia, it now has several developmental options. The challenge is to select the best path forward, one that can help Timor-Leste sustain growth in a turbulent global economy.

Since independence, Timor-Leste has increased its GDP per capita from a little over $300 to $800 (Figure 17). The real annual growth rates are impressive. The sluggish rates during the early days after independence have since improved to nearly 8 per cent. There is also a budget surplus.

![Figure 17: Non-oil real gross domestic product (GDP) of Timor-Leste at current prices in millions of USA and GDP per capita in $(2002-2012). Source: UNDP, 2011.](image)

However, this growth rate needs to be seen in a broader context. Small economies with little or no industrial activity can record comparatively high economic growth rates, especially when there is substantial investment by bilateral and multilateral donors. As the country emerges from prolonged conflict, there is no room for complacency.

---

17 Non-oil, real and at current prices.
Unemployment is at 18.4 per cent. Inflation is in double digits (13.5 per cent in 2011), although, without its own currency, Timor-Leste has little control over it (CIA, 2012). The reasons for inflation are threefold. First, the U.S. dollar has depreciated compared to other major currencies. Second, prices for global commodities have risen: Timor-Leste imports most of its consumables, including drinking water. This has resulted in a huge unfavorable gap in balance of payments. Third, aggregate demand has risen without a parallel upsurge in supply.

The turning point in the Timorese economy came in 2004, when petroleum extraction started in the nearby sea field. Currently, commercial petroleum extraction is limited to the Joint Petroleum Development Area (JPDA) in the Timor Sea, which is shared with Australia (Figure 18). Revenue from the JPDA is split 9:1 between Timor-Leste and Australia. The high oil revenues make Timor-Leste highly oil-dependent. In 2009, petroleum income accounted for about 95 per cent of total government revenue and almost 80 per cent of gross national income (GNI) (IMF, 2011).

The Petroleum Fund of Timor-Leste began in 2005 and is charged with managing resources and revenue in a prudent, transparent manner. The Government of Timor-Leste, represented by the Minister of Finance, is responsible for the overall management and investment strategy. Its Central Bank undertakes the operations. The fund started with an opening balance of $205 million. As of February 2012, it has grown to nearly $10 billion (CBTL, 2012).

When oil revenue is factored in, Timor-Leste’s real per capita GDP goes up more than fourfold to $3,640, or $8,701 in Purchasing Power Parity (PPP) terms. This places the country close to China and Thailand (IMF, 2012).

This seeming bliss can also turn out to be a curse. In economics, the term Dutch Disease explains the apparent relationship between the increase in exploitation of natural resources and a decline in other sectors. This is because the boom results in a “resource movement effect,” which will cause production to shift toward the booming sector, away from other sectors. In such cases, an additional risk is that the petroleum revenue will not be used sufficiently for human development.

At this point in its economic growth, Timor-Leste can avoid the Dutch Disease by adopting two vital strategies: use the Petroleum Fund to develop infrastructure and human resources; and also to develop the non-oil sectors of the economy. ICTs can play specific roles in both these strategies. As the former approach is discussed in section 4.2 in this study, the focus here is on the latter.

---

18 Officially, Timor-Leste uses the U.S. dollar as its currency. Technically it is illegal to use any other currency but in practice the Indonesian rupiah still circulates and is used in local market transactions. At the time of independence U.S. dollars, Australian dollars and rupiah all were in circulation. Both the rupiah and Australian dollar were disqualified as official currency, as they were highly volatile during the previous few years. The U.S. dollar was selected for its strength, but that can be a weakness in gaining export competitiveness within the region.
5.1. ICTs for the Development of Non-oil Economy

In 2011, Timor-Leste’s non-oil GDP comprised agriculture (27 per cent), industry (18 per cent), and services (55 per cent). Its main agriculture products were coffee, rice, corn, cassava (manioc), sweet potatoes, soybeans, cabbage, mangoes, bananas and vanilla. The main industries were printing, soap manufacturing, handicrafts and woven cloth, and service sector revenue came mostly from tourism and communications (CIA, 2012). Compared to petroleum, all these sectors are relatively small in size.

Coffee, as a commercial product, is a good example. It overtook sandalwood as the dominant product in the mid-19th century. The most important money earner during the Portuguese era, coffee production at its peak accounted for half of all exports. However, it was largely neglected during Indonesian rule, and despite USAID funding in 1994 and the creation of Cooperative Café Timor (a non-profit business to handle coffee exports), the industry has yet to regain its previous glory (USAID, 2011).

According to the UNDP and Ministry of Agriculture, at present, Timor-Leste exports 12,500 tons of coffee a year, which accounts for 0.2 per cent of global supply. This comes from 44,000 small-scale producers. Though coffee was nearly 90 per cent of their income, most of them were subsistence farmers with just a hectare or two of coffee plantation. The coffee is organically grown because the farmers cannot afford chemical fertilizers. Annual production has dropped from 600 kg per hectare during the Portuguese period to around 100–200 kg per hectare. This is well below the most efficient level of 2,000 kg per hectare. Transporting it is also a major problem: fuel is expensive and roads and vehicles are unreliable. The Ministry has devised a commodity development program for coffee, and aims to rehabilitate an additional 40,000 hectares by 2020 (UNDP, 2011).

A number of websites already promote high quality Timorese coffee to a niche market. For example, Starbucks is one of the better-known buyers, and other, smaller distributors speak highly of Timorese beans. In many cases, the long history and organic nature of production are selling points. Additionally, some purveyors of Timorese coffee are using Facebook to reach customers.

In addition to selling through applications such as Facebook, ICTs can also help create more efficient internal supply chains, thus increasing farmers’ incomes. The tasks for which large, organized buyers use ICTs in agriculture markets include record keeping, monitoring field agent activities, procurement operations, credit and payment tasks, input distribution, measuring productivity and forecasting. Buyers use a range of Management Information Systems (MIS), from basic spreadsheets to complex software that tracks resources and facilitates the flow of information. Mobile phone-based applications are becoming popular as a “channel” to reach suppliers or their own field agents. With their increasing sophistication, ICTs can offer attractive solutions to address constraints in agricultural value chains (USAID, 2011).19

---

19 For an extended review of the role of ICT in agriculture, see the ICT in Agriculture Sourcebook, available at: www.ICTinAgriculture.org
5.2 Human Development in Timor-Leste

Any assessment of Timor-Leste’s current state of human development, says UNDP’s National Human Development Report of Timor-Leste 2011, must begin by recognizing the progress that has been made since independence in 2002. It also highlights the extremely difficult conditions under which independence was achieved, and the challenges the country has been facing since.20

The newly independent nation was ranked 158 (out of 177) in the UNDP Human Development Report of 2004—the first of the series to include it. It also had the lowest rank in the Asia-Pacific region, the closest being Pakistan, then ranked at 142.

In 2003, at the start of its independence, Timor-Leste’s human development indicators were low:

- Life expectancy at birth was 49.3 years;
- Adult literacy rate was 58.6 per cent; and
- The combined gross enrolment ratio for primary, secondary and tertiary schools was 75 per cent (UNDP, 2003).21

The positive gap between the GDP per capita (PPP USD) rank and Human Development Index (HDI) rank indicated serious deficiencies in human development terms with respect to the economy. This means that given its economic rank, the country’s human development indicators should have been higher.

There has been slow and steady improvement over the past decade. By 2011, Timor-Leste had increased its HDI rank to 147 (out of 187); it is no longer the lowest-ranked country in Asia Pacific, having surpassed Afghanistan, Papua New Guinea and Myanmar, and neared Bangladesh and Pakistan (UNDP, 2004). However, there is still much room for improvement.

5.3 Millennium Development Goals and the Role of ICTs

Overall, sustainable human development is the biggest challenge faced by Timor-Leste as it rebuilds the nation. ICTs can play a decisive role in this respect, if they are used strategically.

Where the Millennium Development Goals (MDGs) are concerned, Timor-Leste’s progress has been mixed, with five achieved, seven on track and 10 off-track, for 22 of the 32 comparable indicators.22 However, considering the very low baseline from which socio-economic development started a decade ago, the achievements to date are commendable.23

5.3.1 Role of ICTs in Eradicating Extreme Poverty and Hunger

The previously-referenced description of Timor-Leste as “rich country, poor people” also needs to be understood in context, as the country is not necessarily rich in the sense many understand that term, and even its limited income has not trickled down to most people. The revenue from its Petroleum Fund—the single largest source of revenue for Timor-Leste—has not improved household income. More than a third, 41 per cent, of the population still lives below the national poverty line (UNDP, 2011).

---

20 UNDP’s National Human Report of Timor-Leste 2011 is perhaps the most comprehensive and most updated reference for the human development conditions in the country, so its information is generously used in discussing the role of ICTs in human development, specifically achieving Millennium Development Goals.

21 Gross enrollment ratio, according to UNESCO, is enrollment in a specific level of education, regardless of age, expressed as a percentage of the eligible official school-age population corresponding to the same level of education in a given school year. For the tertiary level, the population used is that of the age group that is within five years of those graduating secondary school (UNESCO, 2012).

22 Data is not available for ten of the MDG indicators.

23 The study will follow UN’s MDG framework (Annex 1) to explore the role of ICTs in improving human development conditions of Timor-Leste, for its simplicity and applicability.
The role of ICT in post-conflict Timor-Leste

In fact, poverty levels increased between 2001 and 2009, with the proportion of people living below the poverty line rising from approximately 36 per cent to a little over 40 per cent. The increase in urban poverty during the same period is more significant (from 25 per cent to 45 per cent) than the increase in rural poverty (40 per cent to 52 per cent). Approximately three-quarters of poor households were in rural areas.

In 2007, the central areas of the country were the poorest (57 per cent below the poverty line), followed by the western (55 per cent), and the eastern (27 per cent) parts of the country. Poverty was lowest in the eastern districts of Lautem (21 per cent) and Baucau (22 per cent), and at its highest in the central districts of Manufahi and Ainaro (both at 80 per cent). The per centage of people below the poverty line in Dili was below the national average, but the total number accounted for 16 per cent of the country’s poor (UNDP, 2011).

Given the country’s severe constraints (limited local and export markets, few industries and low capacity) devising poverty-reduction strategies is challenging. The reality, as highlighted in the UNDP NHDR 2011, is different from international stereotyped views of a country mired in poverty, with on-going conflicts and a potential to succumb to the “resource curse.” UNDP’s suggested poverty alleviation approach is twofold: create a means for passing along the returns from oil sales to the poor; and develop the non-oil economy, especially in the rural sector (UNDP, 2011).

ICTs can play a key role in the second approach. Timor-Leste has good potential for international tourism, which remains largely unexploited for logistical reasons. Not every problem in the tourism industry can be rectified overnight. For example, the number of flights to Dili from key Asian hubs is limited. SilkAir, the Singaporean airline that collaborates with Air Timor to link the two capitals, flies only three times a week. Dili also has limited tourist attractions. Currently the sector is trapped in a low input situation: development of the tourist industry will bring in more visitors, but investments are low because of prevailing low volumes. ICT can be used to break this deadlock.

Perhaps Timor-Leste can learn from the Maldives, another small state with limited natural resources, but one that has systematically developed its tourism industry and derives the highest proportion of national income of any country from this sector.

A Google search for “Maldives travel” returns almost everything a visitor needs in the top ten search results. Airline tickets can be purchased or hotel rooms reserved in a few minutes online with an internationally valid credit card. Travel information and recommendations are readily available. While the Maldives, like Timor-Leste, does not offer a wide array of tourist attractions (its capital city has roughly the same land area as Dili), it markets itself very well, for example by means of a large volume of attractive images. Many hotels in the Maldives maintain professionally-produced websites and Facebook groups. All these help give the Maldives a positive image in the minds of potential tourists. Of course, the infrastructure necessary to live up to this promise has been developed over decades, but given Timor-Leste’s oil resources, this is not beyond its potential.

Compared to the Maldives, the Timor-Leste travel industry’s web presence is hardly adequate. Most travel sites repeat the same basic information, providing little imagery. There is little travel information on sites outside Dili. As of May 2012, neither airline tickets nor hotel rooms could be booked online. There was also limited information on packaged tours. Given the importance of the Internet in today’s tourism market, Timor-Leste should place emphasis on improving its presence and image there.24

---

Table 1: Progress made by Timor-Leste on MDG Indicators: Goal 1. Source: UNDP, 2011.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Unit</th>
<th>2001</th>
<th>2007</th>
<th>2009</th>
<th>Target (2015)</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of population below the national poverty line</td>
<td>Per centage</td>
<td>36.0</td>
<td>39.9</td>
<td>41.0</td>
<td>14.0</td>
<td>Off track</td>
</tr>
<tr>
<td>Prevalence of underweight children under five years of age</td>
<td>Per centage</td>
<td>45.0</td>
<td>48.6</td>
<td>45.0</td>
<td>31.0</td>
<td>On track</td>
</tr>
</tbody>
</table>

---

24 For example, warnings of past conflict populate much of the discussion online, painting a rather dour and out-of-date picture.
Beyond developing tourism, ICTs have a limited role to play in alleviating poverty in the short- to medium-term, given the ICT infrastructure deficiencies in Timor-Leste. BPO and ITES industries are not currently viable, as the required human skill and capacity do not exist. There is some evidence that the proliferation of mobile phones is beginning to enhance the incomes of those at the bottom of the income pyramid, but not to the extent found in other developing Asian economies. Mobile phones are sold along the streets by small vendors, some of who also sell SIM cards in values ranging from $1–$10.

5.3.2 The Role of ICTs in Education, Gender Equality and Women’s Empowerment

Education is a cornerstone of the National Development Plan of Timor-Leste and the current National Education Policy (2007–2012). Every Timorese, according to the Constitution, has the right to a quality education, promoted through the establishment of a public system of universal and compulsory basic education offered free of charge (UNDP, 2011). Despite this, the challenge of delivering education to all citizens is enormous, given the prevailing conditions.
Table 2: Progress made by Timor-Leste on MDGs Indicators: Goals 2 & 3. Source: UNDP, 2011.

<table>
<thead>
<tr>
<th>Goal 2: ACHIEVE UNIVERSAL PRIMARY EDUCATION</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator</td>
<td>Unit</td>
<td>2001</td>
<td>2007</td>
<td>2009</td>
<td>Target (2015)</td>
</tr>
<tr>
<td>Net enrollment ratio in primary education</td>
<td>%</td>
<td>65.1</td>
<td>65.6</td>
<td>82.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Proportion of children who reached 5th grade</td>
<td>%</td>
<td>47.0</td>
<td>NA</td>
<td>65.9</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Goal 3: PROMOTE GENDER EQUALITY &amp; EMPOWERMENT</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator</td>
<td>Unit</td>
<td>2001</td>
<td>2007</td>
<td>2009</td>
<td>Target (2015)</td>
</tr>
<tr>
<td>Proportion of seats held by women in Parliament</td>
<td>%</td>
<td>12.5</td>
<td>9.2</td>
<td>6.4</td>
<td>35.0</td>
</tr>
</tbody>
</table>

The World Bank has supported the development of education in Timor-Leste, particularly primary education, through several projects. The Fundamental School Quality Project (2002–06) spent $20 million to improve primary education in Timor-Leste. Its key objectives were to maintain the level of primary education enrollment, restore previous levels of junior secondary enrollment and pursue recovery of a quality educational system through physical rehabilitation of facilities and provision of textbooks and instructional material. The project’s main components were the construction, restoration or upgrading of school facilities, including the provision of basic teaching equipment. Through the “escola basica” program, a basic education system will integrate the primary and junior secondary schools at the district level, to include quality resources such as facilities and libraries, as well as training and communal cultural events (World Bank, 2012a).

The Education Sector Support project (2007–13) will spend another $6 million to strengthen the capacity of the Ministry of Education for effective policy development, resource management and innovation. The program will upgrade ministerial capacity, develop learning curriculum, improve facilities management, and pilot pre-secondary skills development modules.

Notably, these projects lack any focus on ICT education. Instead, they focus on developing basic competencies. ICT education has yet to be identified as a key part of Timorese education at any level. Timor-Leste has only a handful of tertiary education institutions that offer courses in computer science, computer technology and information management, or other ICT-related subjects. They include the East Timor Institute of Business (IOB), Timor-Leste National University (UNTL) (with support from the Foundation of Portuguese Universities), Dom Martinho University, The Canossa Professional Institute (owned by the Catholic Church) and Akademi Komputer (AKAKOM). These institutions face the same challenges: difficulty finding experienced lecturers and an overall lack of facilities (e.g. computer laboratories, textbooks and Internet connections). The gap is partially filled by courses offered by charity and volunteer organizations, including the Catholic Church. There is growing interest in ICT courses as computer skills have become important in securing a job or promotion (da Silva, 2009).

The Global Development Learning Network of the World Bank Institute uses distance learning tools to deliver international training programs in Timor-Leste. Its node in Dili has become instrumental in providing much-needed knowledge and expertise for the region’s newest nation (see Box 05).

---

25 The term ICT Education refers both to teaching ICT use as well as using ICT for teaching other subjects.
As in many developing Asian societies, gender inequality is noticeable in Timorese education. The adult literacy rate among men (59 per cent) is significantly higher than that for women (43 per cent). While 28 per cent of men over 45 have attended school, only eight per cent of women have done so. Similarly, the per centage of the population aged 18 and above who complete secondary or higher education is higher among men than women, 18 per cent and 12 per cent respectively. The recent 2010 UN Labour Force Survey shows that almost 40 per cent of the population aged 15 and above has no formal education at all; another quarter has not gone beyond primary level. The majority of these two groups are women (UNDP, 2011).

However, the gender disparities are slowly declining; they are least visible at school level. Indeed, more girls now attend schools than boys. At pre-secondary level, the net enrollment rates in 2009 were 27 per cent for girls and 22.6 per cent for boys. At secondary level, they were 13.7 per cent for girls and 9.92 per cent for boys. However, this is reversed at the tertiary level, where men outnumber women by a ratio of 2.6 to 1 (UNDP, 2011).
Choosing priorities in Timorese ICT education is no small task. For a country that starts from scratch, every need acquires primacy. Developing one skill cannot be postponed for another. Capacity-building in different information technology streams should ideally move forward in parallel, not sequentially.

The logical starting point is basic ICT skills. According to IT managers in government and donor agencies, just five or 10 years ago, most government officers were not even aware of basic IT applications that are common elsewhere, such as Microsoft Word and Microsoft Excel. While the situation has improved considerably, the country’s workforce, both in government and private sectors, needs skills training in word processing, creating spreadsheets and designing presentations.

The lack of previous experience might even be an advantage. With its present working relationship with the Brazilian government, and particularly with Brazilian IT professionals proficient in open-source software, the Timorese government can adopt open-source equivalents of popular Microsoft applications. However, the pros and cons of such a policy need to be carefully assessed. While open-source software costs less, there may be issues of inter-operability and full compatibility with the rest of the world that uses proprietary applications, predominantly Microsoft. Perhaps the solution is to use open-source for purely domestic uses, while continuing to use proprietary software for tasks that involve external relations. Skills training can also be customized accordingly.

Such an approach can also be extended to schools. While ICT skills training should ideally commence in primary school, current resource constraints in both equipment and teachers would make it more viable to introduce it from secondary level upwards. Computer maintenance and systems engineering training should come next. Various types of internationally accepted certifications can help with this education, such as Cisco Certified Network Associate (CCNA), Cisco Certified Network Professional (CCNP), the Information Technology Infrastructure Library (ITIL), and CompTIA.

Training in business application software is also needed. The choice of software is decided by the market, but government can provide some guidance based on the experience elsewhere in the region.

In the medium to long term, those with some level of training and aptitude could undergo specialized training in computer languages like Java. Those professionals, when trained, certified and experienced, could be in demand overseas as well as find higher-paying employment within their country in specialized outsourced software development services. While the Timorese IT professionals would likely take a few years to reach this level, it is certainly a worthwhile investment in human resources that far-sighted government and corporate entities can make.

Graphics application training would also be useful. In an emerging economy, there is growing demand for desktop publishing and printing. Training should not be confined to the currently popular proprietary software packages; there are open-source products with comparable features. Such training can produce professionals who will either work for the publishing industry or be able to start their own IT-enabled small and medium enterprises.

Web content development is another emerging area. Currently, websites for most Timor-Leste organizations are developed and hosted outside the country, mainly in Australia, Indonesia and Singapore. When web development skills are available, such tasks can be easily carried out locally, generating incomes and reducing foreign exchange issues.
5.3.3 Role of ICTs in Health and Environment

While Timor-Leste is on track for some Millennium Goals related to health and environment, it will not meet almost half of the targets. Despite the achievements made since independence, the overall health status of the Timorese population is low compared to neighboring countries.

The World Health Organization (WHO) proposes several ICT-based approaches in its Country Cooperation Strategy paper (2009–2013) for Timor-Leste. Geographic Information Systems (GIS) is identified as an application with high potential. WHO has developed guidelines and instructions for the management of emergency situations in internationally displaced persons (IDP) camps, and the mapping of emergencies using global imaging software. Furthermore, WHO suggests a computerized database with GIS facility and a data management system for disease surveillance data to maintain accurate health related data. This will be useful in predicting disease spread patterns and thus preventing infectious diseases. While expressing its support in strengthening the technical capacity of data managers at all levels, WHO also emphasizes specialized training on database management and GIS application for mid-level public health professionals (WHO, 2009).

Risk communication is another priority area. Due to resource limitations, the Ministry of Health has neither a unit nor full time staff assigned to Disaster Management. Additionally, the focal point for Disaster Management and health staff at the district and sub-district levels have little understanding of the National Disaster Risk Management Plan. Technical guidelines for the health staff to prepare and respond to disaster do not exist (WHO, 2009). While Timor-Leste has yet to face a major natural disaster like the Asian tsunamis of 2004 and 2011, this is a serious concern that should be addressed immediately. Among other recommendations, WHO strongly advocates improving communications systems to minimize health risks, especially in rural areas.

Timor-Leste also faces serious environmental issues. While precise information is not available, the human impact on Timor-Leste’s flora and fauna has been severe. Factors such as rapid deforestation, grazing, shifting cultivation practices and lack of irrigable land have seriously degraded about two thirds of the land area of Timor-Leste. Population pressures have contributed to watershed degradation and erosion. In the absence of alternative fuel sources, people turn to forests for firewood collection. Unregulated development by industry and tourism further aggravate the problem. Coastal resources remain relatively unexploited, but lie in a narrow patch of fringing reef and are therefore particularly vulnerable to overexploitation. Other issues include indoor air pollution, lack of water supply and sanitation, solid waste and threats to biodiversity. Timor-Leste is also extremely vulnerable to climate change. About 82 per cent of households do not have access to electricity, and 98 per cent use firewood as their primary source of energy (UNDP-UNEP: PEI, 2012).

There are no significant ICT applications in environmental protection, but GIS holds considerable potential. As a system designed to capture, store, manipulate, analyze, manage and present all types of geographical and geospatial data, GIS has multiple uses in environmental management—for example, in monitoring and regulating deforestation. Indeed, early GIS applications were mostly in environment monitoring and protection. Here too, Timor-Leste could follow the example of the Maldives. Mapping Maldives is a project undertaken by the GIS and Mapping Unit, Spatial Planning Section of Department of National Planning in the Maldives. This project has made available digital vector and cadastre maps of the Maldives to any researcher. The newly available maps include an editable version of the Maps of the Maldives in CorelDraw-compatible format. It is ideal for atoll, regional and national level planning and presentation. New satellite images acquired from 2006 to 2008 are also available. The website of the Department of National Planning is frequently updated to offer better information (DONP-M, 2012).

The Maldives has also been at the forefront of international discussions on responding to climate change, working through forums like the UN General Assembly, UN Commission on Sustainable Development and the Alliance of Small Island States (AOSIS). As another member of AOSIS, Timor-Leste can learn from this example how a small island can take a principled stand on a global environmental challenge (AOSIS, 2012).
6. The Way Forward

“This is now the time to plan and get people united around objectives that we all agree on and can work hard towards. We have been all learning. We are a secular state, we are a very young state and we’re all committed to working hard to guarantee a better life for our people.”

– Taur Matan Ruak, President of Timor-Leste at 10th independence celebrations on 20 May 2012

Information analyzed in this study suggests that while Timor-Leste’s ICT sector is still in the early stages of development, it holds considerable potential to grow as a key economic sector, and also provide cross-sectoral support enabling economic growth and sustainable human development.

Some positive developments are already taking place. The market competition created by the recent telecommunications liberalization effort is likely to bring down the costs of access and use. Competition will very likely drive incumbent Timor Telecom and the new operator(s) to extend their coverage to rural areas, and also to offer more value-added services.

In the medium to long term, telecom liberalization will lead to a “mobile revolution” already seen in many other emerging Asian economies such as Bangladesh, India, Indonesia and the Philippines. The key characteristics of this transformative change would be growing mobile usage; a visibly increasing number of users; mobile price wars; new mobile applications; local content development; productivity improvements because of faster communications; new businesses; mobile payments; and a mobile culture.

If the major bottleneck of international bandwidth is resolved (by connecting to undersea or overland fibre optic cable), a similar rapid expansion can take place in broadband Internet as well. Technically, the easiest solution is to obtain a fiber-optic link from neighboring Indonesia. There are several options available. The most viable is to link to Kupang in Indonesia. A fiber link would drastically improve the quality of broadband service for current users, and support new users without compromising quality. It could also spur new economic activities such as BPO in the future. Timor-Leste might miss out on the rapidly evolving mobile broadband opportunities if there are long delays in resolving international bandwidth limitations.

ANC, the new regulator, has a clear facilitator role in these issues, all of which are well within its mandate. With backing from international agencies and government, ANC is in a position to address them one by one.

Indonesia’s prospective role in the development of Timor-Leste doesn’t stop here. Both governments should understand that, whatever the history, Indonesia can play an important role in almost every sector. Indonesia is an emerging Asian market, a relatively large one, and the closest to Timor-Leste. An added advantage is that a significant portion of Timor’s population speaks Bahasa Indonesia.

Issues relating to human resources and culture are complex and need careful planning as well as managing. ICT capacity-building and utilization should be systematically improved. Given the constraints described in Chapters 2 through 5, these improvements will happen gradually and incrementally. Capacity building and infrastructure building are locked in a vicious circle. Capacity building is delayed because of infrastructure bottlenecks and vice versa.

International development agencies and donors can play a decisive role by supporting the Timorese government financially and technically in building ICT capacity. Distance learning is an affordable technology, and new centers can be supported to grow the industry. Building capacity within the government by sending suitably selected mid-career officials for foreign training is another option.

ICT applications in the healthcare, agricultural and tourism sectors need to be improved as well. Without improved information systems and faster communication, the proposed reforms in these sector can stagnate.

Ensuring a transparent government is another prerequisite in the post-conflict development process. Fears of corruption increase as the Petroleum Fund grows. The Fund’s earnings, as the UNDP correctly proposes, should be used in developing infrastructure and human resources in a transparent manner. ICTs can help monitor financial transactions, public investments and public procurement. The technology should not be limited to a mere transparency portal. International experience in monitoring and evaluation will be useful in developing this role, and here, again, a major role can be played by international agencies in the short term.

As shown in Chapter 3, the relations between Timor-Leste and Indonesia can also be improved over time through new ICT channels that foster an exchange of private and public communication between the two nations at formal and informal levels. The two societies already share a great deal of shared culture, which combined with improved communications can help to gradually improve relationships. Of course, projections of cross-cultural understanding need to be moderate, with a clear understanding of the potential pitfalls and drawbacks. At the same time, this new arena for reconciliation deserves attention and study.

The manifold challenges facing Timor-Leste require much more than ICT, but this study suggests that it is feasible for ICTs to play a supportive and facilitating role. As economic conditions improve in the coming years, ICTs will grow in importance, especially if strategic plans and investments are made from now onwards.

The challenges it faces and potential benefits to be derived from ICT make Timor-Leste an important case study for all ICT researchers and development analysts to watch over the next decade.
References


Annex 1: Telecom prices in Timor-Leste

FIXED PHONE CHARGES

Table 1: Fixed charges for fixed phone connections

<table>
<thead>
<tr>
<th>Service</th>
<th>Charge type</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activation</td>
<td>One-time</td>
<td>$20.00</td>
</tr>
<tr>
<td>Installation</td>
<td>One-time</td>
<td>$20.00</td>
</tr>
<tr>
<td>Fixed charges</td>
<td>Monthly</td>
<td>$10.00</td>
</tr>
<tr>
<td>Deposit</td>
<td>One-time and returnable</td>
<td>$180</td>
</tr>
</tbody>
</table>

Source: Timor Telecom, 2012

Table 2: Variable charges for fixed phone connections

<table>
<thead>
<tr>
<th>Type</th>
<th>Peak (‘Normal’) 07:00 hrs—23:00 hrs</th>
<th>Off-peak (‘Super Economic’) 23:00 hrs to 07:00 hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed-fixed</td>
<td>$0.108</td>
<td>$0.054</td>
</tr>
<tr>
<td>Fixed-mobile</td>
<td>$0.24</td>
<td>$0.14</td>
</tr>
</tbody>
</table>

Source: Timor Telecom, 2012

MOBILE—PRE-PAID CHARGES

Table 3: Variable charges for national calls (within East Timor) price per minute—pre-paid

<table>
<thead>
<tr>
<th>Type</th>
<th>Peak (‘Normal’) 07:00—23:00 hrs</th>
<th>Off-peak (‘Super Economic’) 23:00—07:00 hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile-mobile</td>
<td>$0.21</td>
<td>$0.08</td>
</tr>
<tr>
<td>Mobile-fixed</td>
<td>$0.27</td>
<td>$0.18</td>
</tr>
</tbody>
</table>

Source: Timor Telecom, 2012

Table 4: SMS charges—pre-paid

<table>
<thead>
<tr>
<th>Type</th>
<th>Any time</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMS-National</td>
<td>$0.08</td>
</tr>
<tr>
<td>SMS-International</td>
<td>$0.18</td>
</tr>
</tbody>
</table>

Source: Timor Telecom, 2012

MOBILE—POST-PAID CHARGES

Table 5: Variable charges for national calls (within Timor-Leste) price per minute—post-paid

<table>
<thead>
<tr>
<th>Type</th>
<th>Peak (‘Normal’) 07:00—23:00 hrs</th>
<th>Off-peak (‘Super Economic’) 23:00—07:00 hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile-mobile</td>
<td>$0.18</td>
<td>$0.08</td>
</tr>
<tr>
<td>Mobile-fixed</td>
<td>$0.27</td>
<td>$0.15</td>
</tr>
</tbody>
</table>

Source: Timor Telecom, 2012

Table 6: SMS charges—post-paid

<table>
<thead>
<tr>
<th>Type</th>
<th>Any time</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMS-National</td>
<td>$0.07</td>
</tr>
<tr>
<td>SMS-International</td>
<td>$0.18</td>
</tr>
</tbody>
</table>

Source: Timor Telecom, 2012

27 All packages include a $3.00 charge for SIM card activation (with $1 credit).

28 Normally the charge for post-paid SIM card activation is $9.00. There is a drop in activation charge per SIM if more than 10 SIMs are purchased. Up to 30 SIM, the price per SIM is $7.20; after the 30th SIM, it is $4.50.
**Table 7: International fixed and mobile call charges**

<table>
<thead>
<tr>
<th>Group</th>
<th>Fixed</th>
<th>Mobile</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Peak (07:00—23:00 hrs)</td>
<td>Off-Peak (23:00—07:00 hrs)</td>
</tr>
<tr>
<td><strong>Group 1</strong>: Australia, Indonesia and Portugal</td>
<td>0.369</td>
<td>0.279</td>
</tr>
<tr>
<td><strong>Group 2</strong>: Asia Pacific—China, Hong Kong, Japan, Macau, Malaysia, New Zealand, Philippines, Singapore, Thailand and South Korea</td>
<td>0.495</td>
<td>0.378</td>
</tr>
<tr>
<td><strong>Group 3</strong>: Brazil, Canada, USA, PALOPS&lt;sup&gt;29&lt;/sup&gt;—Angola, Cabo Verde, Guiné-Bissau, Mozambique and St Tomé and Principe</td>
<td>0.864</td>
<td>0.648</td>
</tr>
<tr>
<td><strong>Group 4</strong>: France, Germany, Spain, Sweden and United Kingdom</td>
<td>0.900</td>
<td>0.675</td>
</tr>
<tr>
<td><strong>Group 5</strong>: Rest of the world</td>
<td>1.530</td>
<td>1.152</td>
</tr>
</tbody>
</table>

Source: Timor Telecom, 2012

**Table 8: Broadband Internet charges in Timor-Leste**

<table>
<thead>
<tr>
<th>Type</th>
<th>Package 1 ('NetBo'ot Light')</th>
<th>Package 2 ('NetBo'ot Lais')</th>
<th>Package 3 ('NetBo'ot Xlais')</th>
</tr>
</thead>
<tbody>
<tr>
<td>Download speed in kbps</td>
<td>128</td>
<td>256</td>
<td>512</td>
</tr>
<tr>
<td>Upload speed in kbps</td>
<td>64</td>
<td>64</td>
<td>64</td>
</tr>
<tr>
<td>Free limit of download</td>
<td>3 GB</td>
<td>3 GB</td>
<td>3 GB</td>
</tr>
<tr>
<td>Modem Price (normal)</td>
<td>$50</td>
<td>$50</td>
<td>$50</td>
</tr>
<tr>
<td>Modem Price (Wireless)</td>
<td>$190</td>
<td>$190</td>
<td>$190</td>
</tr>
<tr>
<td>Installation/activation charges</td>
<td>$100</td>
<td>$100</td>
<td>$100</td>
</tr>
<tr>
<td>Price for additional traffic (per MB)</td>
<td>$0.03</td>
<td>$0.03</td>
<td>$0.03</td>
</tr>
<tr>
<td>Per minute charge (Normal)</td>
<td>$0.03</td>
<td>$0.03</td>
<td>$0.03</td>
</tr>
<tr>
<td>Per minute charge (Economic)</td>
<td>$0.01</td>
<td>$0.01</td>
<td>$0.01</td>
</tr>
<tr>
<td>Monthly (fixed) Fee in USD</td>
<td>$49</td>
<td>$99</td>
<td>$199</td>
</tr>
</tbody>
</table>

Source: Timor Telecom, 2012

NB: Normal: 07:00—22:00 hrs; Economic: 22:00—07:00 hrs

**Table 9: Dial-up (analog) Internet charges in Timor-Leste**

<table>
<thead>
<tr>
<th>Type</th>
<th>Package 1</th>
<th>Package 2</th>
<th>Package 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limitations</td>
<td>Occasional User (Up to 6 hours per month)</td>
<td>Normal User (From 6 to 30 hours per month)</td>
<td>Intensive User (30 hours and up per month)</td>
</tr>
<tr>
<td>Activation charge</td>
<td>$20</td>
<td>$20</td>
<td>$20</td>
</tr>
<tr>
<td>Monthly charge</td>
<td>$4.5</td>
<td>$10</td>
<td>$30</td>
</tr>
<tr>
<td>Per minute charges (Normal)</td>
<td>$0.071</td>
<td>$0.042</td>
<td>$0.026</td>
</tr>
<tr>
<td>Per minute charges (Economic)</td>
<td>$0.062</td>
<td>$0.035</td>
<td>$0.017</td>
</tr>
<tr>
<td>Per minute charges (Super economic)</td>
<td>$0.027</td>
<td>$0.018</td>
<td>$0.009</td>
</tr>
</tbody>
</table>

Source: Timor Telecom, 2012

<sup>29</sup> Stands for Países Africanos de Língua Oficial Portuguesa, or Portuguese-speaking African countries.
At the 10-year anniversary of Timor-Leste’s National Development Plan, this case study reflects on the role of information and communications technologies (ICTs) for the young nation’s development and national integration. The study analyzes the current status, promising initiatives and future challenges related to using ICT for economic growth, social development and post-conflict reconciliation in Timor-Leste. The report draws on in-country research and interviews with key players in government, the private sector and development agencies, and builds on existing analyses on the economic and socio-economic aspects of such technologies in Timor-Leste and elsewhere in the developing world.

The study finds that the scope of ICTs in Timor-Leste’s economic development and human development has expanded significantly in recent years, and that they are likely to play an even more pivotal role over the next decade. "Information" – in the form of structured and timely data -- is now widely recognized as central to economic activity, even in traditional sectors such as agriculture and manufacturing. Timor-Leste, embarking on physical reconstruction as well as nation building at the beginning of the twenty-first century, can now take advantage of more advanced ICTs – such as broadband Internet and 3G mobile telecommunications networks – and bypass the early and more cumbersome stages of ICT infrastructure. Timor-Leste can also benefit from the many documented experiences of other small developing countries in harnessing the potential of ICTs for economic growth, as well as national integration.

The study also identifies three main challenges that have to be overcome to realize the potential of ICTs: (a) establishing and maintaining an effective regulatory capacity; (b) establishing and maintaining ICT policy capability in the Government given the cross-cutting nature of ICT, potential of ICT to improve delivery of government and other services and potential contribution to growth; and (c) improving international connectivity.