

Andean Competitiveness Project



# Working Papers

**Andean Readiness for the Networked World,  
Introduction and Regional Overview**

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**with**

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**Executive Summary**

Information and communications technologies (ICT) can be a valuable resource for helping the Andean region meet its core challenges of creating more economic opportunity, better ways to teach and learn, more transparent and effective government, and ultimately, a better quality of life. Nations should view ICT as a means rather than an end, and use them to create and leverage opportunities for achieving defined community goals. In order to take full advantage of these powerful tools and understand best how to do it, each nation needs to understand its own state of Readiness for the Networked World, in other words, its capacity to effectively integrate ICT into its functioning.

One of the most important and challenging tasks for leaders is to chart a course for their society's effective adoption of ICT. They are faced with integrating the myriad ICT initiatives and programs underway in a strategic and holistic approach that capitalizes upon existing synergies and creates new ones, while giving future direction. The private sector, academia, civil society and government should all be genuinely involved in this process, and while each sector has different interests, roles and responsibilities that vary over time and across nations, they are remarkably complementary. Government should focus on creating the overall environment that allows and encourages businesses, non-profits, academia and others to take part in the networked economy, but should also set a strong example with its own approach to technology use. The top Andean priorities are improving the environment for business and telecommunications (supporting a legal and regulatory framework which broadly enables and encourages the appropriate use of ICTs) and creating stronger human capacity (both via and for ICTs) among all segments of the population.

Principal barriers to progress on Readiness in the Andes are poverty, and economic and political instability – and initiatives need to consider them carefully in their long term planning. The Andean region trails all of the developed and much of the developing world in Readiness, including most of South America and nations like Turkey, Egypt and Thailand. Yet despite these challenges, it has taken proactive steps to improve its Readiness for the Networked World. There are ICT initiatives underway in every Andean nation that illustrate the great potential, existing human capacity, resourcefulness and enthusiasm in the region.

As part of the *Proyecto Andino de Competitividad* and based on the methodology outlined in CID's *Readiness for the Networked World: A Guide for Developing Nations*,

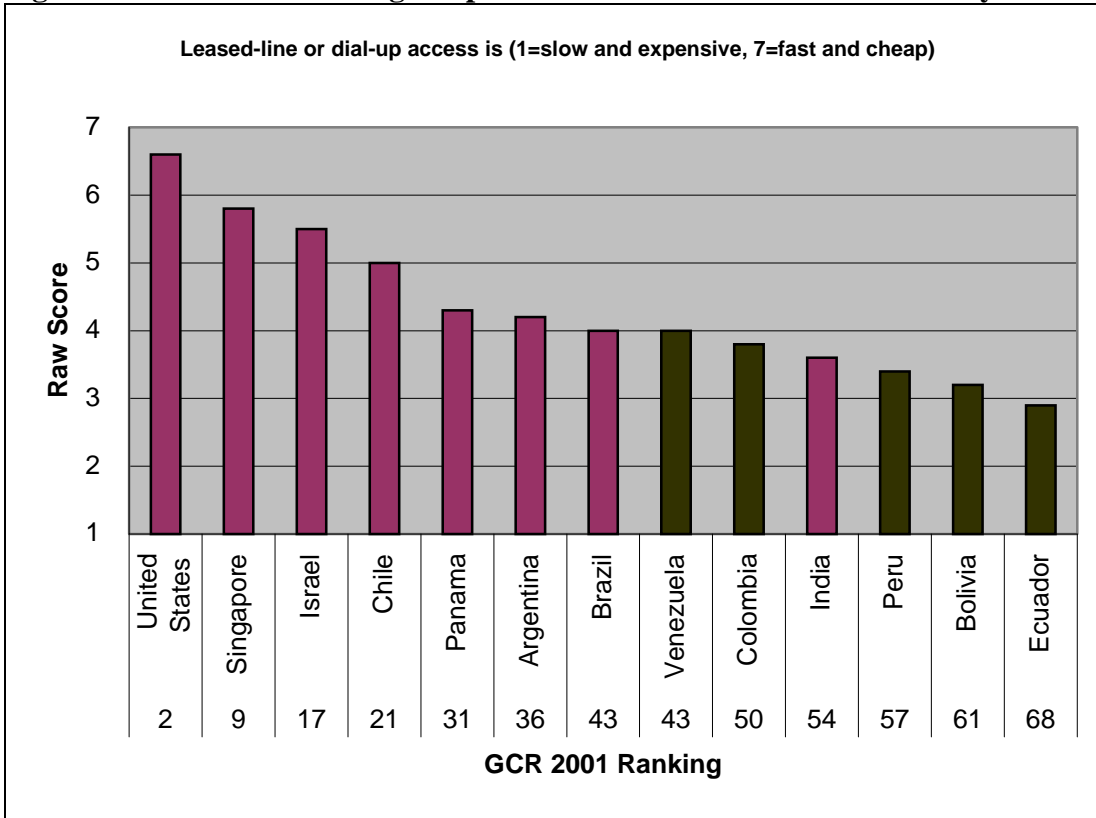
CID and its Andean partners realized extensive studies of the ICT environments in the five Andean nations. The framework examines five main areas (Network Access, Networked Learning, Networked Society, Networked Economy and Network Policy), and research utilized information sources including extensive interviews, surveys, workshops, and Web materials, in addition to diverse pools of hard data. The resulting national reports offer excellent insight into the situation of each nation, along with policy recommendations, and are valuable resources for future initiatives.

### **Network Access**

The region suffers in virtually every aspect of access: there are very low per capita numbers of wireline phones, Internet hosts, Internet Service Providers (ISPs), and personal computers; phone quality and service are still relatively poor, with associated slow dial-up speeds, and a high percentage of dropped calls; and hardware, software and cumulative access prices are out of reach for the majority of the population. Upper classes in urban areas have ICT access that is equivalent to the most developed markets, while the majority of the population has little or no real opportunity to use ICT. There is a significant gap in access between urban and rural areas, with the majority of all relevant infrastructure, including phones (teledensity commonly varies by a factor of ten), ISPs and power supplies located in the largest urban areas. Access to the international backbone has been poor, but has improved markedly in the past year as new submarine cables have come online. Internal infrastructure outside the largest urban centers remains lacking, with little infrastructure competition and limited interconnection between networks. The rapid diffusion of wireless telephony (Venezuela leads the continent in wireless teledensity) especially following the introduction of pre-paid services in many of the markets, demonstrates that there is strong demand and disposable income for telecommunications services with appropriate pricing models and adequate service. The highly competitive nature of wireless markets has played a key role in the high wireless telephony penetration rates, leading to creative and context appropriate approaches to delivering value.

One of the keys to accelerating Internet penetration rates in the short term appears to be shared access models, which can decrease both the economic and technical barriers to using ICTs by pooling community resources and sharing risk. Perú has enjoyed great success with this model, matching the community access ranking for New Zealand and beating the United Kingdom in the 2001 Global Competitiveness Report (GCR), and all with private sector initiative. Additionally, it is essential for the cost of the access devices themselves to decrease if they are to gain more widespread use.

**Figure 1: 2001 GCR Ranking in Speed and Cost of Internet Connectivity**



Source: Global Competitiveness Report 2001

*Next steps* should include promotion of public Internet access points and private telecenters (by improving the legal and regulatory environment, access to capital and incentives). Encouraging build out of network infrastructure to secondary cities will enable competition and support regulators' attempts to protect it. The role and strategy of government programs offering rural ICT access and their interaction with other initiatives should be considered. Research should be undertaken to design, develop and deploy technologies that meet regional needs -- applications and devices that are robust, low cost, low power and flexible (including Voice over Internet Protocol - VoIP). Further study is necessary of ways in which existing wireless networks could be leveraged to provide data services and the extension of the pre-paid service model to other telecommunication services.

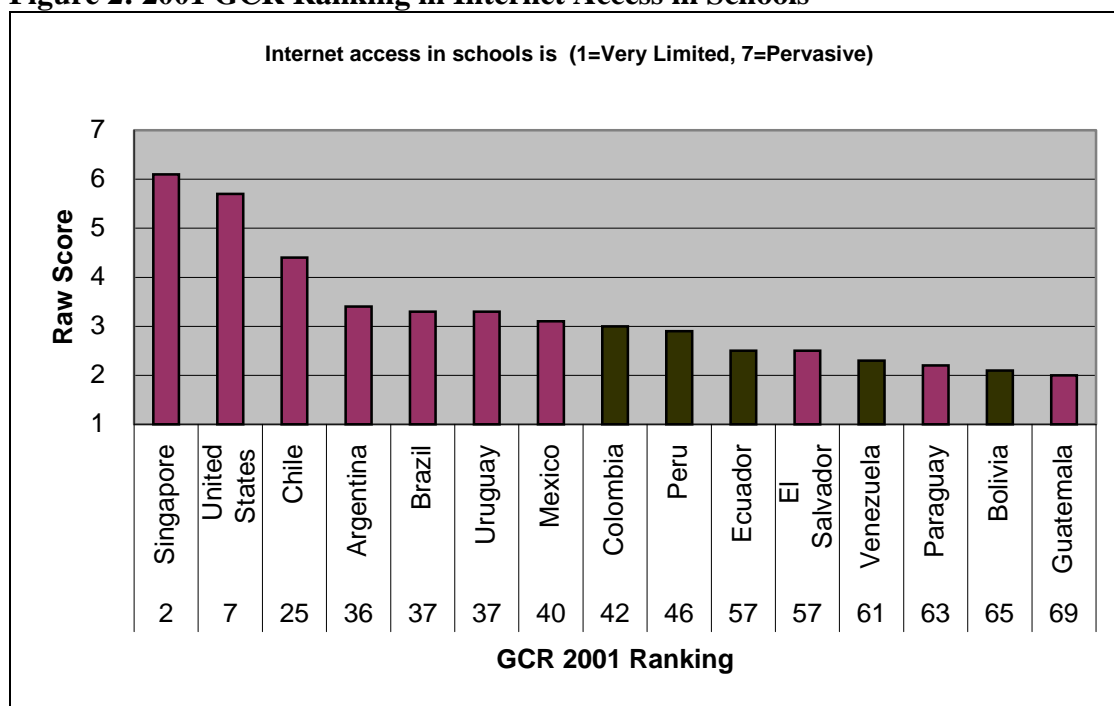
### Networked Learning

The nearly complete lack of data regarding ICT usage in the Andean region is a strong indicator of the lack of a cohesive strategy for ICT usage in education. When ICTs are used in the educational setting exists, they are primarily found in private schools and urban areas. For example, even though Venezuela's absolute numbers are very low (the 2001 GCR ranks it below El Salvador for Internet access in schools), Venezuelan private schools average 40 computers for every single computer in public schools. Teachers, other professionals and students have little or no access to distance learning facilitated by ICT. Many of the first initiatives to include ICT in education were techno-centric in

nature, and often did not include funds for teacher training or curriculum development. Recent efforts have shown greater promise, but commitment to a more effective and financially sustainable approach remains in doubt.

If the quantity of ICT access remains low due to budgetary and infrastructure limitations, effort should be focused on ensuring the value of their usage, through appropriate training, curriculum development and private sector input and support.

**Figure 2: 2001 GCR Ranking in Internet Access in Schools**



Source: Global Competitiveness Report 2001

*Next steps* include undertaking additional research on the role of ICT in education, such that it is included in any educational reform process and seen as an opportunity rather than a problem. Further, academia and the private sector can assist by encouraging higher education to work with teachers to use ICT effectively, and identifying incentives for businesses to provide ICT training to their workers. At a regional level, cooperation on teacher training and collaborative curriculum / materials development could accelerate educational reform and progress. Governments must do better at gathering information on education as a whole, including the role of technology.

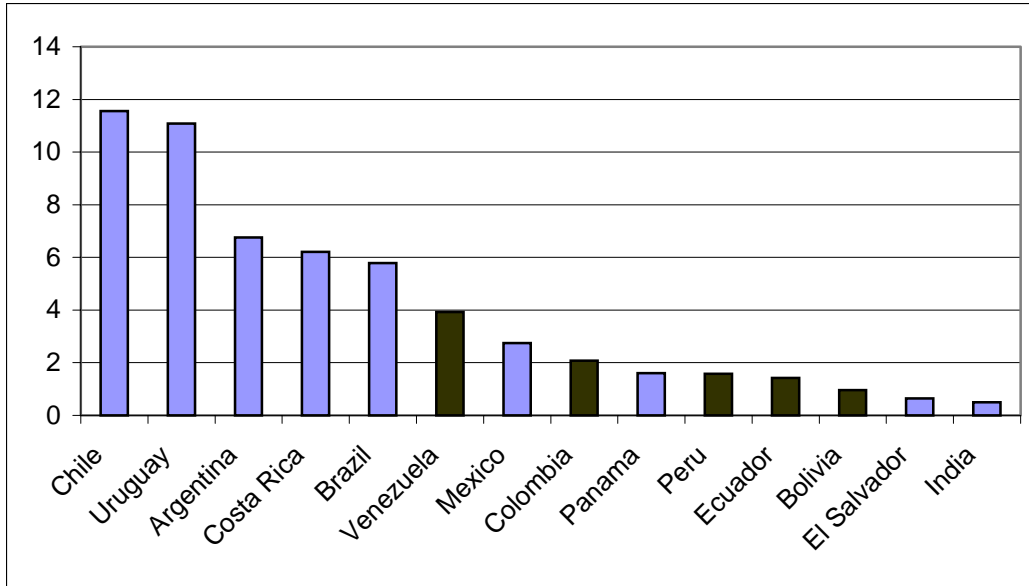
### **Networked Society**

Internet use in the Andean region is low and increasing, but much more slowly than Chile or Argentina. Broadly speaking, users tend to be young, educated, urban, wealthy, and male. Some services are as sophisticated as anywhere in the world, but the vast majority of all citizens find access difficult, or have not found applications that are adequately valuable to outweigh the difficulty and cost of use. Residents of rural areas and smaller cities are particularly disadvantaged.



Important barriers are the high combined cost of access (ISP charges, telephone calls, PC), limited access points, limited availability of relevant content, and lack of exposure to ICT (in developed countries most people learn about ICT at school or on the job, but that is less likely in the Andean region). Devices, access schemes and content presentation need improvement, as they do not address illiteracy, multiple languages, lacking of keyboarding skills, cultural issues and other characteristics of users in the region.

**Figure 3: Internet Users Per 100 Inhabitants**



Source: International Telecommunications Union (2000c)

*Next steps* include creating applications and devices that respect different languages and levels of literacy, promoting the creation of appropriate and valuable content, and focusing on the needs of rural and poor users. Government should use the power of the market to involve the private sector and academic institutions in addressing issues of localization of content and applications. Programs should be implemented to alleviate the cost of access, whether through subsidies, public private cooperation (as *Empresas Públicas de Medellín* is doing by offering unlimited Internet access and equipment for US\$ 30 per month), or some other means.

### Networked Economy

**Business:** While there is a great deal of excitement around electronic commerce (e-commerce) in the Andean region and around Latin America, Miami quickly became the Latin e-commerce center due to its favorable economic environment, robust infrastructure, access to venture capital (and associated networks) and abundant human capital, much of which emanated from the Andean region. Despite this magnetism, many dot-com companies have formed in the Andean region – in the face of severely limited access to capital, difficult business environments, lacking infrastructure and common complaints about small national markets. These companies service domestic and

international markets in software and services, and for the most part have not received any special treatment or incentives from government.

Business-to-business e-commerce (B2B) is the predominant force in the e-commerce market in Latin America. Unhindered by low credit card penetration rates and the lack of clearance mechanisms, and limited disposable incomes, and less vulnerable to fears of fraud and low ICT adoption rates, B2B has fewer obstacles than business-to-consumer e-commerce (B2C). Both can be key elements in overcoming challenges of distance, small markets, and geographical barriers, while increasing regional integration.

Traditional big businesses are interested and willing to invest in e-commerce, but many are still in the planning stages due to financial concerns and (understandable) skepticism. Most small and medium-sized enterprises are unable to make the investments required to prosper in this new medium. New businesses, supposedly the engine for competition, are faced with significant administrative start-up burdens, and no access to capital from the banking system, capital markets or private equity groups. There are also noteworthy needs for ongoing government interaction, and often inadequate legal and regulatory systems lead to insecurity and make dispute resolution difficult.

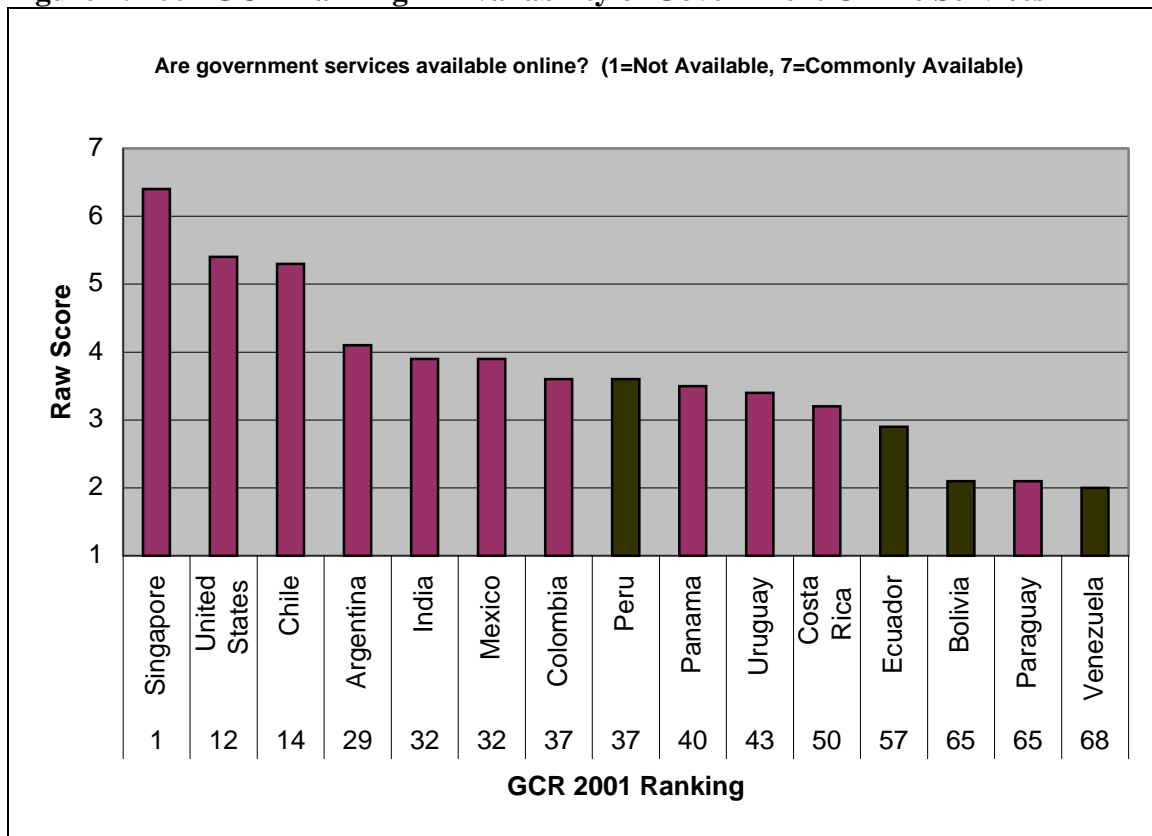
*Next steps* should include improving the overall business climate, identifying business opportunities by targeting specific sectors, creating incentives for businesses to use ICT, communicating the benefits of ICT to small and medium businesses, encouraging greater participation by the financial sector, and creating access to capital. Technology parks with tax incentives and state of the art infrastructure have proven successful in nations such as India and would lower some barriers to doing business, while possibly cultivating cluster development. Private equity funds with special attention to Andean needs such as those run by SEAF in Bolivia and Perú offer an important support for this nascent, but committed group of entrepreneurs. While a capital injection is important, recent work in the field suggests that access to contacts and technical assistance are also essential. A predictable legal environment and regulations that promote rather than impede the founding and success of small and medium enterprises, are essential to cultivating this sector of the economy. Another important challenge is helping informal sector businesses to benefit from ICT, rather than further isolating them. Interactions between business and academia have had success in Western Europe, North America, Israel, Brasil, India and elsewhere in developing and commercializing new technologies, incubating initiatives, and all the while better preparing the future workforce.

Government: Each of the Andean nations has an online presence and has made some strides towards implementing electronic government, more so in the cases of Colombia and Perú. However, by and large efforts are not well coordinated and are still at fairly preliminary stages. Many have not yet internalized the difference between innovation and automation or the concept of citizen as a customer, which means that there is relatively little use of ICT as a tool for optimizing processes or services and key opportunities are missed. There are exceptions (Perú's online customs payment, and Colombia's *Gobierno en línea*), but for the most part the results are static websites with limited information, no service delivery, little increase in transparency (the Bolivian

Congress and Perú's new public accounts sites are bright spots), and insignificant cost savings. Governments, like many businesses in the Andean region, are largely just beginning to understand what e-government might mean for them and how they should think about it.

Governments face major obstacles to e-government including their citizens' limited ICT access, lack of inter-institutional organization within government (and associated lack of leadership), funding constraints, the complications of bureaucratic reform, lack of technical and managerial expertise, and non-ICT specific challenges associated with large-scale government reforms.

**Figure 4: 2001 GCR Ranking in Availability of Government Online Services**



Source: Global Competitiveness Report 2001

*Next steps* include determining a strategic approach to government use of technology, whether by letting each agency choose its own path or choosing a universal solution, some guidance must come from above. Pairing initiatives with tangible and achievable cost savings and efficiency goals has proved politically powerful and motivating in countries such as Chile and Brasil. Allowing and encouraging experimentation with access to necessary funds and acknowledgement that not all projects will succeed is important to injecting needed creativity in the process. As with all government initiatives, it is important to ensure that any program continue despite changes in administration. Outsourcing, particularly to regional suppliers when feasible, is one potential route to supplementing limited government IT capacity and growing businesses.

### **Networked Policy**

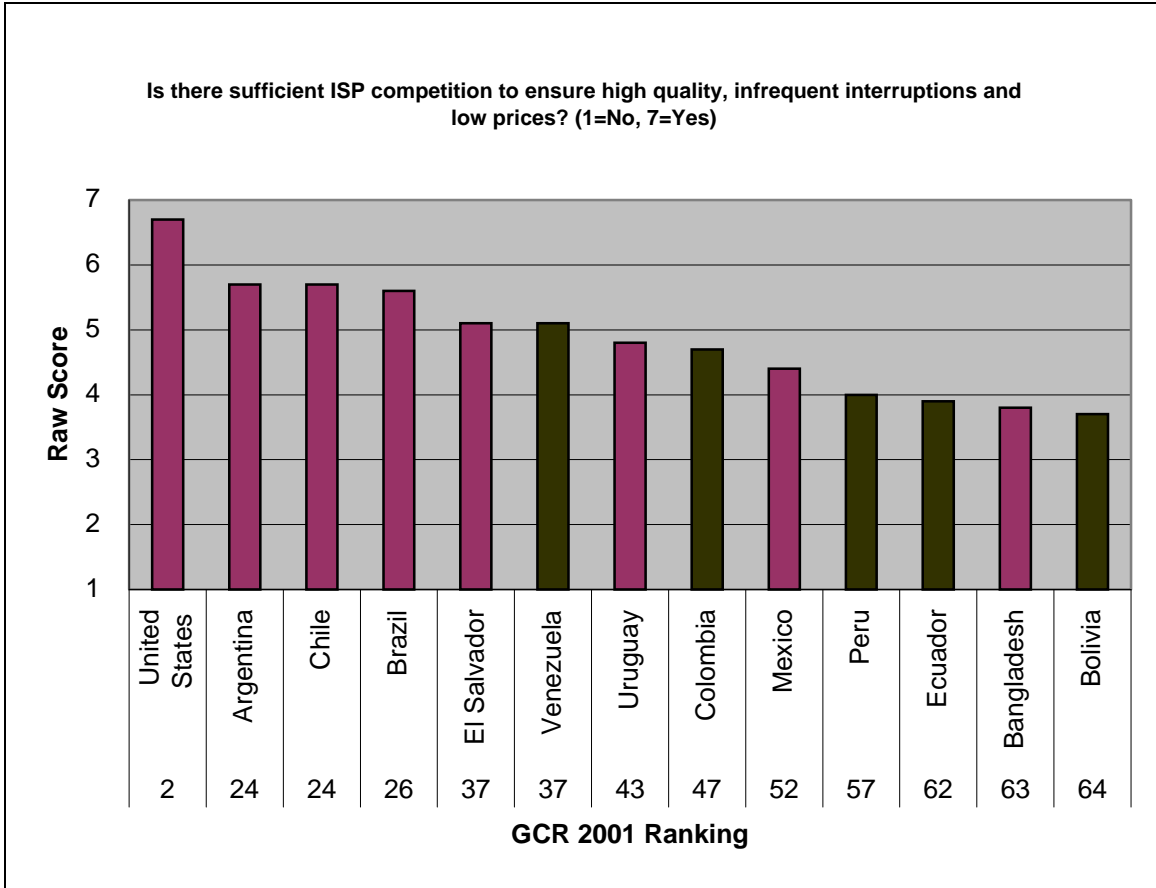
Leaders should seek an integrated understanding of the diverse factors affecting ICT-use, and work together to develop a strategic plan for preparing their community for the Networked World. Colombia's *Agenda de Conectividad* is one example, some of the many others include Ecuador's *Agenda de Conectividad*, Perú's *e-Perú*, México's *e-México*, Brazil's *Livro Verde* and South Africa's *Info.com 2025*. Governments have the power to create the appropriate environment and lead by example, the private sector has the capacity for innovation and action, and academics and non-governmental organizations have diverse strengths which all can be brought together to form a robust approach to increasing Readiness. Workshops throughout the region confirmed that each sector in each nation felt it had the responsibility and capacity to take on these challenges, but also required signals and support from other stakeholders

Competition and appropriate regulation are essential components of a thriving ICT sector, and while the region is progressing in privatization and regulatory reform, more work is needed. State monopolies have become dominant providers in Perú, Venezuela and Bolivia; thus, yielding new investment and service improvements, but not genuine competition or its benefits in many markets. Prices are high, service is often lacking, and independent ISPs have difficulty competing with dominant providers due to their resistance to interconnect networks (in Bolivia, Perú and Venezuela), greater resources and control over international gateway access.

Given the nascent state of competition in many countries, regulators are challenged by their inexperience, dearth of financial resources, and lack of independence from government in comparison to the massive financial and experiential resources enjoyed by the dominant providers. Regulations are often inadequate, unclear and unpredictably enforced, frustrating all participants. The tension between generating income from telecoms and creating a dynamic telecoms sector has largely been resolved in favor of the latter, but political resistance to reform remains.

Governments and regulators around the world are struggling with how to effectively balance consumer protection, business interests, technological innovation and other related and competing issues. With the convergence of technologies, old regulatory paradigms are no longer adequate, yet new paradigms have yet to have been successfully implemented and tested. Further, with the rapid pace of technological development, regulatory environments that encourage and enable applications of the new technologies are increasingly relevant and important.

**Figure 5: 2001 GCR Ranking in Perception of Effect of ISP Competition on Quality and Price**



Source: Global Competitiveness Report 2001

*Next steps* should include preparing regulators better, and adapting regulations where necessary (to address convergence issues). Regulation must be complemented with new avenues for competition (including new entrants and infrastructure) to deliver the benefits of liberalization, and the recent *apertura* in Venezuela and Bolivia and planned reforms in Ecuador create specific new business opportunities. Within that context, incentives and mechanisms for telecoms to provide services to rural areas and smaller cities need to be designed, as well as mechanisms that promote experimentation and innovation in ICT-use in business, government and education. Support is needed for initiatives that build on national ICT strategy planning and lead to execution.

### **Ten Important Priorities for CAF**

1. Promote and **support multi-sectoral approaches** as valuable mechanisms for ICT strategy planning and implementation, while fostering greater interaction between the sectors.
2. **Build regional capacity to use ICT** effectively via public-private partnerships in formal and non-formal learning settings through the development of materials, training methods, curricula and administration tools. Perform a region-wide study and evaluation of recent efforts to integrate ICT with development, including the identification of tools and techniques used for learning, electronic commerce initiatives, and government programs -- with specific attention to public-private partnerships.
3. Create a funding mechanism to **support and encourage innovative ICT projects** in government, business, non-profits and academia, and disseminate success stories that identify the region (and sub-regions) with technology.
4. Assess need for **technology parks** that offer benefits such as improved infrastructure, tax incentives, joint marketing and cluster formation.
5. Research the creation or seeding of a **fund that invests in and supports Andean businesses** that produce or use ICT, considering issues such as industry focus, target business/investment size, overall fund size, necessary institutional/technical support, investment diversification, etc.
6. Promote **development and adaptation of appropriate high technologies** by and for the Andean region, particularly through private sector cooperation with academia.
7. **Research and design effective means to develop rural network infrastructure** with public funding mechanisms and public incentives, and foster competition by promoting additional development by new entrants. Encourage peering and other means in improving the efficiency of the existing infrastructure.
8. Encourage the deployment of **public and private telecenters** for community access to ICT, taking experiences in the region to date into account.
9. **Gather more quantitative information** about the trends and factors that affect Networked World Readiness, with particular attention to education.
10. In all efforts, consider and **address the special challenges** that rural, poor, female, illiterate and indigenous people face with respect to use of ICT in the Andes.

## **Introduction**

### **The Role of Technology**

The persistent economic and political instability in the Andean region is both the most important challenge the region faces, and the biggest impediment to real and lasting social progress. The Andean nations are consistently ranked at or near the bottom for economic competitiveness, Networked World Readiness, education, health and other important indicators. It is clear that the region needs to make significant changes in order to improve its well being in the twenty-first century. And while the nature of the challenge makes it seem almost insurmountable, information and communication technologies (ICT) should be an essential part of the solution that enables a healthy and prosperous future for the region.

Effective use of ICT in business, government and education has become an increasingly important element in every nation's ability to participate in the global economy and therefore a key driver of economic competitiveness. The capacity to meaningfully integrate ICT within social, educational and economic structures is captured by the concept of Networked World Readiness. Readiness examines a variety of factors including Network Access, Networked Learning, Networked Society, Networked Economy and Network Policy, and is a core element of competitiveness.

The enthusiasm for ICT in the developing world has reached a fever pitch, and while we are gaining a body of knowledge around it, rigorous analysis of non-anecdotal information has been limited and more is required. To date, our collective thinking has been characterized by much hypothesized and some observed promise of ICT benefits. We are only beginning to develop an understanding of the best strategies to address challenges developing world communities face in creating the right environment for appropriate ICT use, the actual benefits ICT offer, and how big a priority they should be.

Moving forward, we must find a balance between doing analysis and learning by doing. There is little doubt that technology holds great promise, and while we must be critical before devoting scarce resources to ICT, we must encourage creative and novel uses of technology. There is enough experience that we do not need to delay implementing new programs, but neither should we assume that technology will cure all ills.

As leaders develop ICT strategies and allocate scarce political and financial resources to ICT, they need to understand the initiatives' context and how they might interact with ICT. The ICT component of the Andean Competitiveness Project<sup>1</sup> (PAC) seeks to understand how new technologies exist in the region today, in order to offer goals and strategies to utilize them as building blocks for regional economic competitiveness. Concomitant research examines past and present experiences elsewhere for further insight into the related planning and implementation processes.

### **The Project**

With the April 2000 release of *Readiness for the Networked World: A Guide for Developing Nations*, the Center for International Development (CID) offered a systematic

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<sup>1</sup> Sponsored by the Corporación Andina de Fomento (CAF).

approach for examining the issues related to appropriate and effective use of ICT in a developing world context. The approach has become widely accepted and been used as part of the assessment and planning process in numerous communities by the Information Technologies Group at CID (ITG), the World Bank and its partners, consulting firms, governments and non-profits.

As part of the PAC and based on the methodology outlined in the *Guide*, ITG prepared an introduction to Readiness issues and preliminary assessment of *Andean Readiness for the Networked World* in October of 2000. This document contains a more thorough overview of the role of ICT in relation to economic development and competitiveness. During June-September of 2000 student interns lived in each of the five Andean nations, doing broad-based research on the Readiness. They worked with local partners, PAC project assistants and ITG in Cambridge to develop a pragmatic and appropriate approach to working in each nation. Since that time, local partner institutions<sup>2</sup>, in conjunction with ITG and based on the *Guide*, have completed extensive studies of the ICT environments across the Andean region. ITG and local partners jointly hosted multi-sectoral workshops in each country (except Venezuela, where a major weeklong conference was organized by the *Venezuela Competitiva* and PAC Project Assistant) to present preliminary results, seek reactions and solicit ongoing participation in the assessment and planning process. The resulting reports offer excellent insight into the situation of each nation, along with additional resources and policy recommendations.

This regional summary seeks to introduce the national reports and place them within a larger context. It does not pretend to summarize their findings, but it does attempt to recognize and understand some of the most important regional trends, as well as propose some ways to think about common frustrations. It will pay particular attention to how institutions like the CAF can contribute most effectively to the process.

What emerged over the research and workshops conducted over the past year is an image of a region that is at once facing tremendous barriers and benefiting from exciting opportunities. Many of the barriers to Readiness are not specifically related to ICT, but rather to other societal characteristics such as political and economic instability, needed economic reform, poverty and educational deficits. The challenge that we face as academics, policymakers, financiers and private companies, is to take this context into account, without becoming discouraged by it. We must design creative solutions utilizing the human capital, vision and spirit of the region, and ultimately convert seemingly insurmountable challenges into mechanisms for change and prosperity.

### **Selected Lessons on Readiness**

Time and again, ICT have been shown to be most effective when considered in conjunction with existing situations and behaviors, rather than as a separate matter altogether. Much as we have learned in e-commerce in the US market, some rules of business have changed, but many remain the same. Because technology gives us the

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<sup>2</sup> [Universidad Católica Boliviana - Instituto de Investigaciones Socio-Económicas](#) in Bolivia, [Universidad de Los Andes](#) in Colombia, [Escuela Politécnica del Litoral](#) (ESPOL) in Ecuador, [Universidad del Pacífico](#) in Perú and [Venezuela Competitiva](#) in Venezuela.



capacity to work, learn, and interact differently, it does not suggest that we will (or should) leave all past practices behind. Experience suggests that we must consider previous systems along with new opportunities, and figure out the most effective mixture of the two. Rather than waiting for education policy reform to occur and beginning a subsequent effort to include technology, leaders are better served by integrating technology in that process. In many cases, the excitement around ICT can help advance other needed policy changes -- such as creating new access to capital or streamlined regulations for starting and running a business -- factors necessary for e-business, but equally important for traditional industries.

Just as technology must be integrated in other aspects of policy change, the different aspects of technology must be approached in a holistic fashion. Attempting to address infrastructure deficits without regulatory reform, or offering electronic government services without promoting adequate public access, are recipes for wasted capital -- political, financial and human. Indeed, in order to achieve the synergies possible with initiatives to foster ICT readiness, communities must address these areas interactively, lest they eliminate one bottleneck only to find another.

National IT strategies have taken many paths around the world, and while no one preferred approach has emerged, experience suggests the importance of exchange between the public, private and non-profit/academic sectors. Due to its relative youth and rapidly evolving nature, technology relies on the interactions between ICT inventors, producers, sellers, users, regulators, funders, and researchers to bolster market mechanisms for feedback. Genuine multi-directional exchanges between government, business, non-profits and academia can play a valuable role in avoiding and removing blockages in this interactive system. Whether nations have formed voluntary task forces, government commissions, or other mechanisms, success has been characterized by involving parties with diverse technology interests in the planning process.

To that end, as part of the ICT component of PAC, workshops were convened that involved members including banks, Internet Service Providers (ISP), universities, government ministries, development non-profits, journalists, academics and others. In each case we found tremendous willingness, capacity, and commitment to improve national Readiness, and take advantage of ICT as a source of economic competitiveness. It was as though ICT were a public good, and while no organization wanted or was able to advance national Readiness alone, every organization was eager to create the necessary conditions collaboratively. Regardless of sector, people expressed a significant level of obligation and ability to help their community build its capacity, and in many cases, went so far as to offer their resources in support of the process.

As a result of the time spent in the workshops, participants committed to continuing to work together in a self-appointed task force. These groups have emerged in each nation, with particularly strong participation in Bolivia, Ecuador and Perú. They are attempting to collaborate on policy advice as well as projects, hoping to learn from one another while creating the critical momentum needed to advance the ICT agenda.

### **Further Questions and Challenges**

Numerous research questions arose over the course of the PAC, but the single biggest area that requires more study is the relationship between Readiness and economic competitiveness. Understanding this interaction will better allow policymakers to prioritize initiatives and help to ensure that resources are allocated efficiently. For the most part, the global rush towards Readiness has been undertaken without hard evidence proving that time is of the essence, all countries need to be ready in all areas, or Readiness is a more important source of competitiveness than other factors. It may be the case, for instance, that rather than focus on a broad Readiness campaign, that governments are best served by concentrating on specific economic sectors or focusing on education and learning opportunities.

Governments in the region will be well served by collaborating with other sectors and each other as they seek to understand the most immutable roadblocks and the biggest opportunities to leverage ICTs for economic competitiveness. By consulting with groups like those formed from the PAC workshops and other multi-sectoral bodies, policymakers can both ensure that they have a multifaceted understanding of the issues, and garner the unique support available from the private sector, academia and non-governmental organizations. Combining the efforts of these groups can lead to synergies that address diverse financial, political and organizational needs while helping the society at large.

The tasks are complex, the stakeholders are many, political risks and rewards are significant, and the availability of best practices is limited. Policymakers face the challenge of integrating many different actors while being constrained by government's inability to work on Internet Time or with Internet Agility (to say nothing of longevity). They are thus challenged to find a balance between carrying out the extensive planning they are accustomed to and acting in a timely fashion, between only choosing initiatives with a high chance for success, and experimenting with more creative initiatives – fostering innovation, not just automation<sup>3</sup>.

### **Organization of the Paper**

The text of this Regional Overview is divided into the five major areas suggested by the Guide: Network Access, Networked Learning, Networked Society, Networked Economy and Network Policy<sup>4</sup>. Within each area, selected broad conclusions are presented with supporting indicators and related recommendations. The paper should be read as an introduction and supplement to the national reports.

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<sup>3</sup> Suggested by the Kennedy School of Government's Strategic Computing in the Public Sector publication of *Eight Imperatives for Leaders in a Networked World* (2000) online at <http://www.ksg.harvard.edu/stratcom/hpg/index.htm>.

<sup>4</sup> For detailed descriptions of these terms and their significance please see the aforementioned *Readiness for the Networked World: A Guide For Developing Countries*, or *Andean Readiness for the Networked World*, online at <http://www.readinessguide.org/>

## NETWORK ACCESS

### Key insights

- Wireline teledensity is low and stagnant, while wireless is growing rapidly
- The combination of low cost, quality service and phone coverage is generally lacking
- Rural areas suffer disproportionately from low teledensity and poor service quality
- Hardware is expensive
- Non-IT infrastructure is inefficient and deters business and trade
- International bandwidth is increasing in quality and decreasing in price

### Key opportunities

- Promote community access points (telecenters, cyber cafes)
- Test potential for technology parks
- Explore potential uses of the existing wireless network
- Research and develop technologies appropriate to the Andean context
- Promote regional peering to improve cost and service

### Overview

While effective access is not sufficient for Readiness, it is a pre-condition for use of ICT. If people and organizations cannot find or afford reliable access to the national and international voice and data networks, they are simply unable to participate in the Networked World.

**The region suffers in virtually every aspect of access:** there are very low per capita numbers of wireline phones, Internet hosts, ISPs, and personal computers; phone quality and service are low, with associated slow dial-up speeds, high percentage of dropped call and limited availability of broadband service; hardware, software, and cumulative access (phone and ISP) prices are out of the reach of the majority of the population; and energy supply, transportation and distribution networks are often inconsistent and inefficient. Significant telecoms investment has flowed into every country<sup>5</sup>, but it is not enough, nor is it distributed evenly. Benefits from existing funding for rural telecoms development should be maximized to encourage infrastructure investment outside of the largest urban areas in conjunction with other mechanisms.

In each Andean nation, **there is a significant access gap between urban and rural areas**, with the majority of all relevant infrastructure, including phones, ISPs and power supplies located in the largest urban areas. Given the topography of the region and often-inadequate transportation infrastructure, the limited communications with areas outside the largest cities isolates these areas even more, impeding social communication and economic interaction, while exacerbating sub-national differences.

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<sup>5</sup> In Venezuela alone there are investments by AT&T, Bell Canada International, BellSouth, British Telecom, Comsat, Convergence Communication, Global Crossing, GTE, Impsat, MCI, New Global Telecom, Telecom Italia Mobile, Telefónica de España. Telefónica, Telecom Italia and BellSouth are involved throughout the region.

**Shared access points like telecenters and cyber cafes** are an important element of the access solution for both urban and rural areas. Leaders should explore ways to promote these centers, through policy requirements, subsidies, deregulation, and use as a shared platform across programs.

Furthermore, research should be undertaken to **design, develop and deploy technologies that meet regional needs** -- applications and devices that are robust, low cost, flexible, and respect different languages and levels of literacy.<sup>6</sup> Opportunities to further exploit additional communications opportunities of the many wireless networks now in place should be investigated. For while there has been significant speculation on the arrival of 3G (third generation) wireless networks, yet recent experience suggests that they make take much longer to arrive than originally anticipated.

Current ICT products are targeted primarily for developed markets, with some spillover into secondary markets in the developing world. Until there is sea of change in income levels, these products will continue to be out of reach for most of the population. Of equal importance is the fact that they are not designed to meet the unique combination of needs of most Andean residents.<sup>7</sup> This further demonstrates the importance of developing both business models and technologies targeted specifically for the Andean region, and not simply importing those of more developed nations.

#### **Teledensity is low and not improving**

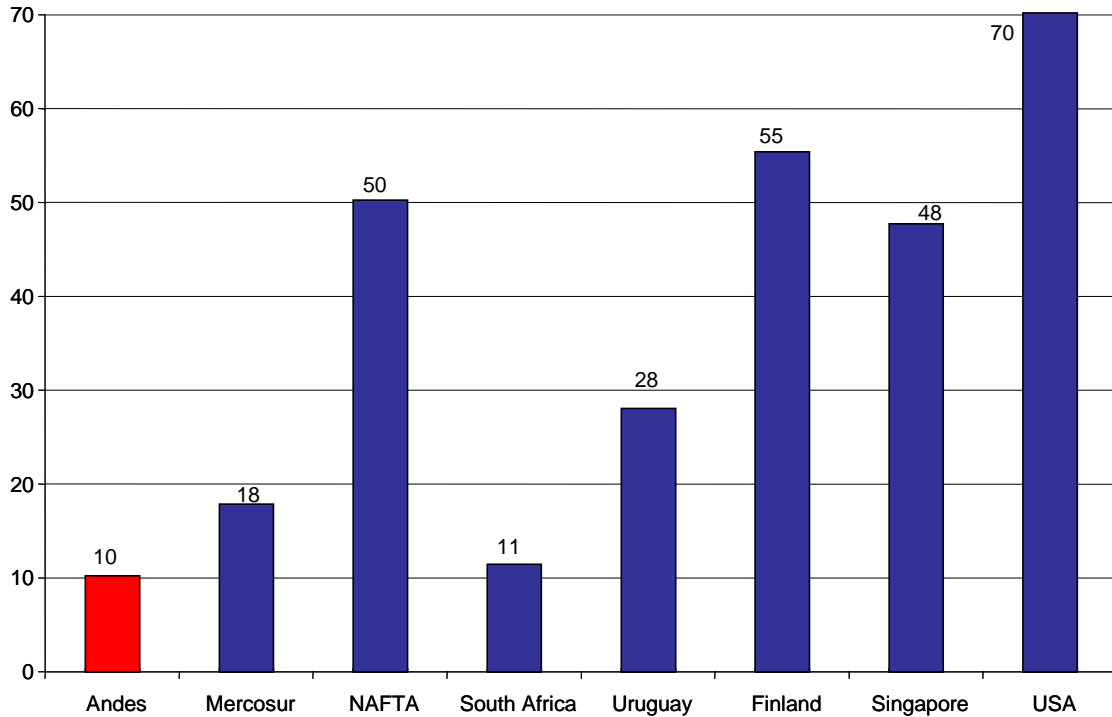
The number of telephone mainlines per capita is one of the most traditional benchmarks of technology adoption, and serves as an approximation for Andean Networked World Readiness. The teledensity of the region as a whole is quite low: it is less than 20% of the most developed telecommunications markets, about 40% of Uruguay's teledensity (the Latin American leader), about half the average for Latin America and the Caribbean, and roughly equal to South Africa (African continent leader).

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<sup>6</sup> See Geoffrey Kirkman's article "Out of the Labs and Into the Developing World: Using appropriate technologies to promote truly global Internet diffusion," *Journal of Human Development*, Volume 2, Number 2, 2001.

<sup>7</sup> Dr. Ashok Jhunjhunwala of Indian Institute of Technology-Madras engineered a wireless local loop telephone network that costs less than half of a typical US line, delivers simultaneous voice and data at 35.5/70 KBPS, and is capable of rapid rollout. More information is available at <http://www.tenet.res.in>.

**Figure 6: Number of Main Telephone Lines per 100 Inhabitants, Select Countries / Regions**



Source: International Telecommunication Union (2000c)

In recent years, teledensity growth has been slow in most Andean countries and actually ceased in some cases. In Venezuela and Colombia this is a result of increased mobile telephony, political and economic troubles impeding investment, and limited perceived incentives for further investments due to lack of competition. Perú's teledensity growth has become somewhat stagnant and telecoms investment has dropped significantly since the first years of limited competition, all this despite extremely low numbers in much of the country and binding commitments of Telefónica del Perú to install more lines<sup>8</sup>. Phone costs remain too high for most of the population, while public phones and telecenters are more economical and increasingly available (also part of Telefónica's commitment)<sup>9</sup>. The unsure state of the monopolies in Ecuador has limited investment, leaving demand unmet and increasing interest in mobile telephony.

Indeed, as new types of connectivity become increasingly prevalent (whether by mobile access or telecenters), traditional measures of teledensity are less important indicators. It is important that we continue to question these indicators and devise new ones that may better capture a developing world community's ability to participate in the Networked World.

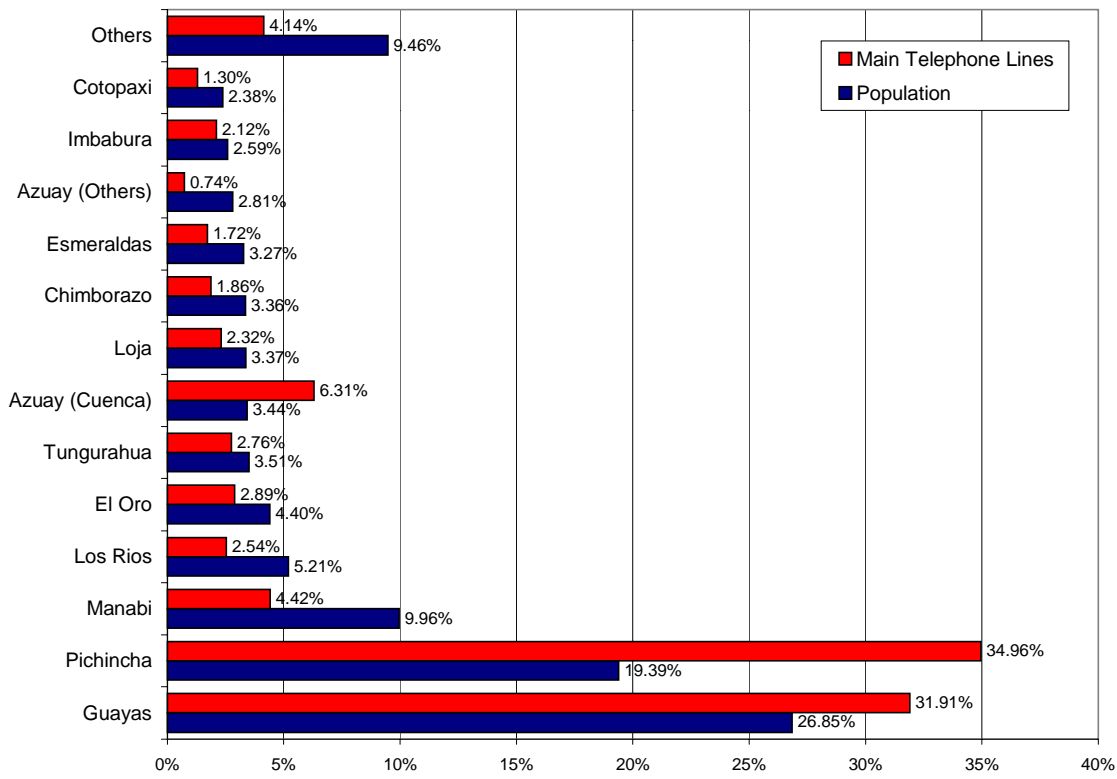
<sup>8</sup> ITU (2000a) suggests that the protected period after privatization often begins with new investments and quickly falls off. In Perú's case, the importance of selecting the appropriate commitment is also highlighted.

<sup>9</sup> Billing also matters in Perú and elsewhere; many people actually prefer to use pre-paid phone cards that allow them to monitor and control their calling volume.

**ICT infrastructure gap between urban and rural areas**

The significant divide in teledensity between urban and rural areas is consistent throughout the region. The largest urban centers often have double the number of lines per capita that smaller cities have, and rural areas have even less network access. Lima, for instance, has over 15% teledensity, while Arequipa and Tacna (the next highest departments) have just over 8%, and 17 of the 21 remaining departments have fewer than 4.2 lines per 100 people. As seen in Figure 2, the states with Ecuador’s largest cities are the only ones with a greater percentage of phones than population. In numbers similar to its Andean neighbors, cities average over 15% teledensity while rural areas hover at about 4%.

**Figure 7: Population and Main Telephone Lines as Percentage of Total in Ecuador, by Region**



Source: PAC IT Report Ecuador (2001)

Each of the Andean nations has a mechanism to promote development of the rural telecoms infrastructure, but they have seen limited success to date in creating real change. By and large, they have not been able to devise strategic approaches to addressing the deficits that may involve existing funding mechanisms, private sector participation, regulatory change and technical innovation. ITU’s research suggests that mechanisms like those already in place that subsidize private sector operators may be the best way to achieve effective universal access (rather than service requirements for privatized monopolies), especially when alternative networks are in place. Further analysis on their effect, and how to best structure contracts and regulation in order to create competitive services in rural areas is needed.

**FITEL (FONDO DE INVERSION EN TELECOMUNICACIONES)**

<http://www.osiptel.gob.pe/fitel/frames/frintro.html>

As part of Perú's Rural Projects Program, designed by OSPITEL and approved by the Ministry of Transportation, Communications, Housing and Construction, FITEL recently offered the third international tender to implement telecommunications services in rural areas. The winner was granted the right to install and operate the service for a period of 20 years for the benefit of more than 2,300 communities and more than 2,000,000 inhabitants by 2003. Phase one connections already in place have reduced travel time to access telephones significantly by 67-98%, but results indicating how much people are accessing the new services (including Internet) or whether they have benefited the region are not yet known.

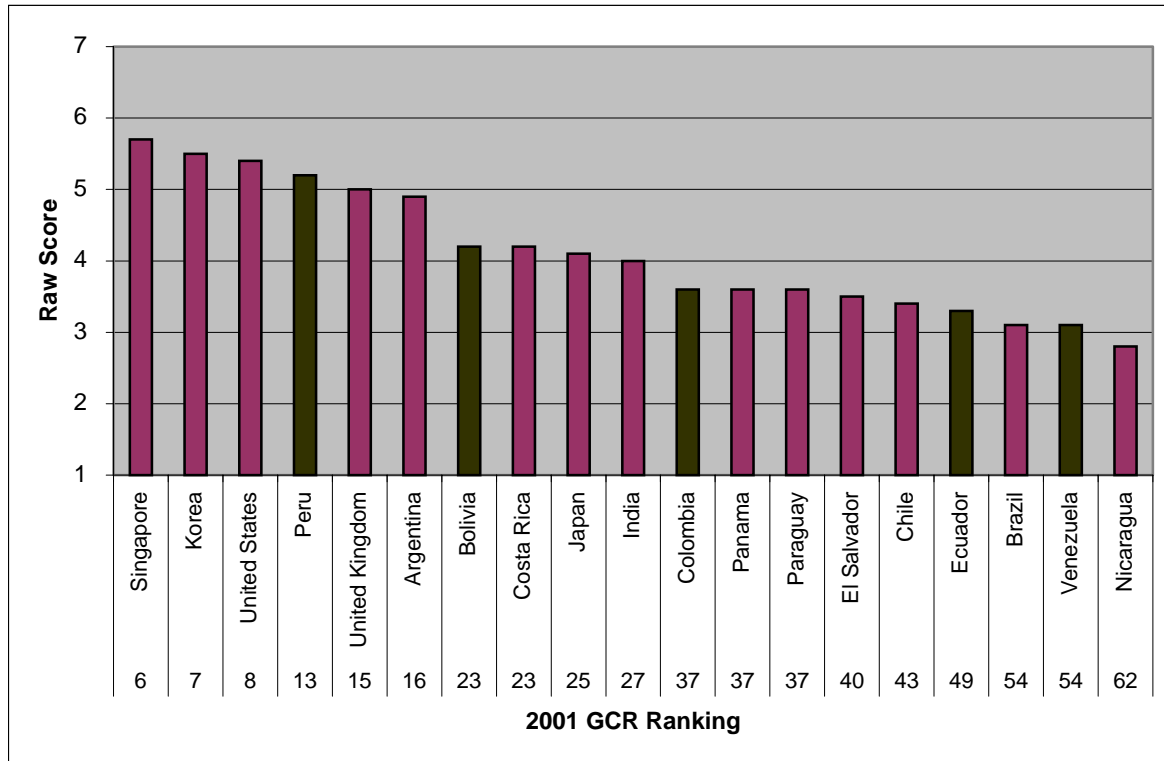
**Using telecenters to get Internet to the people**

It is clear that at least in the near term, the US model of one phone line and one computer per household is unrealistic in the Andean region. Regardless of whether the preferred terminology is telecenter, cyber café or *cabina pública*<sup>10</sup>, some model of shared access for computers and Internet can be an effective and efficient way to provide widespread access to ICT efficiently and at a relatively low cost. Drastically increasing phones, computers, education or income in the immediate term is neither a realistic nor efficient approach. While seeking to create those conditions in the medium term, leaders should work on creating the right environment for more telecenters to flourish now.

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<sup>10</sup> As coined by *Red Científica Peruana* or RCP, whom many credit with the first private telecenter network.

**Figure 8: 2001 GCR Ranking in Public Internet Access**



Source: Global Competitiveness Report 2001

By lowering the barriers for Internet access – ownership of a telephone and a computer, education, and an account with an ISP (combining to require a high income level) – people can experiment and get to know the new opportunities available to them. Resources can be shared between community members, and therefore utilized more completely, rather than letting excess capacity go to waste. Telecenters can act as a locus for interaction around ICT, reaching the community for ICT training and related resources.

With the great cultural and economic diversity of the Andes, tailoring content and delivery mechanisms to local needs is essential. One of the advantages to the telecenter model is its flexibility. The basic package consists of some form of computer and Internet access, with all other characteristics based on the needs of the community it seeks to serve. Telecenters may be large or small, operated as for profits or nonprofits, and in urban or rural areas. The basic idea is that costs can be shared by providing a number of different services to different people on the same platform. They can also be used as points to communicate inside or outside the community, deliver educational material, access electronic government, and facilitate specific initiatives that utilize ICT.

The relatively low cost and easy deployment of telecenters mean that or an individual *cabina* or a wide network can be rolled out rapidly, with content more often a limiting factor than infrastructure. The network may be run by one company with franchisees, or by a series of independent operators (like many public phone booths). A combination of



funding is available through donor agencies, rural telecoms development initiatives, and the private sector. Infrastructure may rely upon any combination of wireline and wireless solutions. While there is not one best practice approach, there is a volume of experience that suggests what works and what does not<sup>11</sup>. There are also many long operating telecenters in the region that can provide invaluable advice relating to their financial sustainability, ability to reach target audiences, and main barriers they face. Perú's experience in particular, more so than virtually any other developing world nation, merits greater consideration because of its financial sustainability.

In addition to considering the physical infrastructure and policy environment, leaders should think about the initiative in a deeper way. Developing applications (like the Quechua-Aymará-Spanish dictionary project in Bolivia), content (online government information and services) and business opportunities (Bolivian entrepreneurs are proposing a government voucher program that would support use of telecenters for government and educational use) for telecenters are essential. The public sector should both create its own initiatives<sup>12</sup> and offer support for private sector efforts (which should increase on their own with success). Programs should support the many existing telecenters, while offering incentives for the creation of new ones, particularly in poor and rural areas.

#### Red Científica Peruana

<http://www.rcp.net.pe/index.shtml>

RCP helped make the public access concept public, by holding weekly awareness raising meetings starting in the early 1990's, supporting entrepreneurs, and ultimately helping to spawn a privately operated network of approximately 1500 *cabinas públicas* in Perú. Although it began as a non-profit, RCP became profitable, yet did not limit services to the wealthiest areas of Lima (although the vast majority are in the city), and actually provides service at approximately 40% less than of the cost of home Internet access – not including the cost of a computer or ISP. RCP has worked with governments (such as El Salvador) in setting up their own telecenter networks, and has recently begun franchising its experiences outside Perú with the *Red Latinoamericana de Cabinas Públicas*.

#### **Wireless growth**

Given the generally sad state of wireline telephony in the region, with costs as high as \$US 1500 to connect a wireline phone in Bolivia in 2001, it is not surprising that people are opting for the flexibility and convenience that wireless phones offer<sup>13</sup>. The wireless sector's open competition has also been of great importance to growth in most markets, and has attracted new investors from around the world. It's important to notice, however, that the process is slowing down in Colombia and Ecuador, which are two of the

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<sup>11</sup> The Inter-American Development Bank's "Telecenters for Socioeconomic and Rural Development in Latin America and the Caribbean" and UNESCO's "The Community Telecentre Cookbook for Africa" are two good sources of further information.

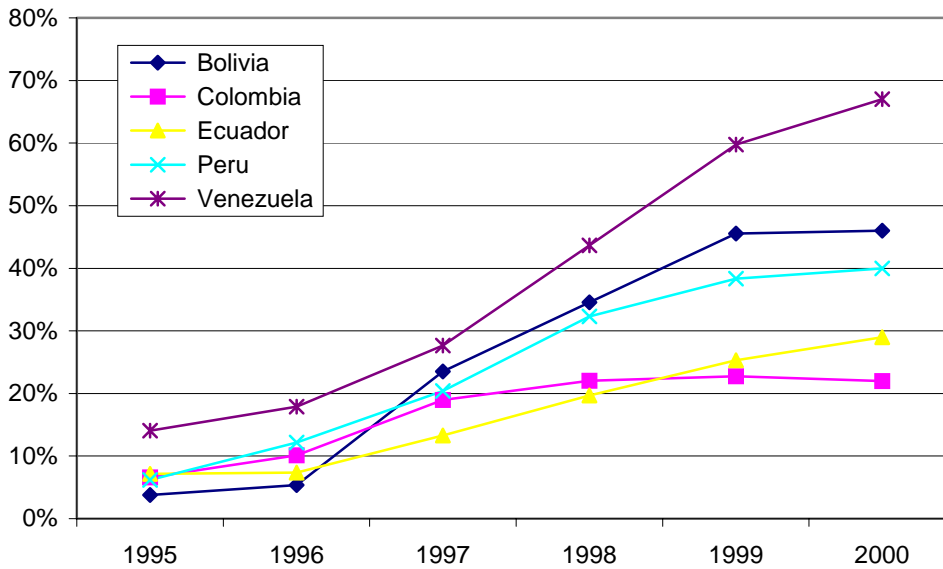
<sup>12</sup> The Colombian and Venezuelan governments have telecenter initiatives underway under COMPARTEL and CONATEL, respectively.

<sup>13</sup> It is typically characterized by immediate access, lower initial cost, pre-paid calling cards, calling party pays.

countries that have not fully liberalized this sector of telecommunications (among other barriers to investment including economic hardship).

When wireless penetration and per capita GDP in the Andean nations are compared to Latin America as a whole, they fare well. In 1998, Venezuela was the leader in wireless teledensity Latin America, with a significantly higher penetration rate than higher income countries such as Chile, Uruguay and Argentina. Bolivia and Ecuador performed well relative to their GDP levels as well.

**Figure 9: Mobile Telephony as a Percentage of All Telephony**

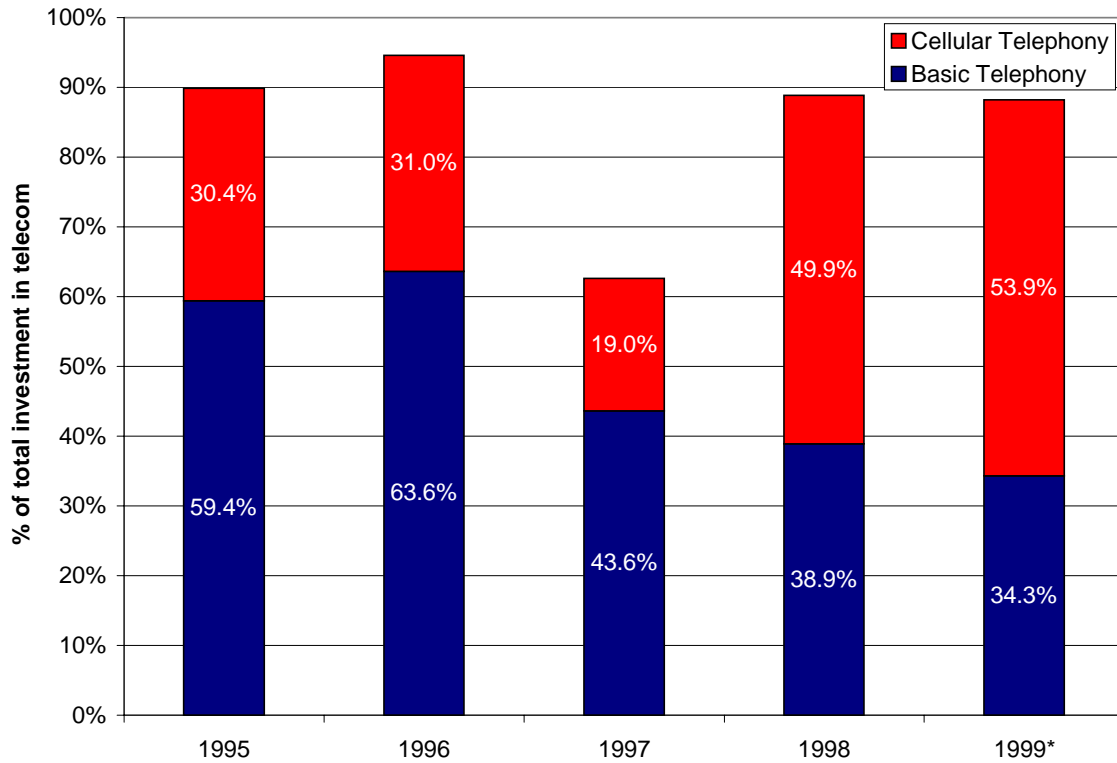


Source: International Telecommunications Union (2000c)

This widespread trend towards increasing mobile wireless use may be a substitute for wireline, rather than a complement. The growth is positive because it means that people are more able to communicate more easily, but it is also troubling due to its economic bias towards urban areas. Most of mobile telephony's fixed costs are for initial infrastructure investment, with marginal costs for users, so population density is key for a successful business<sup>14</sup>. While it may not be a substitute in rural areas, it could make other wireline investments less appealing to telecoms carriers because the urban markets they covet are shrinking in size.

<sup>14</sup> It should be noted that depending on topography, service may extend widely into rural areas.

**Figure 10: Investment in Basic and Cellular Telephony in Venezuela 1995-1999**



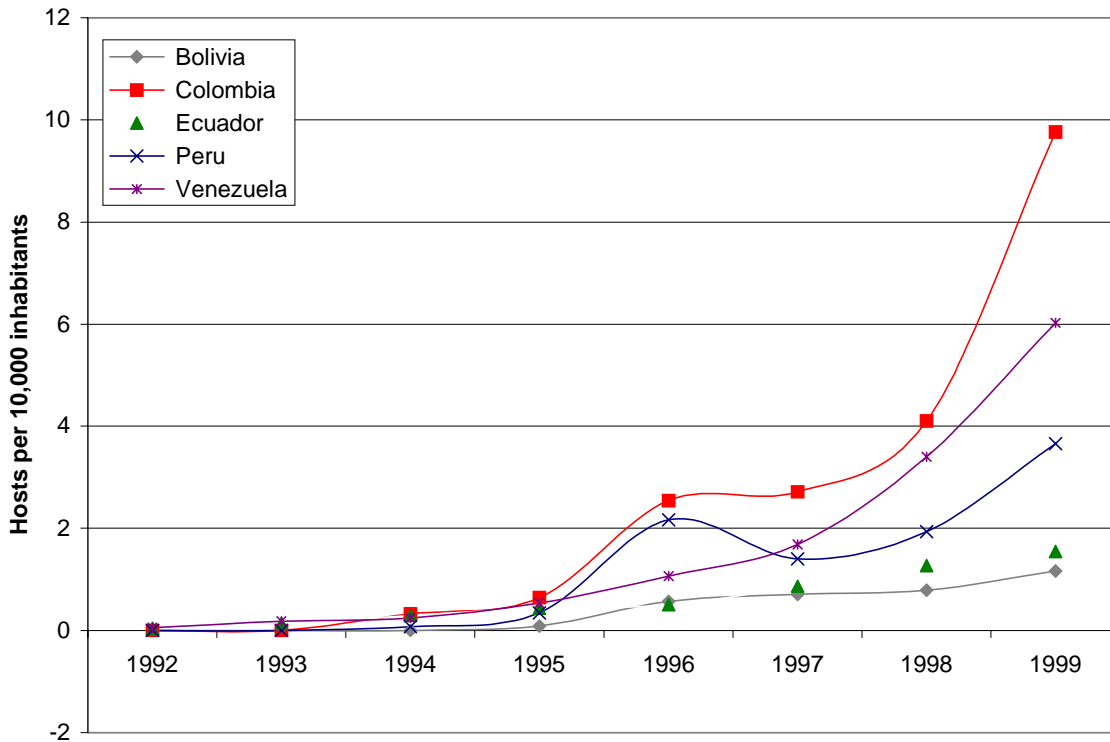
Source: PAC IT Report Venezuela (2001)

Substitution is also of concern because current 2G (second generation) wireless technologies hold limited potential for Internet access<sup>15</sup>. While a recent Punto-Com magazine survey suggested that Wireless Access Protocol (WAP) was popular in Colombia and that many Venezuelans planned to buy WAP-enabled phones, it is not clear what percentage of the population will actually use it, or what services will be WAP-accessible. Thus, it may well mean that while more people have access to voice services, the data services normally associated with them will remain severely limited.

#### **Limited Internet availability and high cost**

When Internet host density, an important usage indicator, is examined in conjunction with per capita GDP, all five nations are clustered near the bottom of the Latin American regional spectrum, meaning that even considering their poverty, and despite recent growth, they are still not performing well.

<sup>15</sup> Some 2G phones can be adapted for use as a modem; they transmit data at between 9.6 and 19.2 kbps.

**Figure 11: Internet Hosts per 10,000 Inhabitants**

Source: International Telecommunications Union (2000c)

Most Internet access in the region occurs through dial up modem, so the access cost is a combination of telephone and ISP charges (in addition to the computer). Phone prices and ISP rates both vary, but in the end, access cost is high compared to local income. There is time-metered calling almost everywhere, which also impedes Internet use, especially because downloads can take long periods of time. Colombia has attempted to solve this problem by introducing the discounted rates for Internet calls (*tarifa plana* or flat rate pricing<sup>16</sup>). It should be noted that in the case of Santa Cruz, Bolivia, COTAS<sup>17</sup> lack of time metered pricing caused some distortions in Internet use, thereby taxing the resources of local ISPs. Flat rates are widely credited with helping the Internet to succeed in the US, as opposed to Europe, where time-metered calling is prevalent (but likely moving to flat-rate for Internet).

Usage is even more limited in rural areas because in addition to the limited numbers of personal computers and phone lines they have, most ISPs are located in urban areas. Smaller urban communities have limited choice of ISPs and services, and are sometimes forced to make long distance calls in order to access the Internet (resulting in even higher effective access costs and worse service). As a potential model for the Andean region, Argentina created the 0610 prefix to offer nationwide Internet access at a discounted rate. Other nations have introduced prefixes that allow any Internet call to be considered local.

<sup>16</sup> [http://www.crt.gov.co/proyectos/prom\\_internet.htm](http://www.crt.gov.co/proyectos/prom_internet.htm)

<sup>17</sup> Cooperativa de Telecomunicaciones de Santa Cruz

### **Network cost, speed and quality**

Despite the fact that there are a fairly high percentage of digital lines in most of the region, existing infrastructure is in fairly bad shape, with numerous mainline faults, a high percentage of dropped calls and sub standard quality local lines. Yet telecom reform has begun to elicit some positive effect, with Perú and Venezuela's dominant providers improving service numbers significantly, including repair time. While Bolivia's capitalization of ENTEL is not an unqualified success, service has improved somewhat according to ISPs, and the organization has been laying fiber around the country in preparation for November 2001's telecoms *apertura*. Simultaneously, many of Bolivia's cooperatives (COTEL<sup>18</sup>, in particular), are in very dire straights, as they face mounting competition in conjunction with a long history of mismanagement. Ecuador's state run monopolies are in much the same position, awaiting privatization, but without a political mandate to make any investments while they wait. ISPs are beginning to offer broadband in some cases, but limited resources and government regulation (like those in Ecuador which prohibit ISPs from offering this service) have slowed its rollout. While broadband is not necessary for all applications, it is important for many, including those which applications service providers (ASP) would provide. In each case sub-standard service and the retarded development for the ICT sector, adversely affect the economic competitiveness of the nation.

Yet developments during 2000-2001, including the completion of continental rings by Global Crossing and Emergia (Telefónica) and as NAP of the Americas comes online in Miami, portend an improvement in price and quality. Prior to these developments, there were a mere five peering points in all of Latin America. By peering ISP networks and creating Network Access Points (NAPs)<sup>19</sup>, national and regional traffic will not be forced to travel to the United States, but can be routed more directly to its destination. This infrastructure will result in higher speeds (the distance traveled is shorter), more reliability (there is more than one route), and lower costs (because the total volume of international traffic decreases). Furthermore, the Yankee Group predicts an annual 20% drop in submarine cable costs over the next three years<sup>20</sup>. These new opportunities for connectivity are timely, coming, as markets are increasingly open and competitive.

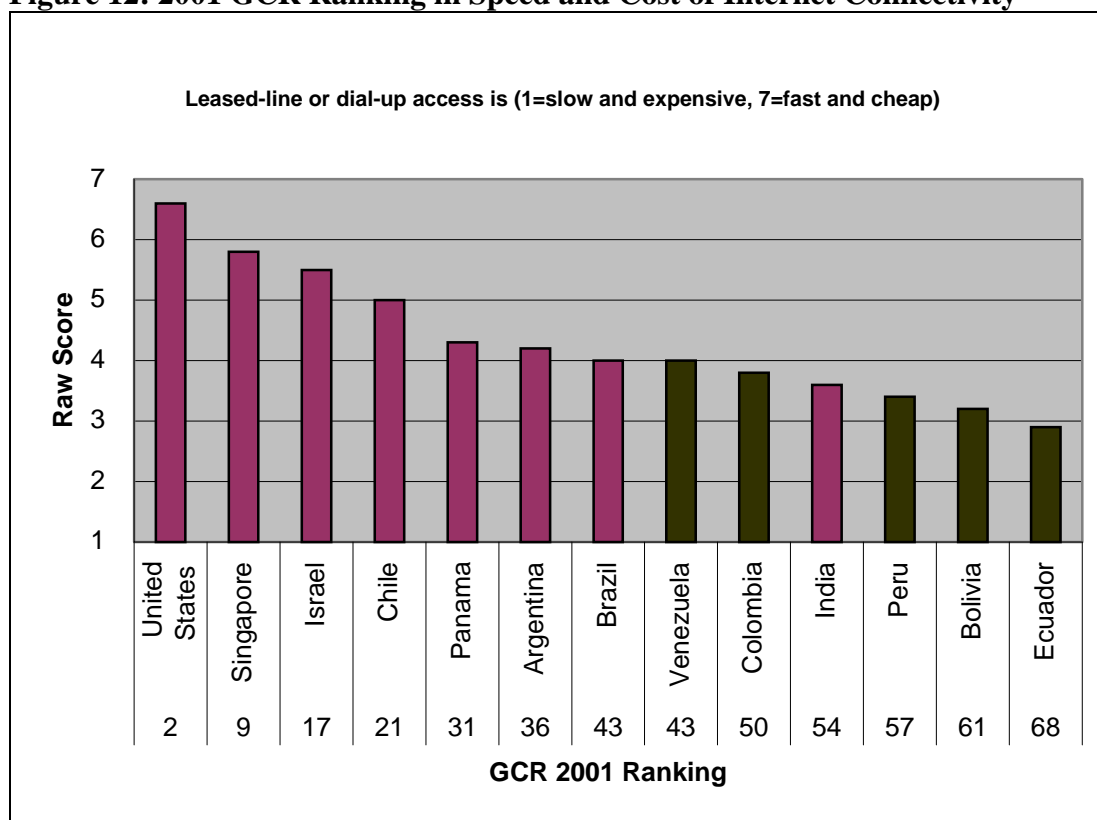
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<sup>18</sup> Cooperativa de Teléfonos de La Paz.

<sup>19</sup> Colombia is the only Andean nation with a NAP, but the Asociación de Empresas de Telecomunicaciones la Comunidad Andina (ASETA - Association of Telecommunications Companies of the Andean Community) has a project underway to develop a regional peering and backbone.

<sup>20</sup> According to Punto-Com magazine (May 2001), it is also likely that satellite use will be redirected due to this increased capacity, possibly towards rural areas that would otherwise be off the telecommunications grid.

**Figure 12: 2001 GCR Ranking in Speed and Cost of Internet Connectivity**



Source: Global Competitiveness Report 2001

Internet Telephony (or Voice over Internet Protocol - VoIP) seems to have had a noteworthy effect on Internet use, both from the home and from public access points. The low cost it carries compared to wireless or wireline long distance for national and international long distance is appealing and has become the prime mode of distance communication for many. At the same time, it challenges dominant long distance providers in their most lucrative markets, pushing them to rationalize bloated costs and cross-subsidies.

**Table 1: Monthly Rental Cost of a 2Mbit/Second Leased Line**

Country	Monthly rental of 2Mbit Leased Line (US\$)
Bolivia	56,230
Colombia	28,776
Ecuador	40,000
Peru	25,386
Venezuela	Not available

International Telecommunications Union (2000b)

## LEARNING

### Key Insights

- Lack of information about education and technology
- Low educational levels, especially for girls, the poor and indigenous people
- Low PC and phone penetration rates in schools
- Techno-centric approach to ICT in learning is common
- Access to ICT is skewed toward urban and non-public schools
- Funding mechanisms for ICT and education exist in many countries

### Key Goals

- Include ICT in educational reform (including distance learning)
- Emphasize human capital and curriculum development
- Bolster cooperation with universities, private sector and NGOs
- Promote regional development of educational materials, techniques and curricula
- Create lifelong and informal learning opportunities
- Integrate telecenters with schools and vice versa

### Overview

There can be little doubt that **learning and education are the cornerstones of any knowledge economy**. In addition to knowledge, today's business environment increasingly demands people who are innovative, capable of solving problems and able to work in groups. Formal education in the Andean region and much of the world remains largely unprepared for the needs of the 21<sup>st</sup> century, both in terms of its approach to learning and in its integration of ICT in that process.

**Educational opportunity in the region is sorely lacking** and features troubling characteristics such as lower educational levels for women and girls, the poor, and indigenous communities. The 2000 GCR ranks all of the Andean nations below 50 (out of 59) in both public education and equality of opportunity between rich and poor students<sup>21</sup>. Given the divides that already exist in many Andean societies, and the political turmoil they have caused, there can be little doubt of the importance of offering a quality education to every citizen.

While we have very limited information about education in general and even less with respect to ICT, there appears to be **very limited access to technology in the educational setting**, and what access there is, is largely found in private schools and in urban areas. There has been little documented effective use of ICT in the Andes to facilitate distance-learning initiatives, even though it seems to offer real opportunity to compensate for the limited availability of teachers and materials in remote or inaccessible areas and the region has significant experience with traditional distance-learning programs.

Initiatives that have been implemented to include ICT in education have largely been **more focused on increasing the ICT infrastructure** available in schools rather than its

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<sup>21</sup> The 2001 GCR has similar ratings, with all Andean nations scoring at 56 and lower out of 75 countries.

effective usage. An excessive focus has been placed on studying the technology as a subject, not using the technology as a tool for learning. For example, funds have been designated for the purchase of ICT equipment, but not for its maintenance, teacher training nor curriculum development. The result is unused machines, unprepared teachers, wasted funds, and suspicion about the value of ICT in learning. In a purely political sense, spending significant time and energy to prepare curricula or train teachers, might not be perceived as a good investment, while putting computers in schools is. This is due to the fact that although access is not an outcome, it is a measurable output (and offers political benefit), and may cause the political process to push for computerization of schools.

Therefore, what may be needed is a more **collaborative approach to improving education**, where organizations from all sectors across society combine their efforts to help design and implement a system that grows and deepens the region's human capacity. While this may seem unlikely, there was wide agreement within the workshop participants<sup>22</sup> and others surveyed during the PAC that education was of the utmost importance across the Andes. Furthermore, regardless of which sector they represented, people felt that their organization had a key role and responsibility to help improve learning opportunities.

#### **Lack of monitoring and information about education**

In most of the Andean countries, national statistics agencies do not include questions regarding ICT education levels in census surveys<sup>23</sup>. In fact, the surveys conducted for the PAC were some of the first to gather information on ICT in the education system, and are the only information available in some countries. While this is a start, more sophisticated instruments with a wider scope are necessary to richer information about educational characteristics and levels, so or policy makers can implement effective policies and allocate funds appropriately. Without this information, they can neither design these policies around well-understood needs nor evaluate their impact accurately over time.

#### **Better education is an imperative**

As literacy and secondary education rates remain significantly lower than the developed world, Andean nations are undertaking educational reform. According to the International Association for Evaluation Achievement (IEA)<sup>24</sup>, Colombia's educational system is still deficient despite significant funding increases in recent years. The results of the Ecuadorian program APRENDO (*Sistema Nacional de Logros Académicos*) showed achievement levels averaging less than 50 percent in standardized mathematical tests<sup>25</sup>. Unconfirmed reports from Bolivia suggest limited reading aptitude of many rural students, despite recent reforms, rising enrollment rates and greater investment in primary and secondary education.

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<sup>22</sup> Participants in the PAC ICT workshops from all sectors consistently rated education as both a top priority and the responsibility of all sectors.

<sup>23</sup> The exception is Perú, which in the 2000 National Household Survey included questions regarding IT access and knowledge.

<sup>24</sup> PAC IT Report Colombia

<sup>25</sup> PAC IT Report Ecuador



ICT should be integrated in this reform process because it can help address many of the system's core challenges, facilitating supplemental teacher training, providing new curriculum materials, creating the means for collaborative yet individualized learning, and providing potential career opportunities. As with any tool, policymakers and educators must first understand the challenges they face, and decide whether and how technology can be used to meet them.

One of the best-known networked learning programs is World Links<sup>26</sup> (WorLD), which provides Internet connectivity, training for teachers, and access to its network of schools in 27 countries. Active in both Colombia and Perú<sup>27</sup>, WorLD links students and teachers in secondary schools in developing countries for collaborative and technology enabled learning. The program has developed extensive training materials related to many aspects of ICT in education. Unfortunately, the budget for the Peruvian program did not count on adequate resources to pay for ongoing Internet access, and has thus been able to achieve only limited success.

Creative strategies that have been employed around the world to provide incentives for children to stay in school could be replicated in the region. For example, in India, access to computers is a valuable motivation (they are believed to boost employability), whereas in some Brazilian and Mexican communities, families are compensated for their children's lost wages when they attend school.

Women tend to face greater challenges to access ICT, particularly in the nations with larger indigenous populations and lower incomes (Bolivia, Ecuador and Perú). Policymakers must pay special attention to their needs when designing and implementing educational initiatives as preliminary research suggests that women are a major factor in diffusion of technology within their communities<sup>28</sup>.

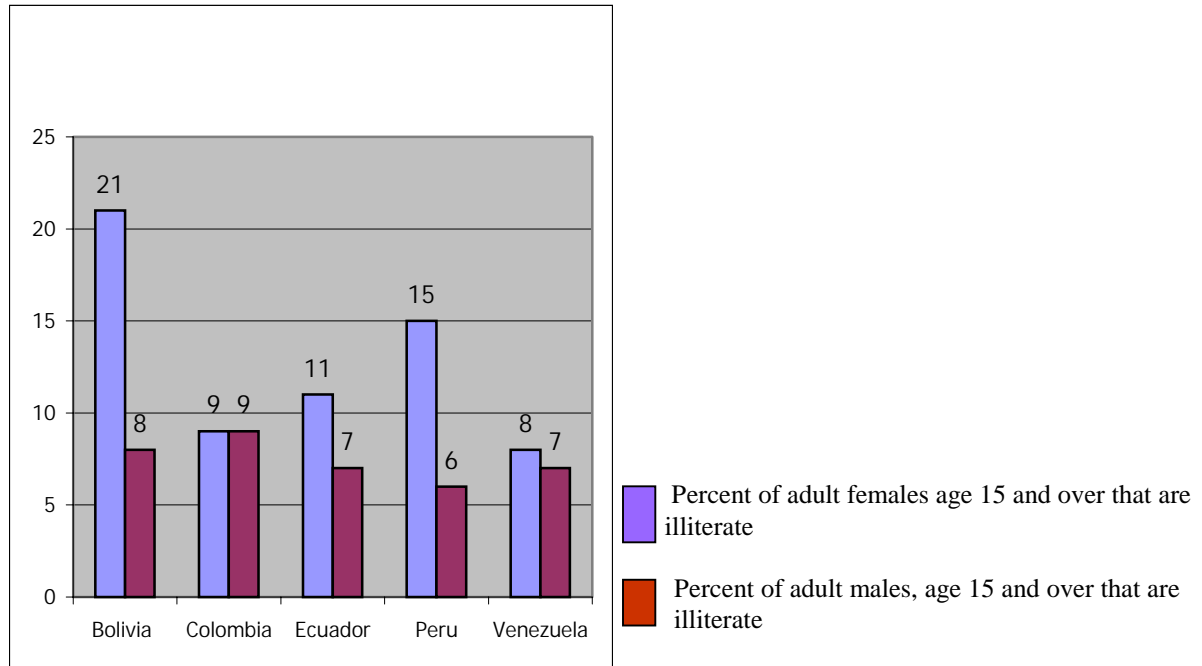
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<sup>26</sup> WorLD, <http://www.worldbank.org/worldlinks>

<sup>27</sup> <http://geocities.com/worldcolombia/index.html>, <http://worldbank.org/worldlinks/english/htm/Perú.htm>

<sup>28</sup> Carlos Osorio ITG working paper (2000).

**Figure 13: Illiteracy Percentage Rates in the Andean Region, 1999**

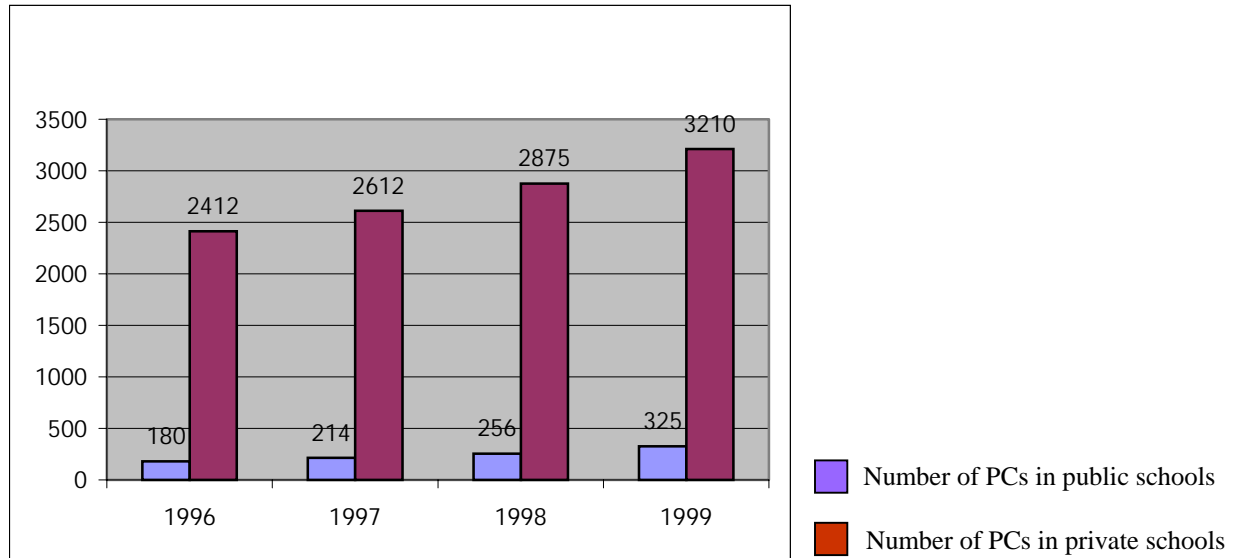


Source: UNDP World Development Indicators (2000)

**ICT is concentrated in urban, non-public and higher-level schools**

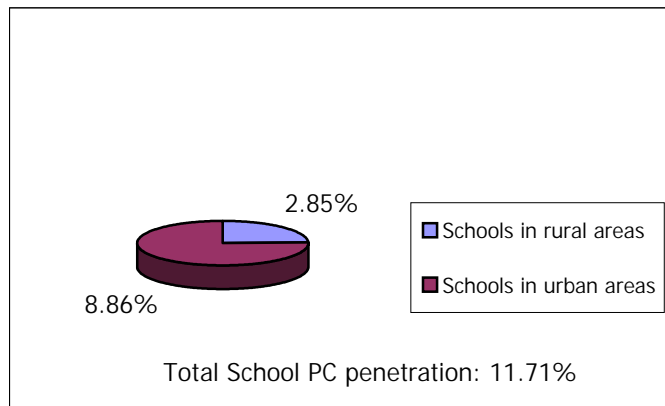
Urban and private schools are much more likely to have computers and phones than public and rural schools. When public or rural schools have computers/phone lines, they tend to have a higher student per computer/phone line rate than in urban and private schools. Less than 30% of all of Venezuela’s pre-primary, primary and secondary schools have telephone lines, with over 80% of those being in private institutions. In a study conducted by ESPOL, of the approximately 5% of pre-university schools with Internet access in Ecuador, over 80% are in urban areas. It is also the case that the higher level the school, the more likely it is to have ICT, with Venezuelan public secondary schools having more than triple the number of phones primary schools have.

**Figure 14: Number of PCs in Venezuelan Schools**



Source: PAC IT REPORT Venezuela (2001)

**Figure 15: Percentage of Schools with Computer Labs in Ecuador**



Source: PAC IT REPORT Ecuador (2001)

**Tamil Nadu Schools Program**

<http://www.elcot.com>

The Tamil Nadu Schools Program is one example of a method for getting ICT infrastructure into schools that has been exploited with fair success. This method involves using the school computer lab as a telecenter and IT training center in its off hours. This system allows both children and the community at large to share the benefits and costs of ICT.

In this Southern Indian state, the state-run Electronics Corporation of Tamil Nadu created the Schools Program in which it offered tenders to install computer labs and teach pre-determined computer classes in each of the over 1,500 government higher secondary schools. Providers of all sizes and with varying levels of experience were awarded contracts, ranging from just a few schools to hundreds. The contractors were paid a fee

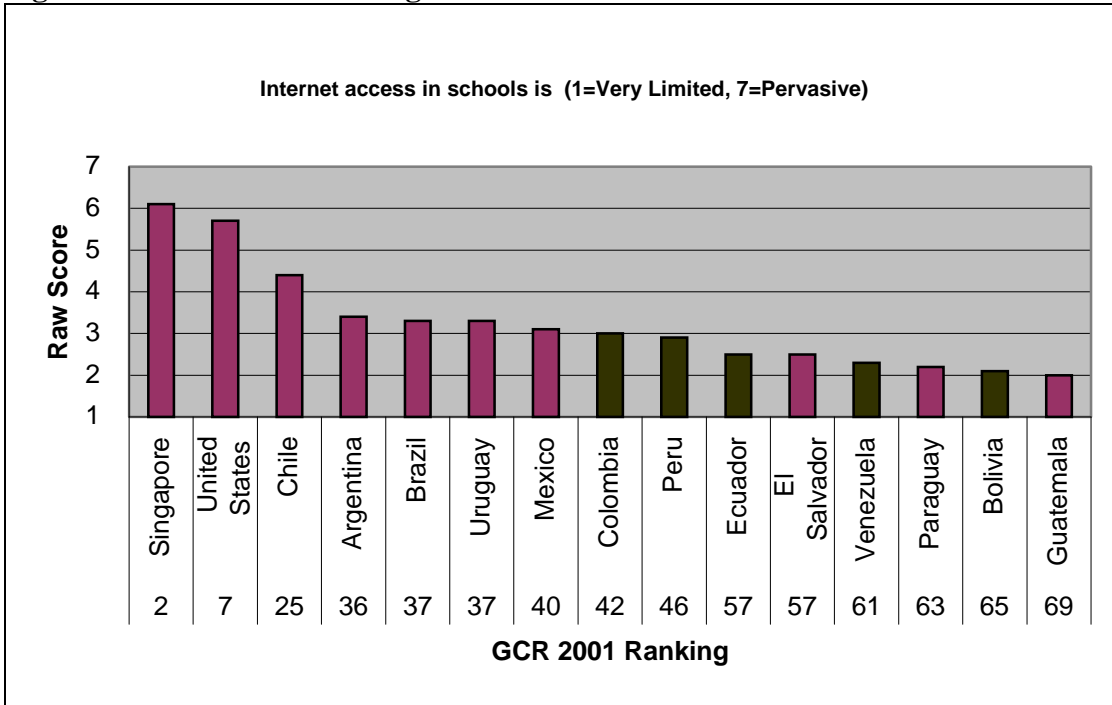
for these labs, but were also permitted to use them to generate additional income outside of school hours. Maintenance responsibilities and ownership of the equipment remains with the contractor. Through this program, the government was able to improve the ICT infrastructure in a cost-effective way while simultaneously supporting small, medium and large businesses.

Most nations have some programs or projects to incorporate ICTs into education, and some have legally mandated the budgets to do so. In Colombia, the goal of the Ministry of Education's New Technologies Program (*Programa de Nuevas Tecnologías*) is to install computer rooms in all of the schools of the country. During the first phase of the project, 757 computer labs were installed, teachers were trained, and software was provided. The second phase is slated to include free Internet access to the schools.

	<b>Table 2: Selected Government Approaches to ICT in Education</b>
<b>Bolivia</b>	No integrated plan or known public projects.
<b>Colombia</b>	"New Technologies Program" led by the National Education Ministry. Projects underway and leadership role by the Education Secretary from Bogotá. Several projects exist as part of "Connectivity Agenda" ( <i>Agenda de Conectividad</i> ) directed by the Ministries of Communications and Education. DELFOS
<b>Ecuador</b>	Isolated projects.
<b>Perú</b>	National Commission of New Technologies ( <i>Comisión Nacional de Nuevas Tecnologías</i> ), Ministry of Education. EduRED, <i>Plan Huascarán</i> .
<b>Venezuela</b>	Ministry of Science and Technology has an "Agenda for ICT in Education" and other projects.

Source: PAC IT Reports (2001)

**Figure 16: 2001 GCR Ranking in Internet Access in Schools**



Source: Global Competitiveness Report 2001

**Higher education and technical training**

Preparing a workforce capable of meeting the diverse needs of the knowledge economy requires different types of professional training. People must be able to access both advanced technical and theoretical preparation at the college and university level, as well training of a more vocational nature through polytechnics and other training venues. Programs in the former tend to be of a greater duration, are more limited in number, and more static in content, while the latter can be much shorter, are inherently more responsive to market demand, and can often be completed in conjunction with (and possibly supported by) current employers. Certification programs help make skill sets learned at private institutes more marketable.

Interaction between the private sector and academia is valuable for professional development. Yet academic programs often have limited contact with the private sector in comparison to their colleagues in the developed world -- who typically undertake sponsored research, consulting, professional internships and other forms of interaction that provide for information flows between the two sectors<sup>29</sup>.

Nur University  
<http://www.nur.edu/>  
 Higher education has the best ICT infrastructure and could be a great resource in working with teachers to use ICT effectively. Most colleges and universities engage in relatively few activities in the communities around them, but the Nur University in Santa Cruz,

<sup>29</sup> The 2000 GCR rankings for research collaboration listed Colombia at 40/59, Bolivia at 46, Venezuela at 48, Perú at 53 and Ecuador at 57.

Bolivia experience suggests that volunteer work can be a valuable personal and professional experience, while providing important services to the community. Nur University was initially concerned about student reaction against its community service requirement, but was pleasantly surprised at how well it was received. The administration was astonished when students continued their activities after meeting their initial obligations, and when other members of the university community sought the opportunity to undertake similar volunteer work.

### **Limited ICT training in the workplace**

Access to ICT in the workplace is improving somewhat, with large businesses being most likely to use ICT, but there remain very limited employer-provided ICT training opportunities. In Ecuador, less than 1% of the companies offer training, and those that do are primarily telecommunications and hardware companies<sup>30</sup>. There are a variety of contributing factors to this phenomena; including fear of “brain drain” to other employers or countries, limited financial resources (especially in small and medium enterprises), and little perceived value for ICT in the workplace. Furthermore, ICTs are not fully integrated throughout organizations.

Public sector support of ICT training (and necessary infrastructure) may be a wise investment in building human capital and organizational capacity and more research is essential to determine whether there is a role for policymakers in this area. Initiatives like Chile’s *Servicio Nacional de Capacitación* (SENCE)<sup>31</sup> have been very successful in sponsoring a wide range of worker training activities and similar programs may provide an opportunity to prepare people and organizations to use ICT more effectively.

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<sup>30</sup> PAC IT report Ecuador (2001)

<sup>31</sup> <http://www.sence.cl/>

## SOCIETY

### Key Insights

- Internet penetration in the region is very low
- Information on users is lacking
- Users tend to be male, students, wealthy and urban
- Limited relevant content is available online

### Key Opportunities

- Use radio to extend information access to rural and illiterate populations
- Create incentives for ICT training in workplace

### Overview

It is difficult to determine how networked a society is, both because actual numbers of Internet users are only estimations and so much of what matters is qualitative in nature. It must also be noted that due to the so-called Network Effect<sup>32</sup>, the value of the network can increase exponentially over a short period of time. **People, organizations and content online are mutually reinforcing**, and because Internet Time is so accelerated, communities can become networked societies in short order<sup>33</sup>.

ITU data estimates the percentage of users in the Andean region in the year 2000 was approximately 2%; a lower penetration rate than most of the hemisphere. Those numbers have increased significantly over the past few years, but remain low compared to the rest of the world. Internet penetration within the Andean region follows national per capita GDP, with Ecuador and Bolivia falling notably behind their wealthier neighbors. It is important to note that the **greatest disparities lie not between nations, but within them** -- users tend to be wealthy, educated, urban, young and male -- the minority of citizens, but the majority of Internet users. For example, although Bogotá has less than 20% of all citizens, it boasts over 60% of all Internet users. In Ecuador, surveys suggest that men and women are equal users, but men dominate elsewhere.

Many of the challenges to Networked World Readiness can be addressed fairly directly by building infrastructure, creating educational programs, or adopting legislative changes, but **success ultimately depends on whether or not society can devise valuable ways to incorporate ICT** into its functioning. If people do not believe that these tools are important for their employment, productivity, education, or happiness, they simply will not use them; further, ICT must deliver greater value than the costs associated with learning and using them – which are considerable and often higher outside of major cities. The optimal access method must also be compatible with the characteristics of the users – their level of written and spoken literacy, language preferences, and cultural traits.

The variation in needs, cultures, capacities, and resources makes it impossible to offer a single solution. What is required is a varied and inclusive approach that incorporates

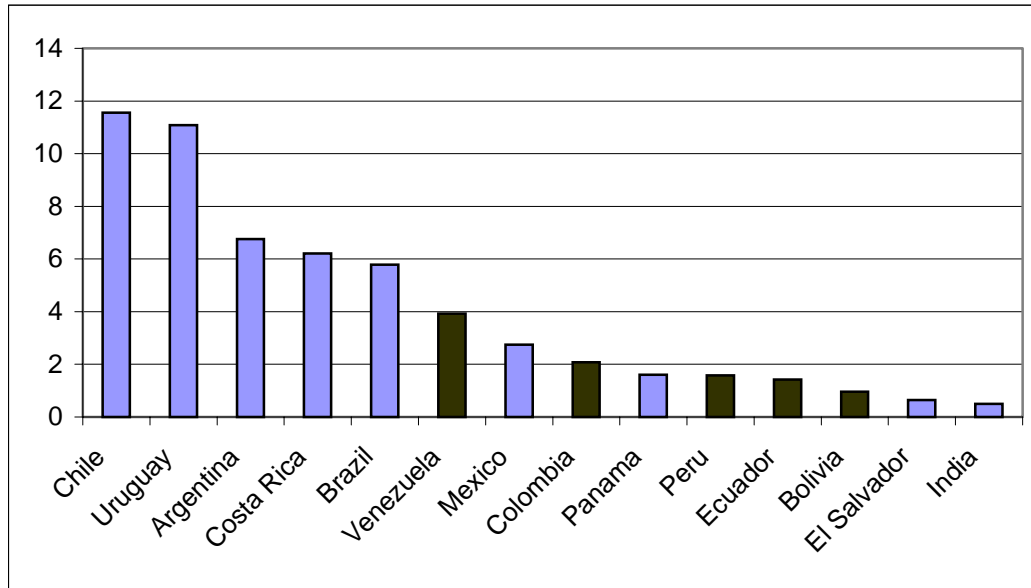
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<sup>32</sup> Also known as Metcalfe's Law, which suggests that the value of a network is the square of its number of nodes, thus causing large increases in value with relatively smaller increases in participants.

<sup>33</sup> China's already significant population of Internet users is estimated to be doubling annually.

ICT's capacity for flexibility and innovation, while capitalizing on the wide range of resources available to the different sectors. Technical innovations include user interfaces that rely on other metaphors than the Windows desktop, tools that allow users without keyboarding skills to interact with ICT, and the pairing of Internet with radio to allow illiterate and poor users at least some limited access to ICT.

**Figure 17: Internet Users Per 100 Inhabitants**



Source: International Telecommunications Union (2000c)

### Tracking use and users

Numbers of Internet users are imprecise at best, so we are left to use a variety of data sources including numbers of Internet subscribers, Internet hosts, cyber cafés, and national websites to better understand how much Internet-related activity is taking place in a nation. No one statistic gives a complete picture including important information about who is using ICT, what they are using it for, where they are using it, and so on. Yet where quantitative data are limited or nonexistent, qualitative information such as surveys or observation can still provide important insight.

Leaders need better information about the online population to understand where progress is being made and where it is lacking, and make decisions accordingly. Survey devices like those of *Instituto Nacional de Estadísticas e Indicadores* (INEI) in Perú are helpful in this regard and should be undertaken more widely. Private firms such as IDC and Pyramid Research compile proprietary data on the region, but not for all countries and for sale at substantial cost.

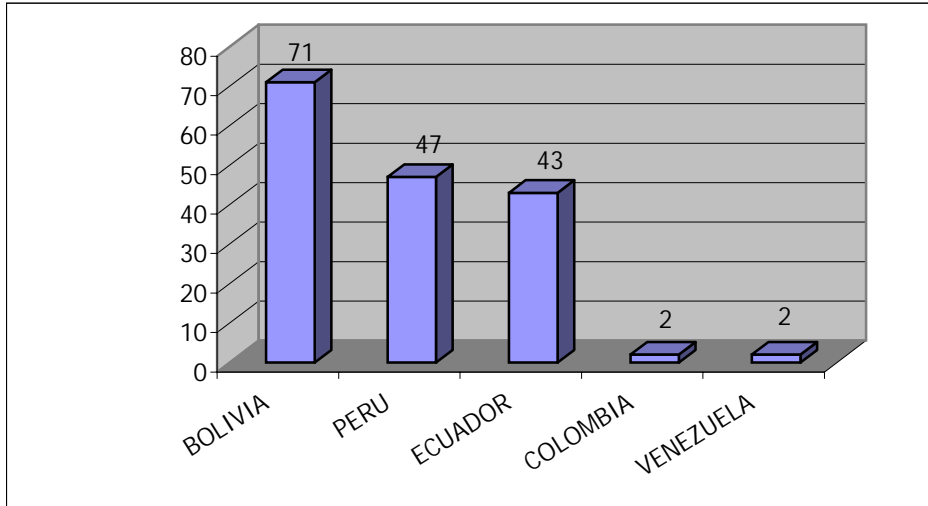
### Cultural diversity and technology

The Andean region has the fortune – and challenge – of being characterized by a diversity of indigenous cultures. Although Spanish is the official language, significant portions of the population speak native languages and little, or no, Spanish. These groups tend to be poor, less educated and live in rural areas. If they are not considered at the



core of any plan to create new opportunities through the use of ICT, we risk exacerbating the social and economic divides which already afflict much of Andean society. Effectively, this means that content should be created in Indigenous languages (if they are written languages) including educational information and user interfaces that are at least as familiar to a rural farmer as the Windows Desktop is to an urban businesswoman.

**Figure 18: Percentage of Indigenous Population in the Andean Region**



Source: International Labor Organization (2000)<sup>34</sup>

Many telecenter projects have addressed language, literacy, geography and ICT barriers by supplementing an Internet connection with local radio broadcasts. In rural Andean communities access to radio is very common due to the low cost of a receiver, capacity to run off battery power, and ability to target the interests and characteristics of the local populations. While radio does not have the same interactivity as the Web, this hybrid system retains valuable qualities of each. Citizens send in questions to the radio station, which in turn locates the response via then Internet, and then reads the answer over the air for the benefit of the entire community.

## **ECONOMY & GOVERNMENT**

### **Economy**

#### **Key Insights**

- Few e-commerce transactions and few statistics; B2B is more significant than B2C
- Lack of financial resources, managerial expertise, technical capacity, weak enforcement of consumer protection laws, credit card problems, limited cyber laws
- Lack of e-commerce culture, fear of fraud and poverty limit B2C
- Big businesses are leading ICT adoption
- Economic instability, low salaries and the lack jobs lead to brain drain
- Entrepreneurship is alive despite systemic challenges

#### **Key Opportunities**

- Facilitate the creation of new businesses
- Create better access to capital and markets
- Get the financial system on board
- Exploit the market advantage of 300 million Spanish speakers
- Create success stories -- entrepreneurship is happening everywhere
- Involve the diaspora network and existing human capital

While there is a great deal of enthusiasm around electronic commerce (e-commerce), it is still in a nascent state even in the more developed markets of Colombia, Venezuela and Perú. **Businesses have plans and are moving online, but are still at the early stages of understanding what ICT** might mean for them. Big businesses generally seem to be interested and willing to invest in e-commerce, while most of the small and medium enterprises are being left behind due to a combination of limited understanding of ICT, view of ICT as of little benefit, and lack of funding.

The Andean region needs to **leverage the capacity for innovation, dynamism and job creation that exists within its small and medium enterprises** (SMEs). One of the greatest opportunities that ICT provide is to allow smaller organizations to interact and compete like larger ones, by giving them access to new partners, markets and tools that were previously only available to large operations. For most of them, however, the technical and market risks of adoption are strong deterrents.

There is great interest and potential for the creation of technology-based businesses for both domestic and international markets, because as FEDESOFTE (the Federation of Colombian Software Producers) is fond of saying, "It costs less to export software than coffee." Despite numerous challenges, **new business initiatives are being launched in every nation**. Outsourced software coding for German companies is written in Venezuela, banking software is exported from Ecuador, and a technology provider for the insurance industry recently started in Bolivia. There are over 240 dot-com start-ups in Venezuela, despite the challenging business environment. Entrepreneurs and investors

are eager to start businesses and willing to take associated risks, but they need basic improvements in the business climate to do so.

With the recent ICT successes of Ireland, India and Singapore, it is clear that at least some of the promise of ICTs, to access new markets, overcome traditional barriers of distance, and do work efficiently in innovative ways, can be realized. By adopting a software and / or services center strategy, leaders can **promote and utilize the budding businesses already growing in the Andean region**. Creating even two high profile success stories in the region could have a major impact on its attractiveness as a place to invest and do business.

Without access to capital, however, the extent to which small or medium technology size businesses can grow is in doubt. Banks are known for offering money only to those who have it, and even then, at high rates, and neither venture capital nor the networks and expertise that often accompany it are common. A private equity fund designed to fill these shortcomings, targeting the pre-determined sectors, and adapted for regional needs could provide a much-needed infusion of capital, expertise, and connections.

### **Electronic commerce**

There is excitement around business-to-business (B2B) and business-to-consumer (B2C) e-commerce<sup>35</sup>, but the latter has more obstacles in the form of low consumer credit card penetration rates, fear of fraud and limited economic resources. While in the US, B2C is expected to account for approximately 20% of e-commerce; expectations for the developing world are of 10%, which is approximately the ratio observed in Perú and Venezuela in 2000 and 1999, respectively<sup>36</sup>. Much of the B2C that does take place is actually conducted with US-based businesses. There is little non-anecdotal information about e-commerce; in fact, some of the surveys conducted on e-commerce as part of the PAC were the first of their kind.

Consumers' desire to touch products before purchasing, fear of being cheated in an online purchase and mistrust of the distribution system are enough to discourage many. An IPCE survey conducted last year in Lima, found that while about 9% of the population has credit cards, only about 4% of them were willing to engage in any online financial transactions. In Venezuela, about 17% of Internet users reported purchasing something on the Web, more than half within the past three months. The long history of mail order catalogs, wide credit card availability, limited liability, and common use helped B2C grow in the US, but these characteristics are not shared in the Andean countries. However, given the level of entrepreneurship in the region, there is no reason to think consumers will not adjust to e-commerce and a tradition of acquiring on-line goods is initiated – if quality services and consumer protection are offered.

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<sup>35</sup> B2B is defined as commercial activity conducted electronically between two businesses, while B2C is conducted between a business and a consumer.

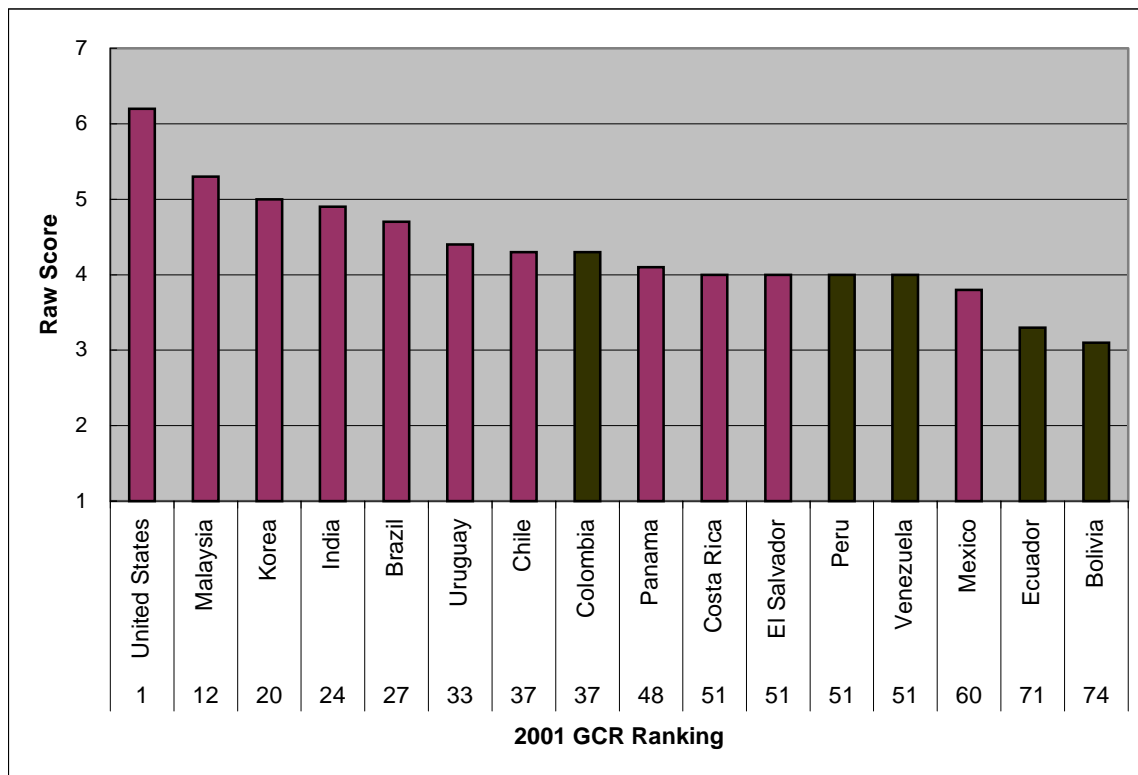
<sup>36</sup> According to the IT PAC Perú Report, *Instituto Peruano de Comercio Electrónico* (IPCE) calculated the year 2000 Peruvian B2C at \$10.9 million and B2B at between \$90 and 100 million. According to Forrester Research, in 1999 the Venezuelan B2C market was \$16 million and B2B was \$213mm. Jupiter Research found that of the total 1999 Latin American B2C e-commerce amount of \$194 million, Colombia had 4%, Perú had 3% and Venezuela had 2%.

**Insecure business climate**

The most serious deterrent to e-commerce is not technology-related, but rather due to the general business climate. In particular, the perception and reality of difficult economic times and instability - which result in people moving abroad, inadequate access to venture capital<sup>37</sup>, and a host of infrastructure problem make business environments unappealing<sup>38</sup>, not competitive<sup>39</sup> nor dynamic.

Many decry the lack of cyber laws<sup>40</sup>, but the level of protection they would offer is unknown given the limited effectiveness of most Andean legal systems. It should be noted that there were no cyber laws in force in the US when e-commerce began its boom and since the digital signature law was passed in Chile, it has seen virtually no further use. Because the process of passing the laws and implementing regulations is onerous, it may be more effective for the private sector to begin by self-regulation, and “pull” rather than “push” necessary legislation.

**Figure 19: 2001 GCR Ranking in Support of Legal Framework for Online and IT Businesses**



Source: Global Competitiveness Report 2001

<sup>37</sup> 2000 GCR ranks all the Andean nations at 54/58 and below for access to venture capital.  
<sup>38</sup> One Bolivian entrepreneur told of it taking six months to legally change his company’s address.  
<sup>39</sup> 2000 GCR ranks Perú at 36, Colombia at 50, and Bolivia, Ecuador and Venezuela last for competition in local markets.  
<sup>40</sup> Colombia, Venezuela and Perú have passed cyber laws, and they are in varying stages of implementation.

**Table 3: 2000 GCR Ease of Establishing a New Business**

Ranked by country from 1 = easiest, to 59 = most difficult

	<b>Ease of Starting a New Business (General)</b>	<b>Economic Ease of Starting a New Business</b>	<b>Financial Ease of Starting a New Business</b>	<b>Administrative Ease of Starting a New Business</b>
<b>Bolivia</b>	52	50	50	26
<b>Colombia</b>	54	55	55	33
<b>Ecuador</b>	58	57	59	56
<b>Perú</b>	53	54	56	28
<b>Venezuela</b>	57	58	51	50

Source: Global Competitiveness Report 2000

### **Financial sector**

While the financial system is a key element for successful e-commerce, only in Colombia has the financial sector attempted to take a leadership role. Its banks have both been forward looking in the way they use ICT and the types of services they offer to their clients. As part of that leadership, automatic teller machines are widely used, there are about two million debit cards, eight million credit cards, and banks support utilities payments by phone. Venezuela has at least two banks that facilitate e-commerce transactions, while Ecuador is the only country in the region that does not allow e-commerce transactions.

### **Institutional innovations**

The Peruvian regulator OSIPTEL helped create the IPCE, the *Instituto Peruano de Comercio Electrónico* (<http://www.ipce.org.pe>) to focus on the discussion, diffusion and promotion of e-commerce, integrating business, consumer and government perspectives through its diverse membership. The Colombian Institute for the Development of Science and Technology (Colciencias) created *Centro de Apoyo para las Tecnologías de Información* (CATI) to support the local software industry through its cooperation with universities, business and technology centers located around the country and around the world.

### **Improving the business climate**

Governments need to simplify the process of starting and running new businesses, so that entrepreneurs can take their ideas to the market quickly and focus on the business, rather than on the bureaucracy<sup>41</sup>. The regulatory environment should also be supportive of the e-commerce industry, recognizing that traditional labor laws, for instance, might be an impediment to high technology start-ups. By facilitating the emergence of innovative new companies, people and organizations will gain much-needed experience quickly and the sector can grow and become more competitive. Job creation at small and medium businesses requires much less than it does at larger firms, so in addition to creating a

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<sup>41</sup> Various Bolivian ISPs estimated that they spend 25-50% of their time dealing with the government.

more dynamic economy, start-ups can also be an efficient way to generate employment. At the same time, there is a need to create initiatives that stimulate and support entrepreneurship, such as development of venture capital, training, incubators, and other incentives for ICT businesses<sup>42</sup>.

## **Government**

### **Key Insights**

- All countries have some government presence online
- Most government websites are static and only offer information
- Most countries do not have a unified strategy

### **Key Opportunities**

- Promote reform and innovation
- Foster ICT-innovation in government functioning
- Develop a regional resource base for integrating ICT in government
- Support assessments of government use of ICT
- Explore private sector delivery of e-government services

Governments in the Andean region suffer from serious institutional challenges and deficits, and the effective implementation of electronic government (e-government) should be a part of addressing these problems. Advancing general reforms, including the **creation of a service mentality within government**, is the larger goal. E-government heralds many important improvements: increased transparency and accountability; improved services, including rural and anytime access; time and cost savings; creation of relevant content to encourage ICT use; and sending a signal to investors about state commitment to modernization. In order to achieve maximum benefit, however, a combination of institutional change and process innovation is required<sup>43</sup>.

Some governments recognize the opportunity afforded by putting their operations online but are also aware of the related complications. They face major obstacles including their citizens' limited ICT access, lack of inter-institutional coordination within government<sup>44</sup>, funding constraints, the complications of bureaucratic reform, lack of technical and managerial expertise, and the many other difficulties encountered in government that are not ICT specific.

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<sup>42</sup> Taiwan offers a seven-year tax holiday to any high technology business that invests over \$1 million.

<sup>43</sup> *Eight Imperatives for Public Leaders (2000)*.

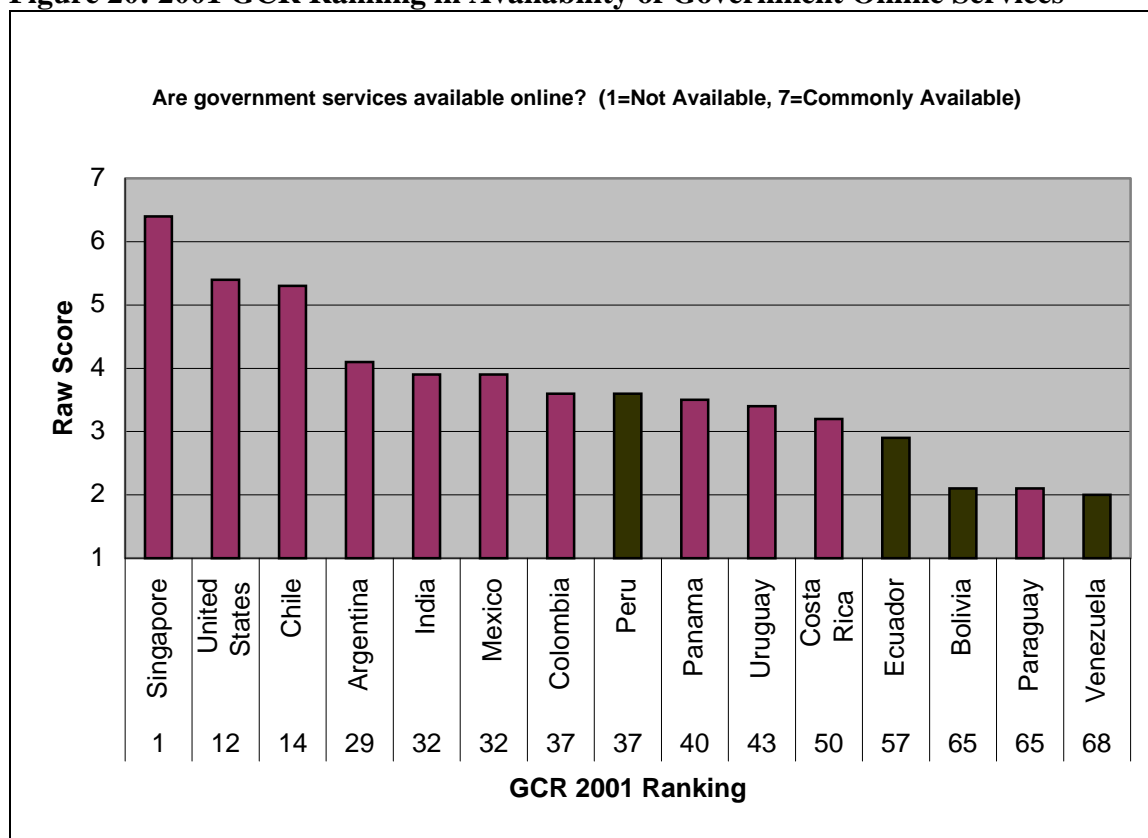
<sup>44</sup> Except in the case of Colombia, which successfully created technical standards across government.

**Table 4: Selected Electronic Government Efforts**

<b>Bolivia</b>	<b>Colombia</b>	<b>Ecuador</b>	<b>Perú</b>	<b>Venezuela</b>
National libraries online	Most structured government online initiative in the region	Little standardization or coordination among agencies	Newly released portal, but mostly static sites	Over 200 gov.ve sites
Online tax payments	All agencies online in standard format	Sites are static and not interactive	Ministry of Finance put spending online	Static websites, no central planning process
National Statistics Center offers online statistics	Plans for e-procurement and services online	Online tax payments	Customs allows online submission of tariff payments, questions and reports of irregularities	Further investment and government reform are needed for implementation
National Congress offers laws and regulations online	Part of integrated National Connectivity Agenda		Online tax payments Fine payments through ATMs	

Source: PAC IT Reports, 2001

**Figure 20: 2001 GCR Ranking in Availability of Government Online Services**



Source: Global Competitiveness Ranking 2001

### **Evaluating and designing electronic government**

In considering e-government initiatives, governments would benefit from approaching the situation as though they were a business, offering a new line of services or products. They would need to begin by defining their core reasons for change, understanding the major driver for government action -- competing, cost cutting, popular/business demands, and so on. Governments need to ensure that there is adequate demand for the services they would offer and understand the characteristics of potential users, to best target them.

Governments must consider their own managerial, technical and political capacity to successfully complete the project they are evaluating, and what activities the private or non-profit sector could potentially provide. Given the high level of corruption and the limited technical capacity in the region, it could be more effective for government to outsource service delivery to the private sector, which is considered to be relatively less corrupt and more competent<sup>45</sup>.

### **Limited user access**

Due to the large gap of ICT penetration between rural and urban areas, rich and poor, and educated and not, government will have to provide access to users, or support others who do (as mentioned under telecenters) to enable the usage of e-government services. Not only is it essential to ensure that the audience for those services can access them, but it is important to continue to serve citizens who reach government through traditional means (ideally improving traditional service). Otherwise when service improves for those with ICT, the rest are effectively penalized.

### **Implementation**

Creating an e-government vision and driving it forward requires a great deal of leadership and support from the upper echelons of government, as well as significant work at the lower levels. Success in an e-government project is often a function of managerial structures within government (the nature of its bureaucracy) and flexibility in decision-making (how jurisdictions are divided). Within the private sector, there is a common and clearly stated goal to maximize the economic well being of the organization. Within government, however, motives are often less clear and more narrow in scope -- meaning that the search for more jobs, protection of jurisdiction, or allocation of resources may sometimes come into conflict with efficiency gains and the stated goals of the project. Unless government initiatives account for and work around these conflicting motives, their success will be in jeopardy.

Peruvian Ministry of Economy and Finance (MEF)

<http://www.trasparencia-peru.gob.pe>

The government took a major step forward in transparency by placing its financial transactions online. As part of an inexpensive and low profile effort, the MEF used dial-up connections to make real-time information about its financial accounts available to

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<sup>45</sup> For relative competence of public officials (as compared to the private sector), the 2000 GCR ranks Ecuador 44/59, Perú 51, Colombia 54, Bolivia 57, and Venezuela 59.



anyone with Internet access. While the project enjoyed support from the MEF, it was not publicized among other areas of the government.

Experience around the world demonstrates that there is no one correct way to implement e-government initiatives, but rather lessons to be learned that will inform decisions and actions during the process. Common sayings include, “Think big, start small, scale quickly,”<sup>46</sup> and “Go for the low hanging fruit” (such as procurement, online tax payment, online forms and services). That advice has emerged from observing the contrast between a combination of successful small projects with big-impacts, and failed attempts to elaborate an integrated national IT plan and agree on a common platform and standards. Although a government-wide plan can reap the benefits of integration of all government agencies, it may delay the process too much to be worthwhile. Ultimately, the appropriate strategy will depend on the goals and leadership of the initiative and the context in which it exists.

#### *Agenda de Conectividad*

With the 1998 creation of the *Agenda* (National Connectivity Agenda)<sup>47</sup>, Colombia became the first (and only) country in the region to design and implement an integrated public agenda for the spread of ICT (the *Agenda* was actually part of a larger plan to promote peace). As one component of the strategy, and part of the current President’s “Fight against corruption,” Colombia began its e-government efforts. One of the *Agenda*’s principal achievements is the Internet presence of over 80% of public agencies, including all the major ministries. The *Agenda* created a network of people both in the central agency and within each public agency, and a website to assist agencies in designing and creating their web pages<sup>48</sup>. The first phase also included important guidelines in order to ensure a uniform service in terms of design, information required on the page, frequency of updates, and maintenance. The principal challenges to the *Agenda* emerged due to limited availability of funds for the initiative, and the complicated task of helping organizations to understand the potential impact of e-government at a strategic level.

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<sup>46</sup> KPMG Consulting - Public Services

<sup>47</sup> The *Agenda* is available online at  
<http://www.directiva02.gov.co/Documentos/Conpes%203072%20-Agenda%20de%20Conectividad-1.pdf>

<sup>48</sup> <http://www.directiva02.gov.co>

## Network Policy

### Key Insights

- National ICT plans are increasingly common
- Regulatory environment is lacking
- Privatization effectively replaced public monopolies with private monopolies, inhibiting competition
- Periods of exclusivity ended recently in Perú, Venezuela and Bolivia

### Key Opportunities

- Promote multi-sectoral working groups to advance ICT initiatives
- Regulations should be clear and evenly enforced; protecting competition not competitors, focusing on market dynamics not market design
- Create independent and effective regulators
- Support recent and planned *apertura*
- Encourage better telecom services for smaller cities and rural areas
- Finance innovative ICT use by business, government, education, NGOs and academia

### Overview

**Network policy is the underpinning of ICT Readiness and a networked economy.** Along with the related business and economic context, the policy environment affects virtually everything that drives ICT use. It can help (or hinder) competition; quality, price and availability of network access and service; investment in networks and related businesses; consumer confidence in online transactions; and myriad other areas of Readiness. The policy environment is comprised of areas that are explicit to ICT use, such as cyber laws, telecoms regulation and ownership as well as broader policy areas that affect the general business climate (covered in the Economy section).

Governments must develop a holistic understanding of the diverse factors affecting ICT-use, and work with other actors in the community to develop an integrated and self-reinforcing approach to succeeding in the Networked World. In conducting workshops in the region, it became clear that there is a **strong motivation across all sectors to participate in designing and implementing Networked World Readiness initiatives.** The synergies arising from a multi-sectoral approach are fundamental for success due to the interdependence of each sector, the interactive nature of the challenges and overall resource limitations.

The environment of political and economic instability (real and perceived) is a major obstacle to use of investment in ICT. Privatizations have been derailed by popular protest, investment in ICT has been inhibited, and professionals have emigrated – taking their business ideas and skills with them. Regardless of the quality of ICT-related initiatives and market reforms, success will be inhibited as long as these other concerns persist.

**The Andean region has made significant steps in the area of market and regulatory reform** over the last decade, but **still requires significant change.** As part of the

privatization process, government monopolies have effectively become private monopolies, yielding initial new investment and service improvements, but not creating genuine competition. Privatizations led to decreased waiting periods for telephones in Perú, Venezuela and across the continent<sup>49</sup>, but the lack of competition has allowed prices to increase, making telephone access too expensive for the majority of the population.

There is more competition in the area of new services such as mobile telephony, Internet and paging. In some countries, however, problems have arisen where the dominant phone provider is also an ISP, and therefore reluctant to offer a high level of service to its competition. Peering, access to facilities, service quality and cross-subsidy are common problems. In Ecuador, ISPs are only allowed to provide dial up services, thus eliminating them from serving many lucrative business clients. Some insights for the Andes are offered by Brasil's approach to privatization of Telebras that prohibited any of the new owners from becoming ISPs, thus opening the doors to fair competition between ISPs.

### **National ICT policy**

Andean governments have taken varied approaches to generating national activity around ICT, including everything from an integrated national ICT plan like the Colombian *Agenda*, to the Venezuelan decree<sup>50</sup> which made ICT a national priority (and associated projects). In relation to its income level, Perú has a significant level of private and nonprofit sector participation in development of ICT in the country, and has recently put forth e-Perú. There are varied government projects underway in Bolivia, with plans for a more integrated national strategy being advanced by a multi-sectoral group<sup>51</sup>. Although Ecuador remains at an early stage, it is advancing quickly with the introduction of the *Agenda de Conectividad* in late 2001, and benefiting from widespread interest the ICT initiative.

Creating a national strategy to promote the appropriate use of ICT is a challenging process for which there is no standard formula, as each situation requiring its own mixture of initiatives<sup>52</sup>. While there are some areas such as the telecommunications and business environment that require government to take direct action, other areas may require a mixture of public and private leadership and action. In other areas still, the private sector, academia and/or non-governmental organizations may be best equipped to lead the efforts, with government playing a supporting role. It is incumbent upon government to determine where its leadership is essential to catalyze efforts (in the case

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<sup>49</sup> ITU America's Telecommunications Indicators (2000).

<sup>50</sup> *Decreto 825 (Gaceta oficial No.36955, May 22, 2000)*, "It is declared the access and use of internet as a priority for the development of Venezuela".

<sup>51</sup> Begun with the idea of joining the MIT Media Lab and CID's Digital Nations Consortium, and continually evolving.

<sup>52</sup> The Information Society of Brasil's *Livro Verde* is an excellent example of a cooperative approach to ICT planning.

of a diffuse private sector<sup>53</sup>), and where it is best left to other actors, with the government playing a supporting role.

One consistent problem is that government approaches tend to not adequately account for private sector experiences, and thus omit key elements of strategy. While Colombia's *Agenda* is the most holistic strategy to date in the region, private sector representatives felt only tangentially involved; their input was not fully considered, and they were not involved in the resulting initiatives even though they expressed willingness to participate<sup>54</sup>. In Venezuela, CONATEL's public consultations fell far short of private sector expectations for interaction. A series of multi-sectoral groups in Perú are currently preparing advice for the incoming presidential administration with respect to a national ICT agenda<sup>55</sup>.

### **Enforcement**

There are widespread complaints by ISPs of unclear and unevenly enforced regulations in the Andes that allege bias, inefficiency, and ineptitude on the part of the regulators. In the past, Andean governments owned and ran telecom companies, eliminating the need for a regulator in the modern sense, and as a result, today's regulators face challenges due to their institution's inexperience and lack of independence from government and business. These deficits occur in the midst of the Andean governments' learning process around effective privatization and liberalization, and the constant tension between generating state income from telecoms and creating a dynamic telecoms sector.

Furthermore, many of the international telecommunications giants they are trying to regulate (Telefónica and Telecom Italia, for instance), have vast financial resources, play a disproportionately powerful role within the national economic structure, and have extensive experience around the world both as dominant players and new entrants.

Compounding the problem is that regulations themselves are often unclear, with some rules not enforced and legal uncertainty surrounding common practices<sup>56</sup>. Technology convergence issues have begun to exacerbate existing regulatory confusion, and will continue to present a challenge to regulators with the increasing convergence of services (ISPs and cable television, for instance). There are a number of institutions that may be drawn upon to help bolster government capacity to effectively create and enforce regulations for the telecoms sector<sup>57</sup>.

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<sup>53</sup> In countries where the local market has less power to lead the spread of the ICTs, initiatives (such as PROMPEX in Perú and CORPEI in Ecuador) providing orientation to small and medium enterprises on using the Internet for export are valuable in promoting e-commerce.

<sup>54</sup> The participants in the Colombian workshop, for instance, were eager to support and participate in national Readiness initiatives.

<sup>55</sup> *Universidad de Pacífico* and CID are participating in this process.

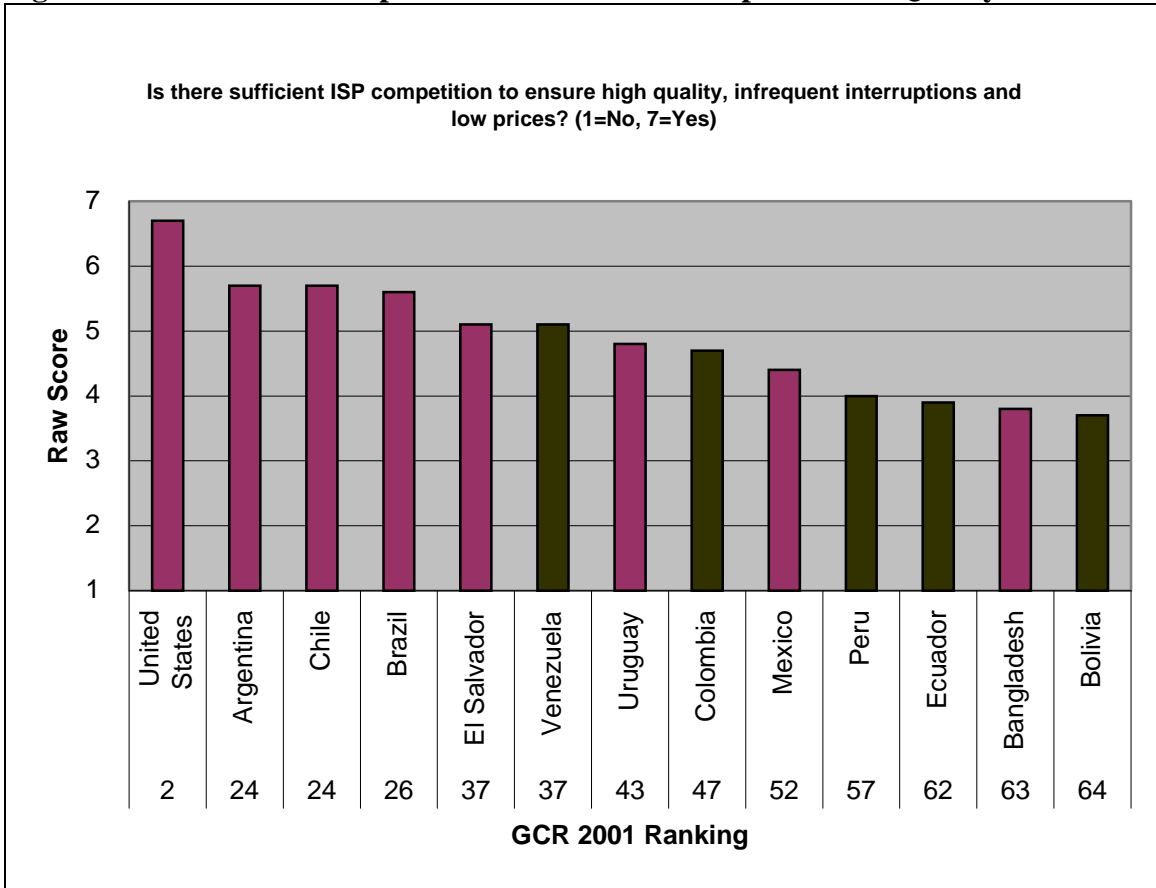
<sup>56</sup> In Bolivia, ISPs disagreed over whether downloading information from the web via satellite was permissible, but agreed that that the regulation was neither clear nor enforced.

<sup>57</sup> Technical support may be available through the International Telecommunications Union (ITU), World Bank, Inter-American Development Bank, *Comité Andina de Autoridades de Telecomunicaciones* (CAATEL), *Foro Latinoamericano de Entes Reguladores de Telecomunicaciones* (REGULATEL, note that Perú is not a member), and other feedback

**Interconnection**

Interconnection regimes have not been effective at creating the intended competitive environment in the region. Dominant providers have created extra difficulties for the new entrants with the actual connection, the type or quality of line provided, or its cost. These problems are common in the case of Bolivia (where cooperatives are also ISPs, and the regulator is widely viewed as captured), Perú (where Telefónica del Perú is reported to have influence over the regulator) and Venezuela (where the two main ISPs control at least 80% of the market).

**Figure 21: 2001 GCR Perception of Effect of ISP Competition on Quality and Price**



Source: Global Competitiveness Report 2001

**Privatization and competition**

The pace and extent of reform in the Andes has varied greatly between nations due to economic and political factors, although most markets are now liberalized -- at least on paper. Colombia has a state-owned telecommunications provider, and Perú has opened all aspects of its market. The results from Venezuela’s November 2000 opening and Bolivia’s 2001 opening are unclear at this stage. Ecuador is planning to invite the

possible through the *Asociación de Empresas de Telecomunicaciones la Comunidad Andina (ASETA)*.

participation of foreign partnerships in its two main telecoms, and has delayed privatization for the time being.

The state of the competition also varies across the Andean countries and across sectors, with a general lack of competition in local and long distance telephony, and much more dynamic markets in wireless and niche services. Perú is widely held to have the most competitive telecoms market, although Telefónica del Perú remains dominant in most services. Bolivia offered temporary exclusivity to Telecom Italia to increase the attractiveness of Entel's capitalization, while allowing local cooperatives to strengthen themselves against future competition. ENTEL's services have improved during that period, but as the *apertura* approaches, ENTEL is directing its attention to the more profitable business services than citizens. For their part, many of the smaller local cooperatives (including COTEL in La Paz) remain non-competitive and in grave danger of failing when the market opens.

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