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63. Strategies for Bridging the Internet Digital Divide in Peru: A Benchmarking of South Korea and Chile

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Abstract

The Internet has become a catalyst of the global economy. Developing countries are lagging behind developed countries due to unequal access to the Internet and other information and communication technologies (ICTs). Governments are challenged to establish adequate strategies to reduce this gap and achieve the inclusion of their citizens. In this context, developing countries could leverage on adequate Internet-gap-reduction strategies to boost economic growth and development. The present study attempts to make an analysis of the Internet-related policies adopted by Chile, which is a leading country in South America; and by South Korea, which is a leading country in the world. We gathered data from secondary sources related to the process of digitalization in both countries. The collected data was processed and a PEST (political, economic, social, and technological) analysis was conducted for Peru to determine which actions can be taken to bridge the Internet digital divide in this country. The results shed light on the complexity of this phenomenon, which depends not only on access, but also on intensity of use and skills. Implications for policy makers are discussed.

Key words

Strategy, inclusion, digital divide, Internet

1. Introduction

The Internet has become a catalyst of the global economy, where developed countries, big economic power, and high Internet penetration are associated (Fink & Kenny, 2003; UNDP, 2001). Indeed, a 'New Economy' is emerging due to the development of information and communication technologies (ICTs) in general and the Internet in particular (OECD, n.d.). These technologies have disrupted the way we work and live, and have become an important driver of economic growth. However, if not properly promoted, these same technologies may act as a source of exclusion, because those who are disconnected may be unable to participate in this modern economy (OECD, n.d.). In this context, developing countries are lagging behind developed countries due to unequal access to the Internet. This gap, known as the digital divide, has been challenging governments, which have been searching for potential strategies to overcome this problem.

Given the importance of this phenomenon, the digital divide has received considerable attention among researchers. From a literature review, we found that previous studies mostly focused on quantitative methods to study the digital divide. For example, at the individual level, research has found that the variables of demographics, use, and expertise have a significant impact on Internet

use (e.g., van Deursen & van Dijk, 2014; Peter & Valkenburg, 2006; Livingstone & Helsper, 2007; Vigdor et al., 2014). These results are in line with Venkatesh and Sykes' (2012) work which found a significant association between technology use disparities with differences in respondents' incomes. Likewise, at the global level, Chin and Fairlie (2007)—by using quantitative methods—found that the digital divide is correlated with income and regulation differences across countries. On the other hand, also by relying on quantitative methods, Brandtzaeg et al. (2011) and Goldfarb and Prince (2008) identified and categorized patterns of Internet use, while van Dijk (2006) and Barzila-Nahon (2006) based their studies on measurement issues of the digital divide. Although van Dijk's (2006) study has highlighted the need for qualitative research on the digital divide, few studies have used these methods to conduct research in this field (e.g., Twonsend et al., 2013, highlights the importance of the role of broadband technologies in bridging the digital divide in rural areas, while discusses the challenges of deploying these technologies in such areas). In short, this literature review suggests that the digital divide may bring disparities in terms of income not only at the individual level but also at the global level. Therefore, it is important that governments implement adequate strategies to reduce this gap.

In spite of these research efforts, there is a lack of guidelines of best practices that may help developing countries to bridge the Internet digital divide. The purpose of our study is to fill this gap in the literature. Our study aims to provide developing countries with a set of potential strategies for bridging the Internet digital divide based on qualitative research. These countries may leverage on these guidelines to improve their Internet penetration and the associated levels of economy and development.

2. Conceptual framework

2.1 The Internet Digital Divide

'Digital divide' is defined by the OECD as the "gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard both to their opportunities to access ICT and to their use of the Internet for a wide variety of activities" (OECD, 2001). Accordingly, this phenomenon was addressed at three levels: *individual* (Akhter, 2003; Rice & Katz, 2003), which refers to the gap between people; *organizational* (Forman et al., 2005; Riggins & Mukhopadhyay, 1994), which refers to the gap between companies; and *global* (Chinn & Fairlie, 2007; Dasgupta et al., 2005), which refers to the gap between countries. In addition, the International Telecommunications Union (ITU) refers to this gap as a multidimensional concept made up of three inequalities: *access*, which refers to the difficulty in having networks and computers; *intensity of use*, which refers to the time people use the Internet; and *skills*, which refers to the ability to use the Internet or lack thereof (ITU, 2013). Our study is limited to the global level and fixed Internet service because it analyzes the three types of inequality among countries with regard to this service.

2.2 Targeted countries: Peru, Chile, and South Korea

Peru is a developing country located in South America, which has one of the lowest Internet penetration rates in the region—just 20.2% of households had an Internet connection by 2012 (ITU, 2013). Chile is also a South American country but is one of the leading countries in the region in terms of Internet penetration—45.3% of households with Internet connection by 2012

(ITU, 2013). On the other hand, South Korea is an Asian country which was one of the poorest countries in the world after the Korean War in 1960 with a GDP per capita lower than US$100 (ITU, 2003). By adopting adequate strategies, South Korea achieved rapid development: (1) by 2012, South Korea led the world in terms of Internet penetration; about 97.4% of households had this service (ITU, 2013), and (2) this country achieved a GDP per capita of US$22,590 in the same year (World Bank, n.d.). Therefore, Chile and South Korea were selected as benchmark countries in our study. Figure 1 shows our conceptual framework, while Table 1 displays a country comparison.

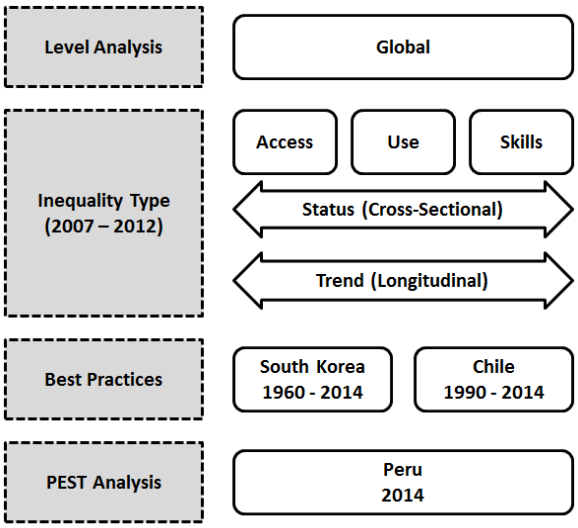


Figure 1. Conceptual Framework

Status by 2012[1]	Peru	Chile	South Korea
Estimated population (millions)	30	17	49
Size (km^2)	1,285,216	756,102	99,720
GDP per capita (PPP$)	10,700	18,500	32,400
Fixed telephone lines per 100 inhabitants (%)	11.5	18.8	61.9
Mobile telephone lines per 100 inhabitants (%)	98.8	138.5	110.4
Percentage of houses with Internet (%)	20.2	45.3	97.4

Table 1. Country comparison

3. Methodology

3.1 Internet digital divide measurement

Santoyo (2003) established that there is no single indicator to measure digital divide. Indeed, authors have used different indicators to address this gap. In our study, we will focus on the ICT Development Index (IDI) for access (IDI-access), use (IDI-use), and skills (IDI-skills). These indicators have been widely used by the ITU to measure the three dimensions of digital divide. These indicators are measured on a scale of 0 to 10 (ITU, 2013).

[1] Source: ITU (2003); World Bank (n.d.)

3.2 Data collection and analysis

In the present study, secondary sources will be used for data collection as follows:

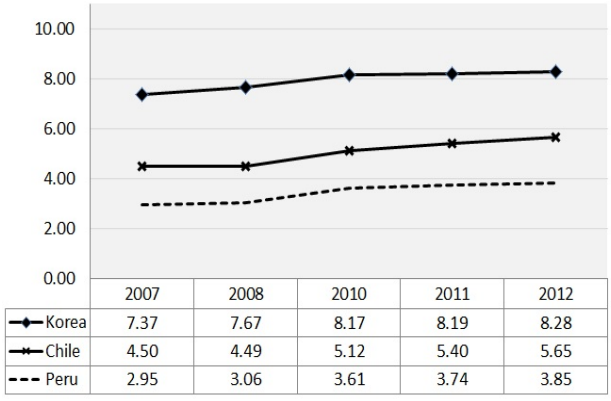
- Internet indicators: ITU website (http://www.itu.int/en/ITU-D/Statistics/)
- Best practices of South Korea: Official websites of South Korea (e.g., http://www.kcc.go.kr/)
- Best practices of Chile: Official websites of Chile (e.g., http://www.subtel.gob.cl/)
- Situation of Peru: Official websites of Peru (e.g., http://www.mtc.gob.pe/)
- These sources will be complemented with other sources such as reports.

The current Internet status of the countries was analyzed through descriptive statistics, while the trend of the gap between countries was analyzed using the Orbicom method proposed by the ITU (for a review, see Orbicom, 2003). A case study methodology was used to identify how South Korea and Chile achieved their current Internet penetration levels. By targeting two reference countries, we attempt to enhance the external validity of our findings. Finally, a PEST analysis was conducted to determine how the best practices of these countries could be applied in Peru.

4. Results

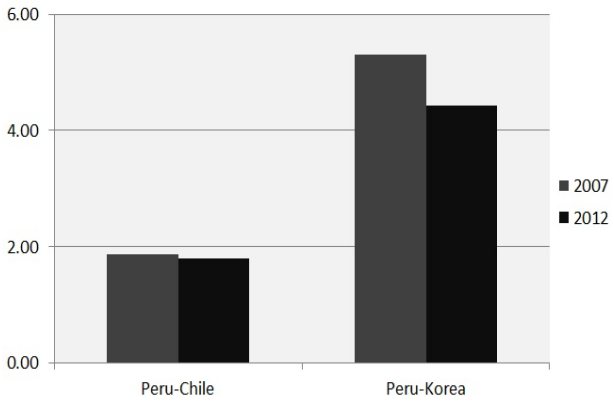
4.1 Internet digital divide analysis

To fully understand the digital divide trend, we propose a longitudinal and cross-sectional study between our targeted countries, which is consistent with Choi's (2010) recommendations. All data in this section were gathered from ITU (2009, 2010, 2011, 2012, 2013). In case of the access dimension, Figure 2a shows the evolution of the IDI-access from 2007 to 2012 for the three countries. Although this indicator is increasing over time, growth speed seems to be low. From a further inspection of this figure, it is clear that Peru is behind others with an IDI-access value of 3.85 (out of 10), while the IDI-access values for Chile and South Korea are 5.65 and 8.28, respectively. On the other hand, Figure 2b shows that the gap between Peru and South Korea is shrinking, while the gap between Peru and Chile has remained almost invariable.



	2007	2008	2010	2011	2012
Korea	7.37	7.67	8.17	8.19	8.28
Chile	4.50	4.49	5.12	5.40	5.65
Peru	2.95	3.06	3.61	3.74	3.85

(a)



(b)

Figure 2. Access Dimension

Likewise, Figures 3a and 3b describe the use inequality dimension of the digital divide. These figures suggest that the trend of IDI-use is similar to the trend of IDI-access. However, differences between countries seem to be considerable. South Korea is ahead of Chile, while

Chile is ahead of Peru with IDI-use values of 8.22 (South Korea), 3.67 (Chile), and 1.63 (Peru). Moreover, these figures suggest that the gap between Peru and South Korea is decreasing over time, while the gap between Peru and Chile is increasing. This result suggests that Peru is lagging behind in the region.

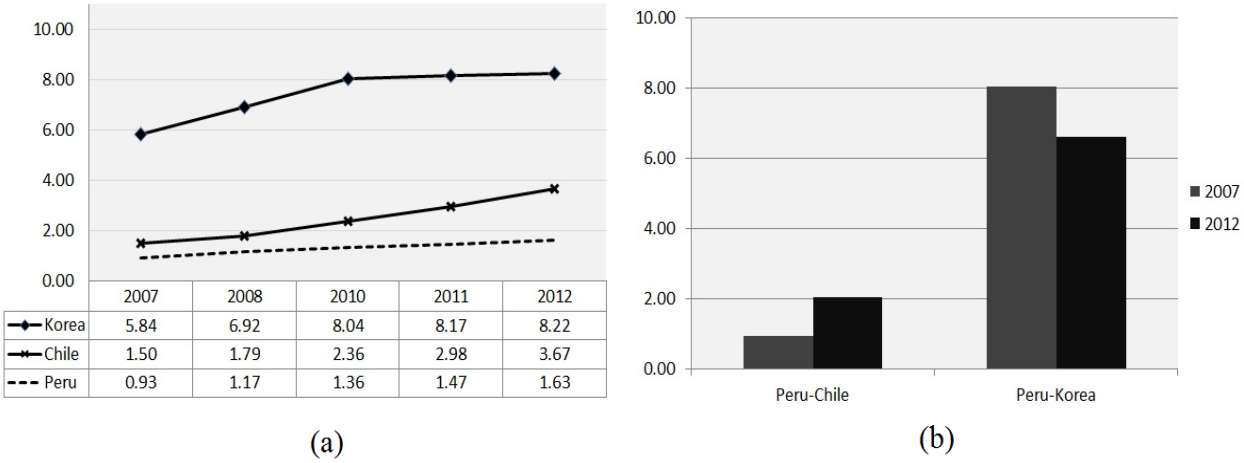


Figure 3. Intensity of Use Dimension

Finally, Figure 4a shows that the trend of IDI-skills does not present considerable changes over time, and that differences across countries are not high. However, this figure shows that Peru is also behind Chile and South Korea in this dimension. Peru, Chile, and South Korea present IDI-skills values of 7.45, 8.64, and 9.86, respectively. Additionally, Figure 4b shows that the gap between countries (Peru-South Korea and Peru-Chile) tends to increase over time.

4.2 South Korean best practices

4.2.1 Access inequality

In 1994, KT was the first operator to launch the Internet service in the South Korean market, using ISDN[2] technology. By 1995, the Internet reached just 1% penetration (ITU, 2003). By that time, the South Korean government recognized the existence of gaps between people living in urban and rural areas. Considering that most people living in rural areas were engaged in agriculture and fishing activities, it was the Ministry of Food, Agriculture, Forestry, and Fisheries (MIFAFF) that started to provide free Internet connections to these areas.

In 1998, Thrunet launched its Internet broadband service using Cable Modem technology. This new trend encouraged the South Korean government to deploy adequate infrastructure. South Korea launched the Korea Information Infrastructure (KII) initiative, which was deployed from 1995 to 2005. This initiative brought together public, private, and R&D sectors with the goal of building a nationwide high-speed backbone. This initiative was divided into three stages: *KII Government* (KII-G), deployed by the government to provide Internet service to government institutions, educational institutes, and research centers; *KII Public* (KII-P), deployed by the

[2] Integrated Services Digital Network

Internet service providers (ISPs) to offer this service to potential end users; and *KII Testbed* (KII-T), which conducted research on suitability and feasibility of future Internet technologies.

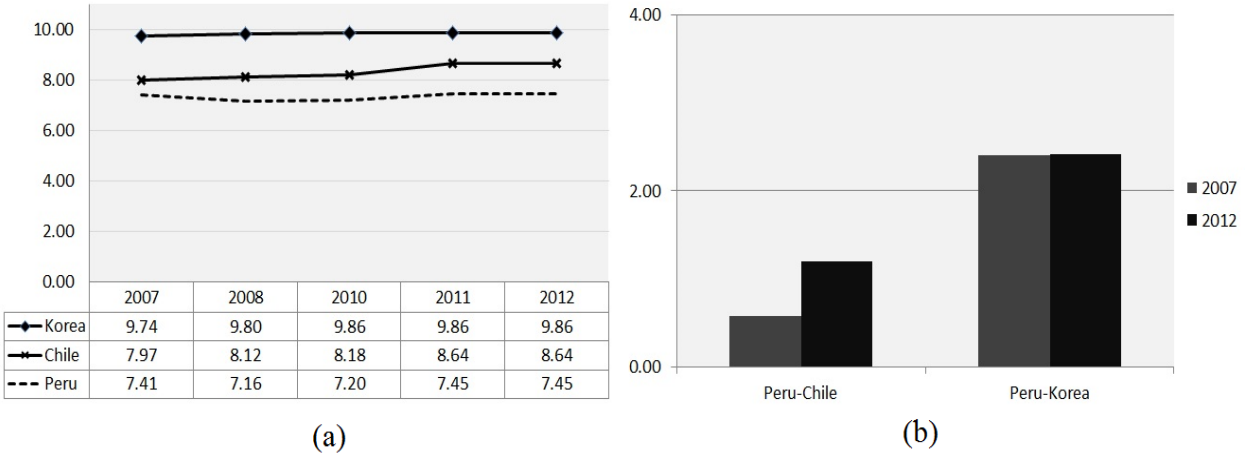


Figure 4. Skills Dimension

As result of these efforts, by 2002 the proportion of households with Internet access reached around 70.20% (ITU, 2009). Moreover, South Korea passed the average Internet penetration achieved by developed countries at that time (ITU, 2003). The economy had also improved, achieving a GDP per capita equal to US$12,094 (World Bank, n.d.). In 1999, Hanaro and KT entered the broadband market using ADSL technology. This multi-platform environment improved competition and reduced prices (ITU, 2003). Furthermore, during the period 2000-2001, the government supported 50,000 low-income students with good grades by giving them free PCs and Internet connection. At the same time, South Korea took advantage of the existing infrastructure in almost 3,000 public places to offer free Internet access.

4.2.2 Intensity of use inequality

E-government, e-learning, and e-commerce were important applications boosting Internet use. In 1987, the South Korean government launched the National Administrative Information System (NAIS), which was a one-stop civil administration portal for raising awareness about the benefits of the Information society. This portal included key government services in administration, defense, security, finance, education and research through a partnership between public and private sectors. This strategy allowed people in rural areas to access government services. As for e-learning, *Edutopia* was launched in 1995 to provide South Koreans with high quality education regardless of their economic situation. This initiative was complemented by: (1) *EDUNET*, which was launched in 1996 to deliver information to students, teachers, and parents; and (2) *Korea Education & Research Information Service* (KERIS), launched in 1999 to produce online educational material. Finally, the Digital Signature Act (issued in 1999) and the General Plan for Promoting e-Commerce (issued in 2000) were the first steps in e-commerce development.

4.2.3 Skills inequality

During 1960-1987, South Korea was aware of the shift from an industrial-based to a knowledge-based society. Accordingly, it founded three R&D centers: (1) *Korea Institute of Science and Technology* (1966), which was the first multi-disciplinary R&D center; (2) *Korea Advanced Institute of Science and Technology* (1971), which was the first R&D center focused on science

and engineering; and (3) *Electronics and Telecommunications Research Institute* (1976), which was created to develop new technologies. The MIFAFF also played an important role in building capabilities. In addition to the free Internet connection, this ministry provided training for people in rural areas through the Rural Development Administrations (RDAs). These training sessions were reinforced when broadband technologies became more widely available. By 1998, the training was extended to low-income students, the military, the elderly, housewives, and prisoners (Im, 2002).

4.3 Chilean best practices

4.3.1 Access inequality

After the dictatorship ended in 1990, the new government realized that education would play an important role in national performance. The first strategy was to provide PCs and Internet connection to government institutions and also to universities. In 1991, the *National Network of Universities* (REUNA, *for its acronym in Spanish*) was launched. This project served as the basis for ENLACES, a bigger project launched in 1993 with the goal to build adequate infrastructure for other educational institutions. By 2000, broadband technology was launched through a multi-platform environment using ADSL and Cable Modem (Orbicom & ITU, 2005). This new trend led the government to update its infrastructure. Therefore, the project REUNA II was launched with the goal to provide universities and R&D centers with broadband connections. With broadband technology being offered, the government took a major role in accessing cost regulation. Cost structure changed from per-minute basis to a fix structure, which in turn raised the number of Internet subscriptions (Orbicom & ITU, 2005). At the same time, the government pulled the demand for this service by: (1) subsidizing PCs and Internet connection to schools, and (2) allowing free Internet use in current infrastructure such as Info-Centers. By 2004, Chile committed to deploy its broadband nationwide backbone. Accordingly, the government launched the project 'Ruta 5D' with the goal to provide adequate infrastructure to government institutions.

4.3.2 Intensity of use inequality

By 1995, Chile decided to provide government services through the Internet. 'TramiteFacil' was the official Chilean one-stop portal launched to raise awareness of the benefits of the Internet for providing government services. The government also launched the E-Government Agenda, which included services such as tax office, electronic invoice, and e-procurement ('ChileCompra' website). All these efforts were supported by the Law of Electronic Document and Digital signature (issued in 2002). Most of these strategies were established through the cooperation among public, private, and academia sectors, and between national and international institutions. On the other hand, ENLACES become an important stakeholder in Chilean education by pushing the use of digital educational contents ('EducarChile' website).

4.3.3 Skills inequality

By 1998, the Chilean government decided to include mandatory ICTs courses in the curricula to build capabilities among both teachers and students—70.8% of teachers received Internet trainings by 2010 (Araneda, 2010). Chile also used ENLACES to provide free trainings to citizens. This strategy was complemented with the 'National Campaign for Digital Training' launched by Chilean Info-Centers.

4.4 Peru: PEST Analysis

4.4.1 Political situation

Peru is a presidential representative democratic republic with a multi-party system. Under the current constitution, the President is the head of state and government elected for a period of five years. The Executive, Legislative, and Judicial Branches, as well as the Ministries are centralized in Lima, the capital (World Bank, n.d.). Therefore, people living in other areas may not have the same opportunities as those living in the capital. Peru is an active member of the Andean Community of Nations, the Organization of American States, and the United Nations, and maintains Free Trade Agreements (FTAs) with other countries (MINCETUR, n.d.).

4.4.2 Economic situation

Peru showed positive GDP growth in recent years (World Bank, n.d.): 8.8% (2010), 6.9% (2011), 6.3% (2012), and 5.1% (2013). As result, the most well-known credit agencies have qualified Peru as a stable country for investments (Trading Economics, n.d.). Indeed, Peru was named the fourth best emerging market in the world (Bloomberg, 2013). However, economic activities differ in terms of contribution to the GDP. For example, 26% of the population is engaged in agriculture, fishing, and mining activities but they only produce around 16% of the Peruvian GDP (INEI, n.d.). This situation may be explained as follows: (1) people do not have the knowledge to manage large-scale production, and (2) they do not have access to a range of sellers (i.e., asymmetric information).

4.4.3 Social Situation

Peru has an estimated population of 29 million: 77% living in urban areas and 23% in rural areas (World Bank, n.d.). Differences between these two groups in terms of Internet connection are considerable. For example, households with Internet connection in Lima reached 44.3%, while this percentage in other urban areas and rural areas is only 18.0% and 0.8%, respectively (INEI, 2014). Likewise, around 60% of schools have Internet connection in urban areas, while less than 10% of schools have this service in rural areas (MINEDU, n.d.). Furthermore, individuals access the Internet mostly in public booths (INEI, 2014). Prices in these places are low, about S/.1 (Peruvian currency)[3] per hour. This situation, however, may act as a barrier for the deployment of e-government, e-learning, and e-commerce services because of the potential risks associated to these centers. Therefore, Internet usage in these places is mainly for communicating, searching for information, and entertainment (INEI, 2014). Finally, there is a lack of economic support in the education sector—only 2.9% of the GDP was invested in education in 2012 (MINEDU, n.d.).

4.4.4 Technical situation

Peru lacks a nationwide backbone. The current infrastructure covers most of the cities in the coast and just three cities in the highlands, which causes national exclusion (BCDD, 2011). ADSL is the predominant technology for fixed broadband connections, around 87.6% of the total connections. Other technologies such as Cable Modem and WiMAX technologies have only 10.1% and 1.60% of the total number of connections, respectively (MTC, 2013). Therefore, Peru lacks a multi-platform environment.

[3] US$1 = S/.2.699 (World Bank, n.d.).

5. Discussion

5.1 Analysis of the problem

Overall, we found that our three countries have been improving in terms of informatization. However, the growth rate differs from country to country and from dimension to dimension. The results show that Peru is lagging behind in the region in terms of *access*. The gap between Peru and Chile is increasing over time rather than shrinking. On the other hand, although Peru is improving in this dimension with respect to South Korea, it is still a long way behind in terms of access and infrastructure. As for the *intensity of use* dimension, the gap between Peru and Chile and between Peru and South Korea is decreasing. However, the differences between our benchmarked countries and Peru remain considerable. In the case of the *skills* dimension, the pattern is different. The differences among countries are not considerable but rather than decreasing, this gap is increasing over time.

5.2 Best practices evidence

We focused on the strategies that are common to both Chile and South Korea. First, we found that governments strongly supported the inclusion of ICTs in education. Chile and South Korea provided free training to build capabilities. This strategy was complemented by e-learning, which is a key factor in encouraging individuals to use the Internet. These findings highlight the recursive nature of the relationship between education and ICTs: by improving education we can reduce the digital divide, while by improving ICTs we can improve education.

A second important finding is that governments may leverage on existing infrastructure (e.g., post offices, hospitals). Results show that this strategy played an important role in reducing digital divide because it allowed low-income people to access the Internet. This finding is consistent with O'Neil and Baker's (2003) work, which suggests that it is possible to improve Internet adoption in the underserved population by leveraging on existing resources. Thirdly, efforts should be made in the right place. It is important to identify people facing the problem such as the elderly, rural dwellers, and farmers. Another important finding is that cooperation plays a critical role. Accordingly, most of the organizations in Chile and South Korea related to the Internet service were created as a partnership of public, private, and academic sectors. By bringing all these together we can create synergy (Frieden, 2005).

Furthermore, market mechanisms are important. On the one hand, governments should participate actively in pulling Internet demand by increasing the number of people who wish to use this service. In the same way, governments should push the supply of this service by increasing the available infrastructure. These pull-push strategies are expected to lead to a reduction in access cost. On the other hand, governments should facilitate a multi-platform environment for providing broadband technology. These findings are consistent with prior literature claiming that countries with competitive market structures have higher Internet penetration than those with monopoly structures (Hargittai, 1999).

Finally, our results suggest that e-government, e-learning, and e-commerce are important factors for increasing Internet use. Indeed, prior research suggests that the use of the Internet is linked with individuals' activities such as the use of government services, education, and commerce (Anderson & Tracey, 2001; Selwyn et al., 2005).

5.3 Recommendations for Peru

Peru's features are as follows: (1) FTAs are opening the Peruvian market to the world; (2) the economic situation is good and stable; (3) there are regional differences in terms of opportunities, education, and access; (4) lack of support in education; (5) lack of multi-platform environment and backbone; (6) plenty of public booths; (7) primary sectors have a low contribution to GDP.

5.3.1 Access inequality

Peru could take advantage of the deployed infrastructure in public booths and outsource it to integrate ICTs in schools. Considering the proliferation of public booths, it may be easy to use them to provide ICT courses to students in schools that are near them. This strategy may be especially important in rural areas and could then be extended to provide free access to farmers and fishermen who cannot afford this service but who can benefit from the use of the Internet. Peru could also establish new rules in the broadband market. Indeed, the lack of a multi-platform environment and the existence of a dominant player are determinant factors in the low penetration of this service. Considering the current healthy economic situation of Peru, the government may actively participate in the deployment of a national backbone. Also, long-term loans may be considered to incentivize ISPs to invest in rural areas and to create a multi-platform environment. As a result of these strategies, an increase in broadband subscriptions is expected.

5.3.2 Intensity of use inequality

Peru should commit to deploying e-government, e-learning, and e-commerce applications to enhance individuals' daily activities. By focusing on these areas, the Peruvian government may not only incentivize the use of the Internet but may also provide the same opportunities to those who live in rural areas (who may benefit the most from the use of the Internet). In this context, Peru may take advantage of its good relationships with other countries such as South Korea to establish cooperation and be able to develop these areas. It is important to point out that although Peru has promoted initiatives to boost e-learning, these efforts have mainly remained at the access level by providing computers. However, there is still plenty of work to do in terms of content that promotes Internet use.

5.3.3 Skills inequality

We found that adequate ICT infrastructure may improve education, but also education may play an important role in reducing the digital divide. In this context, we argue that both factors should be present within the strategies to be implemented by any country. However, the support for education is very low in Peru. Hence, Peru may leverage on its economic growth and allocate more economic resources to improving the quality of the education, especially in rural areas.

6. Conclusion

The digital divide is a complex multidimensional phenomenon. We found that understanding the process of skill acquisition and how to incentivize Internet use are as important as providing adequate infrastructure. Although the Internet may be used for inclusion purposes, improper strategies may result in a negative outcome. Therefore, government should be careful when establishing Internet-related policies.

ICTs are not limited to developed countries. Indeed, the economic situation does not have to be a barrier for adequate development of ICTs and the reduction of the digital divide. As key

strategies we identified: (1) provision of high quality education and broadband technologies; (2) existent infrastructure and resources may be used to increase Internet access, while nationwide backbones are deployed; (3) we should identify those people who need help the most, because we can match the places to serve them; (4) mechanisms to pull demand, push supply, and regulate prices are important; and (5) e-government, e-learning, and e-commerce are key services.

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