

Chapter 9

The Impact of Policy on the Performance of the ICT Sector

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Introduction

This chapter discusses and provides evidence surrounding the link between public policy initiatives, ICT sector performance, and its corresponding economic impact. In particular, it investigates the way in which policies might influence ICT diffusion and adoption, examining models of regulation and public policy and their relationship to specific sector performance. In doing so, it identifies certain public policies and frameworks consistently associated with above par sector performance. Going beyond specific policies, it aims to understand why some countries are more effective than others in implementing policy tools.

The evidence generated in this paper is critical in terms of the creation of the right conditions for developing next generation broadband to serve as a video platform in emerging regions such as Africa. Data presented in this paper will support the notion that public policy, if implemented appropriately both from an institutional and specific initiative perspectives, has the potential for leading emerging countries to leapfrog in technology development.

Relying on both descriptive statistics and case studies, it recognizes that some countries have had more success in implementing policy tools than others but points to key commonalities amongst the nations with the strongest performing ICT sectors. While the statistical analysis employed provides quantitative evidence of these links, the case study data uncover the institutional and cultural variables that can impact ICT sector growth, many of which may go unnoticed in purely quantitative analysis. The chapter also looks at trends in policy evolution, discussing the

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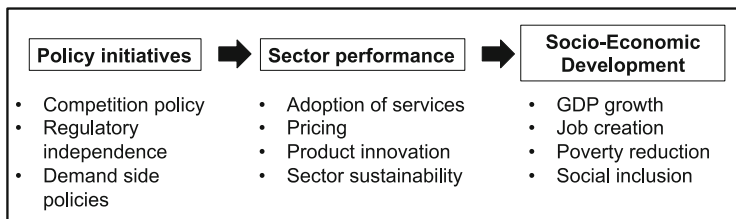


Fig. 9.1 Causal chain between ICT public policy and economic impact

importance of government planning, sector vision, and a clear blueprint as well as the need for accountability and leadership.

Ultimately, it concludes that a country must adopt certain best practices in order to maximize the impact that policy will have on ICT sector performance, which will then lead to economic growth. In other words, while public policy and regulation drive the performance of the ICT sector, active government involvement must complement these policies.

The chapter provides evidence regarding the linkage existing between public policy, ICT sector performance, and economic impact along the following causal chain (see Fig. 9.1).

It proceeds from providing evidence of the impact of ICT sector performance on the economy, focusing after on the influence public policy has on the performance of the sector.

Examining the Link Between ICT Sector Performance and Economic Development

The contribution of ICT to the economy has been studied for some time.¹ In recent years, evidence in this domain has also been generated for African countries. Our own 2012 study of wireless access and the economy in Senegal,² for instance, demonstrates the effects of sector performance on economic growth and compiling country-level time series on technology adoption and economic performance from 2004 to 2011. The study suggests that mobile phones have a measurable impact on economic growth and lie within the estimates of previous work on a much larger scale. The study determined that the Senegalese GDP grew approximately 0.044 % for every 1 % increase in the country's mobile penetration. On the other hand, the economic effect of broadband could not be measured yet because the technology

¹ See Katz (2012); *The Impact of Broadband on the Economy: Research to date and Policy Issues*. Geneva: International Telecommunication Union for a review of the literature.

² Katz, R. and Koutroumpis, P. (2012). The economic impact of communications in Senegal. *Communications and Strategies*.

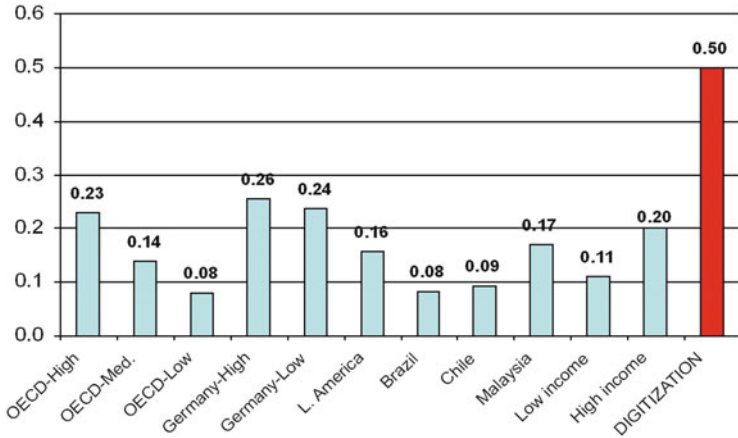


Fig. 9.2 Digitization and economic development (contribution to GDP growth of 10-point increase in variable)

was at its very early stages of adoption. However, the rapid growth of third-generation services during 2011 would suggest a transformation in this type of network access, which might result in important economic effects in the future.³

In recent years, the study of the economic impact of ICT has shifted toward an understanding of the contribution of digitization and away from discrete technologies such as wireless or broadband.⁴ Digitization refers to the cumulative adoption of all information and communication technologies in addition to the assimilation and usage in the economic and social fabric. Figure 9.2 provides a comparison of the magnitude of impact of GDP per capita growth across discrete telecommunication technologies and digitization.

Examining studies that cover both broadband and mobile studies in multiple countries, we found that a 10-point increase in digitization yields a 0.5 % increase in GDP per capita, a magnitude significantly larger than that of either broadband or wireless. This result signifies that only through digitization, which incorporates applications and services, is the full impact of ICT realized.

Digitization also impacts employment, with full deployment and assimilation of ICT contributing to sector jobs such as software development, business process outsourcing, equipment manufacturing, and parts supplies. As is the case with GDP growth, digitization has a higher impact on job creation than broadband deployment alone. On average, a 10-point increase in digitization results in a 0.82 % decrease in a country’s unemployment (Fig. 9.3).

³ See new evidence in Chap. 11 of this volume.

⁴ Katz, R., Koutroumpis, P. and Callorda, F. (2013). The Latin American path to digitization. *Info*. Vol. 15 No. 3, pp. 6–24; Katz, R., and Koutroumpis, P. Measuring socio-economic digitization: a paradigm shift, *Technovation* (in process).

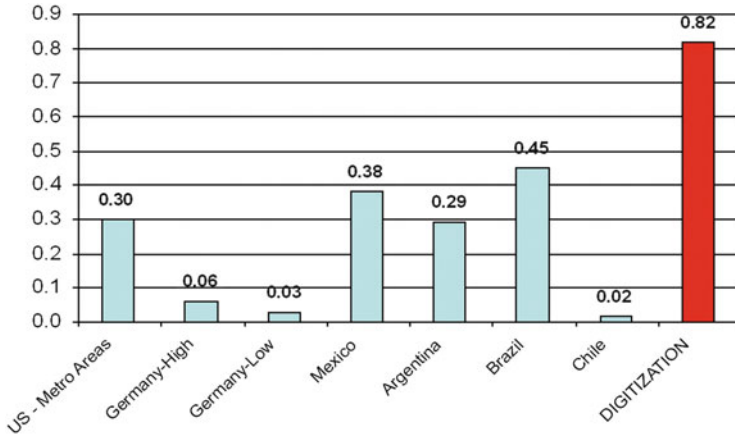


Fig. 9.3 Digitization and employment (contribution to job creation of 10-point increase in variable)

At this point, it is therefore safe to conclude that the impact of ICT, whether at the discrete technology platform level (such as wireless or broadband) or at the aggregate level of digitization, is quite significant. The issue that needs to be raised now is if public policy constitutes a lever through which the aforementioned economic impact can be maximized.

Examining the Link Between Policy and ICT Performance

If ICT has an impact on the economy, can it be proven that public policy has an influence on the performance of the ICT sector? In other words, if the extent of ICT economic contribution is driven by the performance of the ICT sector (in terms of lower prices, enhanced adoption of technology, speed of innovation, and sustainability of the sector), can public policy affect performance? For this purpose, the first task was measuring the sector's performance level. This objective was achieved by developing an index comprising multiple indicators, grouped into three large clusters:

- ICT adoption: comprising broadband and wireless penetration, broadband prices (advertised and effective), and wireless prices (service revenue per minute).
- ICT innovation including percent of mobile average revenue per user (ARPU) derived from data services and quality of service metrics (mobile: dropped calls, service coverage; wireline: Average speed of answer in customer care calls, mean time to repair).
- ICT sector economic performance comprising average wireless sector EBITDA, incumbent investment in broadband and next-generation networks, entrants' investment in broadband and next-generation networks, and mobile carriers' capital investment.

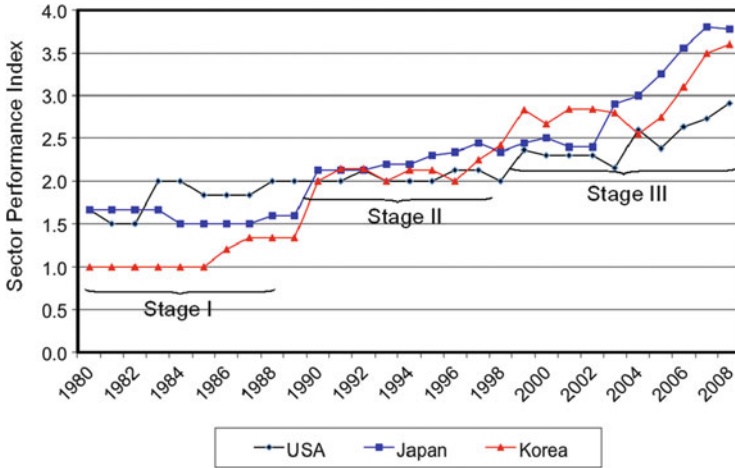


Fig. 9.4 Evolution of sector performance: The United States, Japan, Korea (1980–2008, plotted against the Sector Performance Index)

The index was used to examine the sector performance of 52 countries in the past 30 years. In particular, it was attempted to find answers to questions such as the following:

- How have countries like Korea and Japan performed relative to other industrialized nations? What policy and regulatory variables could explain their different relative performance?
- Are the “BRICs”⁵ behaving homogeneously? Is there a consistent or a divergent development path? Are policies affecting performance?
- What is the path toward enhanced sector performance of emerging countries like? Is there a uniform development path? What are the consistent patterns?

In all, the examination of the evolution of the ICT performance index over time yielded several interesting observations. First, as Fig. 9.4 indicates, the Japanese and Korean ICT sectors bypassed that of the United States in 1998. A comparison of the index over time for the three countries reveals three development stages. Between 1980 and 1990, the performance of the ICT sector of the United States surpassed that of Japan and Korea. After 1990 and approximately up to the year 2000, all three countries exhibited comparable performance. Finally, after 2000, Korea and Japan surpassed the United States. We will explore later what variables can explain this reversal of fortune.

The next analysis compares the performance of the countries known as BRIC (see Fig. 9.5). The most startling feature of this comparison is how China, after consistently being a laggard within this group until 1992, surpassed the other countries in terms of ICT sector performance in 2004.

⁵ BRICs – Brazil, Russia, India, and China.

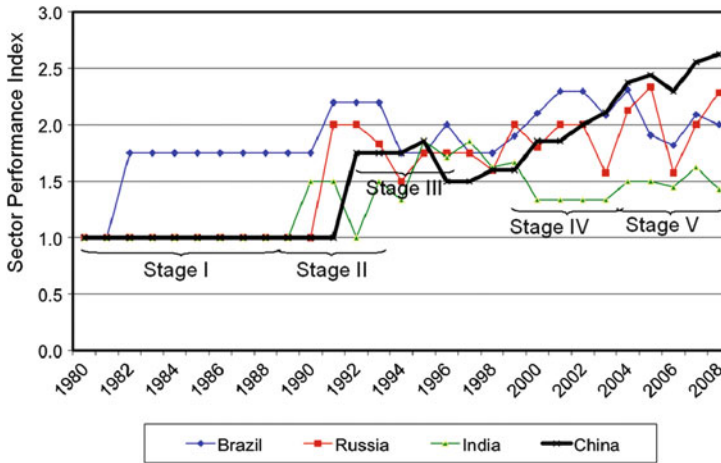


Fig. 9.5 Evolution of ICT sector performance: China versus BRICs (1980–2008, plotted against the Sector Performance Index)

Can we relate these two processes, the Japanese and Korean as well as the Chinese, to specific policy variables? For this analysis, we need to understand what was occurring in the policy arena in each of these countries.

Understanding ICT Policy Evolution

Multiple causal links clearly exist between ICT policy and sector performance. This study would not be the first to find such links. Research has shown, for example, that the institutional framework impacts technology adoption as regulatory autonomy appears to reduce prices and improve wireless penetration and privatization improves wireline penetration. It also impacts the innovation and economic clusters, as an independent regulatory agency and privatization tend to improve sector economic performance, particularly investment.⁶

⁶ See for example, Boyle, G., Howell, B., and Zhang, W. (2008). *Catching Up in Broadband Regressions: Does Local Loop Unbundling Really Lead to Material Increases in OECD Broadband Uptake?* NZ Institute for the Study of Competition and Regulation; Cava-Ferreruela I., Alabau-Munoz, A. (2006). "Broadband policy assessment: A cross-national empirical analysis" *Telecommunications Policy* 30:445–463; Distaso, W., Upi, P., and Manenti, F. (2006). "Platform competition and broadband uptake: Theory and empirical evidence from the European Union" *Information Economics and Policy* 18:87–106; Garcia-Murillo, M. (2005). "International Broadband Deployment: The Impact of Unbundling" *Communications & Strategies*, No 57 1st quarter; Grzybowski, L. (2005). "Regulation of Mobile Telephony across the European Union: An Empirical Analysis" *Journal of Regulatory Economics*; 28:147–167; Grzybowski, L. (2008). "The impact of regulation on the retail prices in fixed-line telephony across the European Union", *Telecommunications Policy* 32:131–144; Gutierrez, L. (2003). "The Effect of Endogenous Regulation on Telecommunications Expansion and Efficiency in Latin America." *Journal of*

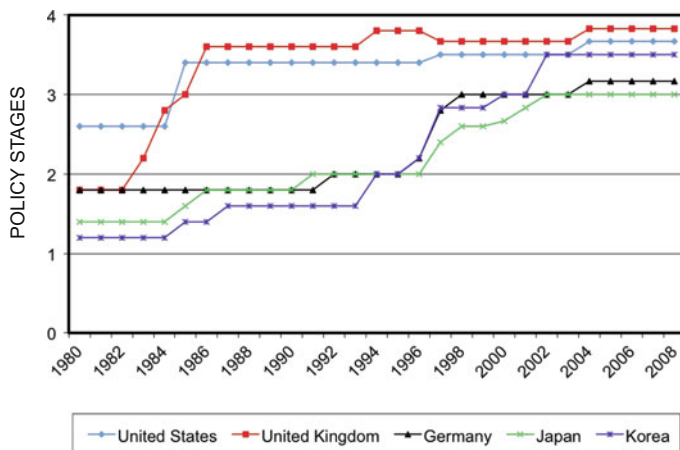
The regulatory framework plays a role as well, as competition can increase wireless penetration, number portability can increase wireless and wireline prices, and platform competition can increase broadband adoption. Furthermore, policies that encourage competition impact wireline and wireless deployment, while access regulation discourages investment.

That said, neither the impact of policy on innovation nor the holistic impact of policy on sector performance has undergone in-depth analysis. In terms of the policy variables, the institutional and regulatory framework could influence innovation, but there is not, to our knowledge, an assessment of the impact of regulation and policy variables on the rate of ICT innovation. Non-sector-specific policies could also shape all three of the ICT sector performance metrics, but studies need to examine the impact of trade regulation and performance and the impact on convergence regulation and performance. Thus, a comprehensive study of the relationship between all regulatory and policy variables and full sector performance would contribute to the field of existing research.

To assess country performance in the ICT policy domain, an index was developed, integrating three components:

- The institutional framework: This component includes such factors as the type of governmental entities that are in charge of developing ICT policy or regulating the sector and the providers of service. For example, is there a cabinet-level position centralizing all ICT policy matters? What is the scope of the telecommunications national regulatory authority and its enforcement powers? Is there an overarching ICT national planning process?
- The ICT regulatory framework: This component comprises all of the variables related to specific ICT policies and regulatory approaches. They include regulations related to market entry (e.g., vertical separation, local loop unbundling, rights of way, numbering schemes, spectrum management), price regulation (interconnection, mobile termination rates, weighted average cost of capital, retail pricing), investment incentive regulation (e.g., asymmetry), actual regulatory process (e.g., market analysis ex ante), and methods of applying regulations (e.g., technological neutrality, operational conditions, compliance monitoring).
- Policies not specific to the sector but having some spillover effect: The policies in this component include restrictions on foreign direct investment that affect market entry and capital structure and other trade restrictions that affect services supply and long-term government planning, as well as the regulation of audiovisual content that impinges on convergence (e.g., restrictions on telecommunications carriers regarding content distribution). In addition, policies that promote and facilitate the adoption of ICT by late adopters (the poor and small and medium enterprises), such as digital literacy programs and equipment subsidization, can play an extremely important role in fostering the emergence of a high-performance sector.

Regulatory Economics, 23:32 57–3286; Katz, R. (2009). *El papel de las TIC en el desarrollo*. Barcelona: Ariel; Li, W. and Xu, L. (2004). “The impact of privatization and competition in the telecommunications sector around the world.” *Journal of Law and Economics*, 47, 395–430.



Source: Katz (2011). *Policy and Development of ICT*, in Van Ark, B. *The Linked World: How ICT is transforming societies, economies and culture*. New York: The Conference Board

Fig. 9.6 Evolution of Policy Index (1980–2008)

Figure 9.6 presents the evolution of the policy index for five countries between 1980 and 2008. According to the time series of the index in Fig. 9.6, countries appear to follow distinct ICT policy evolution paths. For example, in countries following the so-called *Anglo-Saxon path*, like the United States and the United Kingdom, the policy index jumped as a result of early liberalization and privatization. These countries privatized the incumbent and opened the markets to competition early on while employing competitive safeguards. In 1984, these two countries pushed for market opening in an effort that culminated in the 1990s and resulted in near-full liberalization.

In contrast, countries following the *gradual liberalization path*, like Germany and Japan, saw both liberalization and protection of the incumbent along with a step-by-step adoption of deregulation and gradual privatization. Until the mid-1990s, the telecommunications sectors of these two countries were served by state-owned monopolies. At this point in time, the state-owned telecom providers were immune to competition and maintained high investments and staffing levels to provide the necessary advanced infrastructure and services. In the mid-1990s, Japan and Germany embarked on a process of rapid liberalization, with regulators focusing less on protecting the incumbent and more on establishing competition.

Finally, countries following the *developing path*, like Korea, gradually liberalized the telecommunications sector in a methodical fashion to allow for planned performance improvements.

Is it possible to establish a relationship between the policy index and ICT sector performance? When controlling for economic development, a direct relationship seems to exist between both indices. In other words, the higher the policy index along institutional, regulatory, and non-sector policy impacts, the higher the

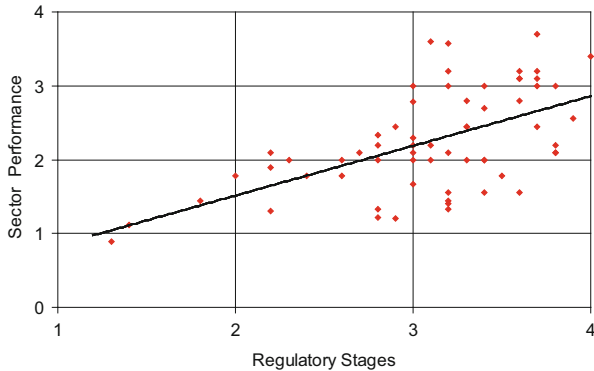


Fig. 9.7 Relation between policy stages and ICT sector performance levels (2008)

performance of the ICT sector in terms of lower prices, technology adoption, and degree of innovation (see Fig. 9.7).

Figure 9.7 demonstrates the distribution of the countries studied, with the countries with the least advanced policy levels occupying the space reserved for countries with the lowest ICT sector performance. On the other hand, those countries with the highest sector performance also had the most advanced policy index scores. These countries included Australia, Austria, Denmark, Finland, France, Germany, Italy, Japan, Korea, Portugal, Sweden, the United Kingdom, and the United States.

The policies of these countries tended to exhibit the following commonalities:

- Full competition in all telecommunications industry segments
- Universal service obligations for fixed line and broadband, driven by a fair allocation of contribution across industry players
- A privatized telecommunications incumbent
- Voice over IP telephony allowed with regulation in place
- No restrictions on foreign ownership of industry players
- A comprehensive national plan to promote ICT industries (software, services, applications)

Beyond this static relationship, case study data also highlights the direct influence of policy on sector performance. The case of China is particularly noteworthy, given that, as mentioned above, in just 15 years, this country managed to advance from a laggard amongst its emerging country counterparts to take the lead of this group and become the top performer amongst the BRICs. The development of the ICT sector has been strongly linked to China's strong top-level institutional leadership. The Ministry of Industry and Information Technology took responsibility for the development of ICT policy, reporting in with the State Council. It is also a member of the State Informatization Leading Group (SILG), which approves

regulatory decisions and oversees the industry, playing a particularly significant role in the Internet regulation and the control of web content.^{7,8}

Taking into account the differences in the culture, political structure and regulatory advancement of different countries between African countries and China, the Chinese example is relevant insofar that it depicts how a country that is lagging in the development of the ICT sector can rapidly achieve a leadership position. The next chapter will explore what practices identified in this study could be adopted by African countries to build next generation broadband network platforms.

Policy Implications for Building a High-Performance ICT Sector

If policy can help maximize the performance of the ICT sector, and, therefore, its economic contribution, it is pertinent to examine which policies and best practices in the policy domain can be more fruitful. Case study data enabled identification of several prescriptive implications.

Firstly, in general, policies (1) promoting the adoption of competition, (2) guaranteed by regulatory independence, and (3) guided by an overarching vision for the ICT sector appear to be linked to ICT sector performance. The countries with the highest ICT sector performance levels tend to have the following commonalities in terms of policy and regulatory features:

- Full competition in all telecommunications industry segments
- Universal service obligations for fixed line and broadband, driven by a fair allocation of contribution across industry players
- A privatized telecommunications incumbent
- Voice over IP telephony allowed with regulation in place
- No restrictions on foreign ownership of industry players
- A comprehensive national plan to promote ICT industries (software, services, applications)

That said, not all telecommunications competition models see equal success in stimulating investment and innovation. While competition encourages investment, at some point, too high a level of competitive intensity decreases the incentive to invest and deploy wireless broadband services. A certain amount of market concentration and a moderate level of competitive intensity appear to be most effective in driving deployment. The implication of this approach to competition policy in Africa is that governments should not be concerned with promoting unrestricted competitive market structures. On the contrary, a moderately concentrated industry

⁷ Source: Katz (2011). Policy and Development of ICT, in Van Ark, B (editor). *The Linked World: How ICT is transforming societies, economies and culture*. New York: The Conference Board.

⁸ See Katz, R., Hoffman, D., Jaeger, K. *China: an ICT "catch up" strategy through a state-owned sector and centralized planning*. Case study in support of The Linked World (op.cit.).

could generate the necessary static and dynamic benefits to consumers, while ensuring sustainability to market players.

Secondly, *competition policy and regulation cannot reach their full potential without active government involvement*. Government planning and an explicit target or vision can play a critical role in driving sector performance. The Korean Government, for instance, has prepared 5-year plans since 1995 to address such issues as universal broadband and its position in the global IT market. Similarly, Japan launched its e-Japan Strategy in 2001, developing annual plans to address the same concerns. African countries typically lack governments actively involved in the formulation of multi-year state policies in the area of ICT. The development of next generation broadband platforms requires that governments, in combination with consumers and the private sector, get involved in outlining a long-term vision of technology development, supported by plans and targets.

Beyond proactively planning for the future, countries must continue to follow up and assess these plans once implemented. At the end of the forecasted period for each plan, the Korean Government assesses the results and then incorporates this feedback into future models. In China, government-sponsored planning supports institutional centralization. Senior leadership reviews are based on the achievement of the plans' quantifiable goals, relating to such indicators as network capacity expansion, coverage, and penetration as well as quality standards. Meanwhile, to ensure sector success, some governments in countries such as Korea, China, and Japan take their intervention to the next level, actively shaping the industry structure, through directives on mergers and acquisitions. Again, African governments tend to shy away from proactive planning and disciplined monitoring of implementation. If plans are to be effective, they need to be followed by an ongoing monitoring of their fulfillment.

Thirdly, *governments can play a key role in ICT adoption through the implementation of demand-side policies*. By identifying government entities that require broadband services (e.g., administration, public schools, hospitals) and turning them into anchor tenants, for instance, they can ensure that broadband investment can reach a breakeven point, as seen in Korea and the Netherlands. Similarly, Sweden and Japan offered tax incentives to companies in the ICT assets and software business to stimulate investment in the sector.

The development of e-government services has also encouraged ICT adoption and influenced the demand side of the equation. Korea, Estonia, and Colombia have demonstrated notable commitment to connecting their citizens. Some examples of these services include tax return e-submission, an e-procurement service for SMEs selling goods and services to the government, platforms for telecommuting, and platforms that support e-business transactions between the government and enterprises. Looking specifically at SMEs, Japan encouraged these businesses to implement IT services voluntarily by offering training, promoting best practices, and supporting collaboration with local communities.

Targeting specific sectors of the population also leads to an increased demand for ICT services. Specifically, offering digital literacy programs, computer subsidies, and online education programs can spur adoption amongst citizens otherwise hindered by socioeconomic and cultural limitations, such as the elderly or the disabled. Sweden, Estonia, and Korea—all of which have high rates of ICT

adoption—have all actively promoted demand-side policies that emphasize digital literacy, subsidization of access, and promotion of applications that stimulate adoption. With a few notable exceptions, such as the stimuli deployed by Kenya in the development of applications new ventures, African countries lack a concerted effort to foster the incubation of start-ups.

Lastly, *executive branch leadership and clear articulation of regulatory and industrial policies* can enhance a country's ICT sector performance. For instance, solid industrial policies can link the development of a telecom sector and the creation of export-oriented IT services and software industries. Korea funds the adoption of its products in the domestic market, thereby incubating its export-oriented industry. In 2007, the MIC in Japan established the ICT International Competitiveness Enhancement Program, collaborating with industry, academic, and government leaders to promote its products in developing markets. To support its domestic technology cluster, the Estonian Government sponsored the Competence Centre in Electronics-, Info-, and Communication Technologies (ELIKO) in 2004. Chinese policy makers focused on cultivating state-owned telecom equipment champions by consolidating its Ministry of Electronic Industries (MEI) to create the Ministry of Information Industries (MII).

Support of ICT policy from the executive branch also appears to play a role in high-performance sectors. This top-level leadership can give the sector direction and ensure cooperation and consolidation amongst all branches of the government, aiding in the achievement of national digital goals. Korea, for instance, names an "ICT Czar." This official regularly meets with the Korean President, who in turn takes ultimate responsibility for sector development. In Brazil, the Secretariat for Strategic Affairs of the Presidency of the Republic and the Casa Civil partnered to create the country's National Broadband Plan, which the president approves directly. Chinese ICT sector development has been attributed to strong executive leadership. Here, the Communist Party controls all senior management personnel decisions in order to ensure compliance. It is fairly common in African countries to delegate responsibility for fulfillment of ICT plans to lower level government entities. This approach reduces significantly the impact of a planning activity or policy implementation.

All things considered, our research has demonstrated the importance of public policy in developing a strong, high-performance ICT sector. It recognizes, however, that different nations exhibit different policies and practices, many of which are influenced by their respective political systems. At the same time, despite these differences, certain best practices seem to occur across the most successful countries. These practices are crucial in maximizing the impact of policy on performance, which ultimately leads to a subsequent economic contribution. Best practices, thus, support performance leapfrogging and maximize the economic impact of ICT development.

If one looks at the higher level of analysis, digitization brings diversity that allows countries to enhance all sectors of public welfare as well as economic growth using ICT, such as using the internet on fixed as well as mobile platforms as a platform for video and all the sectors broadband video can serve. The implication of these findings for the development of next generation broadband as a video platform in Africa are self-evident.