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Innovation in Services: The Hard Case for Latin America and the Caribbean

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Innovation in Services: The Hard Case for Latin America and the Caribbean

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Abstract

The challenge of catching-up requires not only keeping pace with the front runners, but actually outpacing them. The Inter-American Development Bank (IDB) has identified a particular area of weakness in Latin American and Caribbean (LAC) economies; namely - the low productivity levels in the service sector. LAC employment is overwhelmingly concentrated in services, and the sector's productivity levels have been identified as dragging the region's relative aggregate productivity levels downward. The service sector is adding more value to economies in developed regions than in the LAC region.

Recent research conducted by the IDB shows that innovation positively affects productivity growth in the region, although the evidence comes almost exclusively from the manufacturing sector. The dearth of evidence regarding innovation in services is related, at least in part, to uncertainty with respect to how innovation in services actually works, how it can best be measured and whether or not old measurement tools (biased toward manufacturing and R&D) are really applicable to innovation in service sector environments.

Traditional views of services have tended to view it as a sector that is not very prone to innovation, a view that has kept policymakers from considering it a strategic sector in their quest to achieve sustainable growing economies. This viewpoint is becoming outmoded. In fact, services are increasingly recognized as the sector with the greatest potential to affect economic growth; in developed economies the sector is being regarded as a leading job provider and creator, and as one that is capable of spurring economic growth by acting as a chief diffusion agent of general purpose technologies.

If policies to promote innovation are to be effective, they need to reflect the ways in which innovation takes place today. Unfortunately, the little available empirical evidence about innovation in the service sector is largely limited to developed economies or regions; there is no systematic study of innovation in services in LAC.

Recent evidence for developed economies highlights that innovation has became much broader in scope, stemming from a variety of practices and ones that are fundamentally more collaborative in nature. As such, innovation can be found in a variety of sectors (including government) and in a range of activities (such as those considered low-tech, according to the level of R&D) which have only recently started receiving attention to and we are just now beginning to understand.

So far, the limited empirical evidence available suggests that LAC service firms do in fact innovate, sometimes even more than their manufacturing peers; however, they often face burdensome financial constraints when they want to innovate, and these constraints can sometimes be more binding in the service sector than in manufacturing. A deeper understanding of the dynamics at play in the service sector in LAC and the relationship between productivity and innovation in services (as well as specific sub-sectors of services) represents a policy making opportunity that, if ignored, could contribute to prolonged productivity lags in the region, while, if well designed and implemented, could have large economic payoffs.

Policymakers in LAC are faced with the challenge of striking a balance between learning from the most advanced economies and understanding their own contexts which may compromise direct application

of lessons learned from advanced economies. Addressing market failures by means of innovation policy requires understanding firm behavior and how it is affected by incentive schemes. From the information that is currently available, the major obstacles to innovation in services are related to lack of financial support and constraints imposed by lack of human capital and of complementary assets such as broadband connectivity.

With over 20 meetings organized since the creation of the Science, Technology, and Innovation Network (STI) in 2006, the IDB has actively promoted the exchange of ideas, experiences, and lessons learned between policy makers of the Latin American region. The IDB's STI Network has also served as an ideal platform for the identification of regional cooperative initiatives aimed at providing specific solutions to shared challenges and for the identification and exploration of key research topics of interest to member countries. As a result of discussions between IDB member countries during the last Regional Policy Dialogue celebrated in Washington DC in June 2011, one of the main topics for upcoming Dialogues will be innovation in services. Specifically, at the end of 2011, the IDB will have a Policy Dialogue for the Caribbean focused on innovation in services, particularly in the sectors of energy, tourism and ICT.

The **IDB plans to carry out the following research** to cultivate a better understanding and more empirical evidence about innovation in services in LAC:

1. **Productivity gap analysis** both within the region and between LAC and developed countries.
2. **Enhanced information and analysis about the innovation production function.**
3. **Improved understanding regarding the determinants of productivity and innovation in services in LAC:** qualitative and quantitative research will be conducted on the different market failures that hinder innovation and productivity growth in services.
4. **Closing policymakers' knowledge gaps.** New empirical evidence will supply the starting point for the design of service sector-focused innovation policies. Particular attention will be paid to whether and how to intervene in services and correct for the bias against the sector (i.e., policies rooted in targeting innovation in the manufacturing sector) in the regional policy mix.

This paper benefitted from the editorial input of Sheila Mahoney

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Introduction

Purpose — What We Don't Know, *Does* Hurt Us

Important conceptual shifts with respect to innovation in services have been taking place in recent years, and the service sector is increasingly recognized as having the greatest potential to affect economic growth (Inter-American Development Bank [IDB], 2010a; Kuusisto, 2008a). Developed countries have shifted their attention to services. For example, the European Union has created working groups and hosted a series of meetings dedicated to the topic of the "transformative power of service innovation" (Europe Innova, 2011). Traditionally, the service sector was not seen as being prone to innovation, largely based on available evidence from the manufacturing sector and a strong bias toward identifying R&D as the sole driving input for innovation. These views are starting to be considered outmoded, with cutting edge innovation measurement instruments and policy frameworks being used to attempt to address the extent to which innovations are happening in the service sector (OECD, 2010; Hertog, Rubalcaba, and Segers, 2008; Gallouj and Savona, 2008; Tether, 2004).

Furthermore, Latin America and the Caribbean (LAC) faces an urgent need to increase the productivity levels in the service sector. Firms are increasingly required to innovate to survive, and evidence shows how innovation affects productivity (Crepon, Duguet, and Mairesse, 1998; OECD, 2009b; Crespi and Zuñiga, 2010). Given that the service sector is the dominant employer in LAC and recent analysis has found that increasing productivity in the service sector is instrumental to increasing aggregate productivity levels (IDB, 2010a), the inability to address market failures will have a high cost in terms of quality of life for LAC citizens (Lora and Pagés, 2011). The extent to which we do not understand how innovation in service works has repercussions in the sense that policymakers will not have the right information to create appropriate policies, incentives, tax breaks, or tax credits to encourage better allocation of resources for innovation in service firms.

If policies to promote innovation are to be effective, they need to reflect the ways in which innovation takes place today (OECD, 2010, p.10). Recent evidence (see OECD, 2010, for a review) highlights that innovation has become much broader in scope, stemming from a variety of practices that are fundamentally more collaborative. As such, innovation can be found in a variety of sectors (including government) and in a range of activities (such as those considered low-tech, according to the level of R&D), which have only recently started receiving attention and beginning to be understood.

Unfortunately, the little available empirical evidence there is about innovation in the service sector is mostly constrained to developed economies or regions; there is no systematic study of innovation in services in LAC.[1] The purpose of this paper is to briefly explore the information that is currently available about innovation in services with an eye toward the future. The call is for a more solid understanding of

[1] To fill this gap, the Science and Technology Division of IDB is launching a multi-year project on the determinants of innovation and productivity in services at the firm level, with special focus on the role of public policy. The evidence gathered in this research will help identify not only the productivity impact of innovation in services, but also the sort of market failures (and eventually government failures) that might hinder innovation and productivity upgrading in services, evidence that might be valuable for the design of innovation and productivity-promotion policies.

the unique nature of the service sector in LAC, the distinct role of innovation in and among services, and for a commitment to actions that will create a new generation of innovation policies that make room for important economic gains through their depth and breadth of perception and reach.[2]

How Is Innovation Relevant to Economic Growth and Competitiveness?

Innovation and Productivity at the Macro Level

Innovation has long been associated with productivity growth (Schumpeter, 1939; Griliches, 1986; Freeman, 1994). Furthermore, investment in innovation drives long-term growth, rather than the other way around (Rouniven, 2002). In addition, innovation activities, particularly R&D investment, have traditionally been identified as fundamental for the development of the new competencies and skills needed to seek, acquire, and adapt existing technology (Rostow, 1960; Abramovitz, 1986; Cohen and Levinthal, 1989), having a direct effect on the creation of absorptive capacity. Evidence points to the importance of the development of knowledge and technological capabilities in the process of catching up (Griffith, Redding, and Van Reenen, 2004) — a finding that is particularly relevant to developing LAC economies interested in catching up with economies at the productivity frontier.

The three-step model first developed by Crepon, Duguet, and Mairesse (1998) has been widely used to analyze the relationship between innovation and productivity, by using a system of simultaneous equations in three steps: (a) linking R&D to its determinants, (b) observing the innovation output impact (knowledge output phase), and (c) connecting firm productivity to its innovation output. Although this model has been useful in testing and finding positive effects of innovation on productivity in the manufacturing sector, a challenge for using this model is that it tends to rely on R&D expenditures a key variable in determining which firms are engaged in innovation activity. However, firms in the service sector may not be generating innovation in formal R&D laboratories (OECD, 2009b). Further, firms that provide services may not be implementing or keeping track of R&D expenditures or regard the funds used for innovation in the same way as is understood in the manufacturing context.[3]

As mentioned, there is very little empirical evidence testing the relationship between innovation and productivity specifically in the service sector, but relatively recent findings show the importance of service innovation in productivity gains (Rubalcaba and Gago, 2006). Cainelli, Evangelista, and Savona (2006) explore the links from innovation to productivity and the opposite causal link. First, they find that productivity in services is associated with the presence of innovative service firms that are outperforming firms that are not innovating. Here, the **financial commitment of the firm to innovation is associated with higher productivity levels**. When they explore the reverse relationship, they find empirical

[2] Because of the lack of robust information about the different market, coordination, and systemic failures that might hinder innovation in services, innovation policy and productive development policies in general (both in developed and developing countries) have a clear bias toward the development of instruments and interventions focused on the manufacturing sector only. In fact, in many countries the service economy has traditionally been left out of the innovation policy framework and/or played a limited role in productive development policies.

[3] Crespi and Zuñiga (2010) consider the decision of firms to invest in innovation (rather than just R&D) when applying the model to the region.

evidence that more productive firms are more likely to innovate and dedicate more resources to innovation activities, suggesting a relationship between productivity and innovation in which the two perpetuate each other in a self-reinforcing manner.

Micro Evidence Mirrors Macro Evidence

Empirical evidence regarding the relationship between innovation and productivity at the firm level has been documented in LAC. A recent IDB study used micro data from innovation surveys to uncover some valuable insight about the potential for increased investment in innovation in LAC firms to spur productivity catch-up. Crespi and Zuñiga (2010) assess the impact of innovation on a firm's labor productivity in the manufacturing sector in six Latin American countries (Argentina, Chile, Colombia, Costa Rica, Panama, and Uruguay). In line with the findings from the literature in the industrialized world, LAC firms that invested in knowledge were better equipped to introduce both new products and process innovations and had higher labor productivity than firms that were not innovating. The introduction of a technological innovation was associated with a significant increase in labor productivity (between 24 and 195 percent), which is much greater than the increases found in Europe (studies in Spain report 18 percent at the highest end of the spectrum). Non-technological innovation was also associated with productivity increases, though it was subject to more variation across the different countries. The study contends that investment in innovation, corresponding innovation activities, and resulting changes in firm productivity differ greatly in each LAC country (more so than in OECD countries) and part of the heterogeneity can be attributed to innovation systems and investment behavior in the different countries. The study concludes that **public financing encourages innovation** in some LAC countries and that intellectual property rights systems play a role in whether firms decide to invest in innovation. Unfortunately, empirical evidence regarding the relationship between productivity and service firms in LAC is scarce, but forthcoming research indicates that financial constraints to innovation are more binding in the service sector than in manufacturing (Alvarez and Crespi, 2010; Crespi and Zuñiga, 2010).

Nowadays, technology and innovation are increasingly recognized as major forces behind the growth of services. Therefore, there is a growing interest in the study of innovation in the service sector and its importance as an engine of economic growth. Recent work in developed countries confirms that services are more innovative than previously thought (Evangelista and Savona, 2003; Harrison, *et al.*, 2008), and that some sectors are more innovative than in the manufacturing sector (Bogliacino, Lucchese, and Pianta, 2007).

In the service sector, innovation is a continuous, pervasive, and collaborative activity, where firms constantly change products and processes, while developing new ways of working not necessarily based on R&D activities or expenditures. Most of the time, services tend to rely on non-technological forms of innovation as productivity enhancers. In this sense, marketing and organizational innovations, implementation of new designs, and continuous training are characteristic of innovation in the service sector.

At a more accelerated pace than in other sectors, investment in intangible assets, such as personnel and branding, is becoming more important every day in services. At the same time, the usual characterizations of firms as technological (product, process) or non-technological (marketing, organizational) innovators is becoming extremely blurry. In attempts to accurately assess these activities and their respective effects, mixed modes of innovation (OECD, 2010) are of growing importance. As such, becoming a successful product innovator in the service sector requires combining a novel product with new marketing methods, organizational changes, and training. Innovation, thus, is a much broader notion than R&D.

Additionally, many times innovation in the service sector consists of implementing a series (and many times a continuous series) of smaller, incremental changes. Therefore, innovations do not always result in something new being introduced to the world (or even into the market). In this sense, describing the linkages and the interaction between firms is fundamental to addressing policy concerns.

Latin America and the Caribbean Needs to Increase Productivity in the Service Sector

The service sector employs the greatest proportion (more than 60 percent) of the workforce in LAC (Word Development Indicators, 2011). In developed economies, the service sector accounts for more than 50 percent of GDP, and two service industries (trade and business) explain 50 percent of output growth in OECD countries in the last 15 years. Market services was the only service industry to make a positive contribution to job creation from 1995 to 2005 in all OECD member countries (OECD, 2005). The service sector in LAC has not been keeping up with the level of growth in developed economies or rapidly emerging economies in Asia. In fact, underperformance has been cited as dragging overall relative productivity levels downward in LAC (IDB, 2010a). The long-held view of service as a sector that is non-scalable and non-tradable is changing in the face of the globalization of services. Furthermore, the success of countries such as India, where economic growth has been led by rapid growth of the service sector, offers hope to latecomers to development, where specialized niches can be carved out, scaled up, and sustained as comparative advantages in services just as they could be in manufacturing or agriculture (Loudiyi, 2010). Thereby, it stands to reason that if productivity in the service sector could be increased in LAC, the region would experience a rise in overall productivity, and innovation is a promising means through which to spur productivity increases, general economic growth, and a higher quality of life.

Background: Services and Economies Have Changed. How Should Measurement and Policies Adapt?

The OECD (2005, 2009a, and 2010) and the European Commission (2007) have recognized that services represent a crucial means of increasing productivity growth. The message being spread in European reports is loud and clear: innovation in services is essential for the growth of the European economy (Kuusisto, 2008a). Yet, the concept of innovation and its traditional form of measurement are rooted in the era of industrialization and in a sense tied to the manufacturing industry. Despite increasing awareness of the importance of the relationship between innovation in services and productivity growth, and the fact that many innovation scholars and policymakers have analyzed and discussed innovation in services, there is no coherent vision as to how to conceptualize, measure, and facilitate innovation in

services (only Finland, Germany, Denmark, and the European Commission have defined policy frameworks intended to stimulate innovation and R&D activities in services [Hertog, Rubalcaba, and Segers, 2008]). One of the first obstacles in setting about defining an innovation policy framework that incorporates services is the sheer number of activities, occupations, industries, and sub-sectors that are encompassed under the term "services."

The Diversity of Services

What is often referred to as the "service sector" or "services" embodies a huge range of business activities with very distinct characteristics, both in relation to the type of activities and its inherent technological dynamics. At one end of the spectrum are small personal services like hair or nail care that are often low-tech, small-scale operations. At the other end of the spectrum are knowledge-intensive business services (KIBS) such as the FIRE (finance, insurance, and real estate) sector. The markets and consumers of services are equally diverse (Miles, 2004).[4] Such diversity creates a dual challenge of first defining and classifying services and then designing adequate indicators that are flexible and appropriate. Eurostat has produced and updated the widely used NACE classification of services (Appendix A). It is clear that the blurring of boundaries among the different service groups increases the difficulties of measuring the level of innovation.

Despite these heterogeneities, there are common features that can be used to characterize the sector and the implications for technical change and innovation: low levels of capital equipment, discontinuous production processes, a limited role for economies of scale, the immaterial and information-intensive nature of the product that makes storage and transportation difficult, the fundamental role of service provision, and the close interaction between production and consumption over time and space.

Available evidence suggests that the determinants of productivity growth and innovation in services are different than in manufacturing (e.g., less based on R&D and more based on informal arrangements; adoption of information and communication technologies [ICTs] and user–producer interactions; and more sensitive to regulations and tax structures). Evidence from the OECD through different innovation surveys carried out since the early 2000s suggests that service firms innovate for the same reasons as manufacturing firms (e.g., to increase market share, improve quality, and save costs), but also that they innovate differently than manufacturing. Innovation in services is non-technical (e.g., organizational or outsourcing), implies mainly incremental changes in product or processes, is not based on formal R&D, and is of an ad hoc nature (the provision of a solution to a problem presented by a customer). Innovation activity in services tends to be a continuous process, complicating the identification of innovations

[4] As a way of an example, in the case of EU-27, even though services represent 69.2% of total employment, producing 71.6 percent of the GDP, there are strong intra-sectoral differences. According to the EU Commission, in 2007, of the 155 million people engaged in service activities, 90 million were employed in market-driven services and 65 million were employed in public-related services. The value added by the public-related services was less than half that of the value added by the market-driven services. The greatest contributors to both employment and value-added were financial intermediation, real estate, renting, and business activities. Even though there is a positive correlation between GDP per capita and service share of total employment, those services with high employment growth are not necessarily those with higher value-added.

as single events, consisting more likely of informal events with an initial phase of search, idea gathering, and commercial evaluation, followed by implementation (Oslo Manual, 2005). As such, innovation activities are often focused on production efficiency; product differentiation and marketing (Von Tunzelmann and Acha, 2005) place new demands on the skills of the workforce, which can affect the organizational structure and interactions with other firms. As such, in terms of innovation inputs, it seems that ICT capital, software, training, marketing investments, and knowledge acquisitions are more important for innovation in services than in manufacturing.[5]

Measuring Innovation in Services

Identifying innovation in the service sector may be a more difficult task than identifying innovation in the manufacturing sector. Innovations in services may be intangible (Miles, 2004) and service firms may have a harder time distinguishing innovation activities between products, processes, and organizational changes and are more likely to claim an organizational innovation than manufacturing firms (Tether, 2004). Therefore, it is quite possible that traditional instruments to survey innovation may underestimate the amount of innovation that is happening in service firms. Some argue that services do not innovate less than manufacturing, but that the magnitude of innovation varies greatly between different types of services and is much higher in knowledge-intensive business services than in other types of services (Europe Innova, 2007). The role of innovation and our understanding of which sectors innovate must evolve, along with the changing and expanding range of activities the service sector encompasses. The OECD (2010, 2009a) acknowledges that some types of innovation may go hand in hand. For example, a process innovation may be a catalyst for organizational changes, or the other way around. The increasing relationship between process and product innovation results in a lack of clarity when classifying innovation as something that is purely technological or non-technological. While this may be true for both manufacturing and service firms, it seems that it would be even more relevant in services. Introducing the concept of mixed modes of innovation is an important step that the OECD is taking toward adjusting traditional forms of innovation measurement to account for the changes that economies and innovation environments in firms, especially service firms, are facing. But, this raises the question as to whether enough is being done to change the landscape of the current conceptual, measurement, and policy frameworks. Since there is not yet sufficient information regarding innovation in the service sector, or its similarities and differences from the manufacturing sector, will researchers miss important clues if they simply shift or expand old measurement methods? Or is a radical overhaul of the system and methods of identifying innovation activities, their relationship with productivity, policies and incentives needed?

[5] In the same vein, and although market failures affecting innovation in market services are far less understood, this suggests that human capital is more binding than finance in comparison with manufacturing.

Under a policy menu approach, Hertog (2010)[6] outlines three different types of approaches and offers corresponding statistical and policy options that align with the various approaches (see Appendix B). The following is a brief summary.

Assimilation/Traditionalist: Innovation in the service sector is very similar to that of manufacturing and therefore the measurement and treatment of innovation can be adapted from the traditional mechanisms for measuring innovation in manufacturing. Supporters of this theory tend to maintain that technological innovation is less frequent in services though, along with corresponding R&D activities, innovation might vary widely between different types of services. Policies should promote the awareness of R&D and innovation in the sector.

Demarcationist: Innovation takes a completely different shape in the context of services and therefore it must be treated as a unique concept with new modalities of measurement. A major part of service innovation is non-technological and is not explicitly managed. Targeted policies with regard to innovation as understood by this approach are lacking.

Systemic: The growing interdependence of the manufacturing and service sectors makes it more difficult to draw hard lines separating the productivity contributions of the two.[7] Services need to be built into innovation systems policies and are affected by innovation and non-innovation policies.

At this stage, given the fact that there is so little sound evidence available regarding the specific nature of innovation in services in LAC, it seems premature to pick an approach without first conducting much more research on the topic.

Methodology

This paper briefly assesses the current situation in LAC at the macro level using a handful of indicators that help to demonstrate the degree of innovation in the region and touch on the heterogeneity that exists. It then analyzes a recent survey on innovation in Chile to empirically explore the differences between innovations in service firms and those in manufacturing firms in the context of one Latin American country. The paper then delves into real cases of service firms that are innovating in Brazil, Mexico, Chile, and the United States to gain perspective from the experience of individual firms. The paper then returns to the international context to assess how leading regions are expanding their conceptual frameworks with regard to innovation, particularly how they are addressing innovation in services. From this a few poignant

[6] Tether (2004) also outlines the two different modes of thought (*traditionalists* and *demarcationists*) in his paper "Do services innovate differently?"

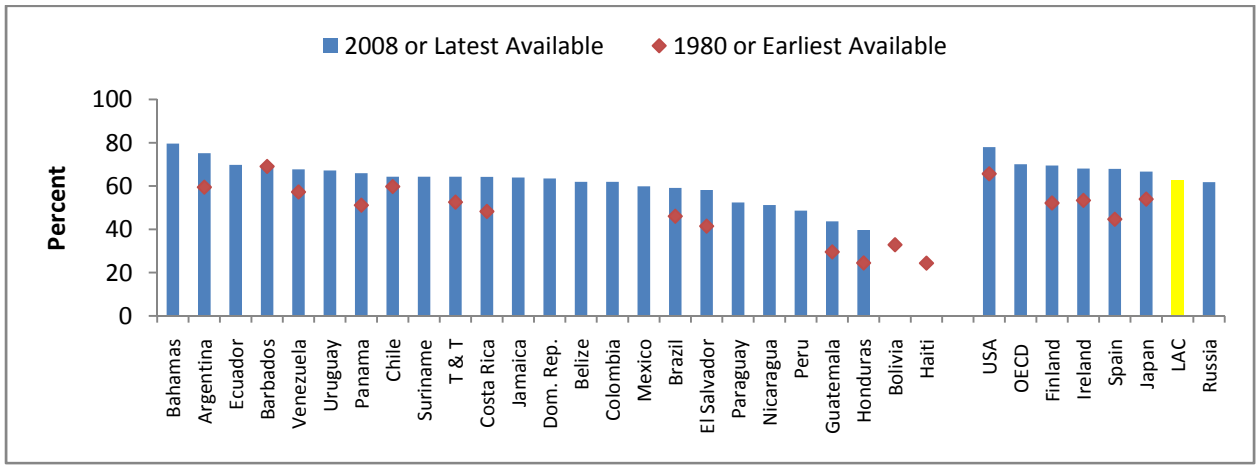
[7] Emerging literature tends to support the notion that drawing hard lines to distinguish between the inputs and outputs for the service and manufacturing sectors is becoming increasingly difficult. The production process of any manufactured good is not possible without service inputs. The ripple effect of innovation in services can be felt in manufacturing outputs (Kuusisto, 2008). Nearly 30 percent of the intermediate output from the business-related services sector is consumed by manufacturing companies and roughly "two-thirds of the manufacturing production value is accounted for by manufacturing purchases of services" (Europe Innova, 2007, p.5).

observations and recommendations are made for where LAC should be headed with respect to shifts in thought regarding innovation in today's knowledge- and service-intensive global economy. Methodology is discussed in each section as it differs depending on the level and type of analysis.

Current Situation

The service sector in LAC is a significant employer and employment in the sector has been growing. Figure 1 shows that, from 1980 to 2008, the service sector grew in most economies. Generally speaking, indicators show a great deal of heterogeneity within the region. Barbados, for example, seems to have a long history of being an economy heavily dominated by the service sector, and that has not changed over time the way it has in other economies. Honduras, on the other hand, shows an economy that is trending in the same direction as many others, with service sector employment increasing, but the country is still not overwhelmingly dominated by the sector.

Figure 1. Share of Employment in the Service Sector

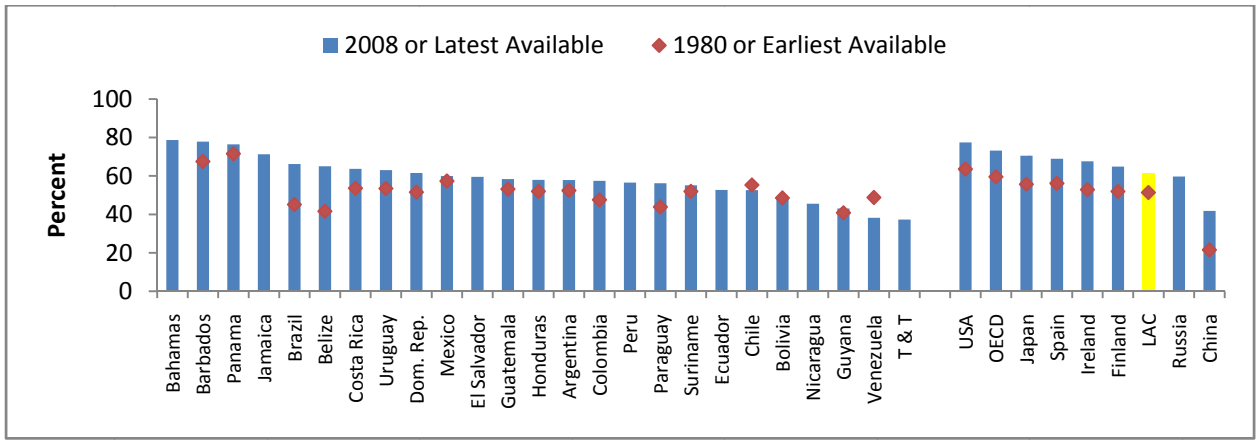


Notes: Data for China and Guyana were not available for the time period selected. Not all of the data are from 2008 or 1980, but a threshold of five years was used. The latest available data could be from 2004 to 2008 and the earliest available data could be from 1980 to 1984.

Source: World Development Indicators

Figure 2 looks at the value added by the service industry as a percent of GDP in 1980 and 2008, making clear that there is heterogeneity within the LAC region. In fact, the contribution of value added to the GDP ranges from nearly 80 percent in the Bahamas to less than 40 percent in Trinidad and Tobago. And while the percentage of the value added contributed by the service sector has increased in many of the countries in the region, it had increased more in most of the comparison countries. This is particularly concerning given the challenge that developing economies often face — it is not enough to simply keep up; to *catch up*, the economies must outperform the leaders. Figures 2 and 3 help confirm what the literature contends — the service sector in LAC is not catching up, or even keeping up.

Figure 2. Services Value-Added as a % of GDP

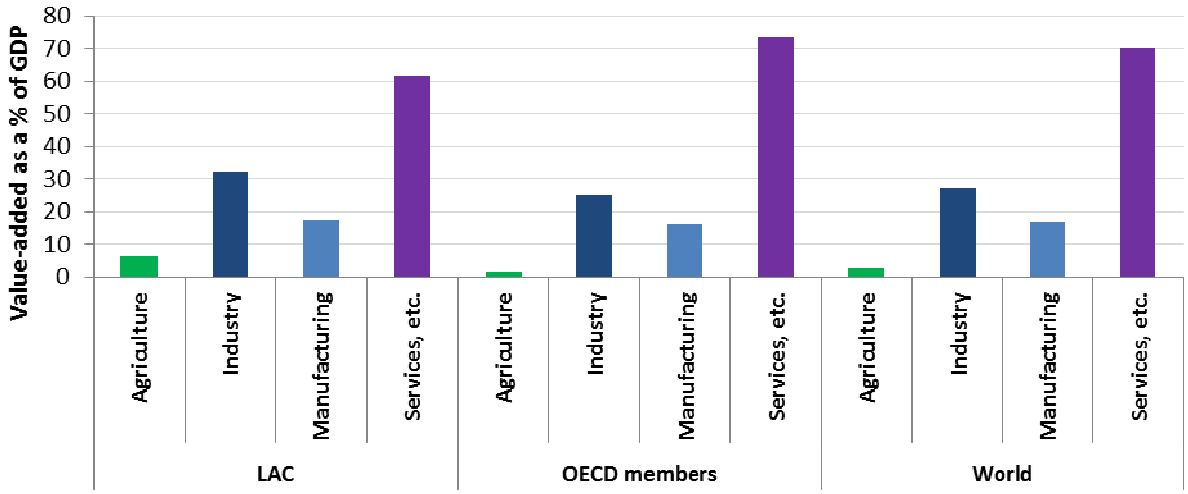


Notes: Data for Haiti were not available for the time period selected. Not all of the data are from 2008 or 1980, but a threshold of four years was used, so the latest available data could be from 2004 to 2008 and the earliest available data could be from 1980 to 1984.

Source: World Development Indicators

Figure 3 supports the available literature (IDB, 2010a) and illustrates the point that other sectors in LAC are performing comparatively well in terms of their contributions to overall GDP. While not revealing in absolute terms, and therefore limited, it is still meaningful in that policies aimed at increasing productivity and competitiveness ought to consider the weakest link in LAC's economy; which, relative to international benchmarks, certainly appears to be the service sector. This justifies the need for an intensive move in policymaking toward conducting further research, gathering empirical evidence, and concentrating policymaking efforts on addressing this productivity shortfall in the region.

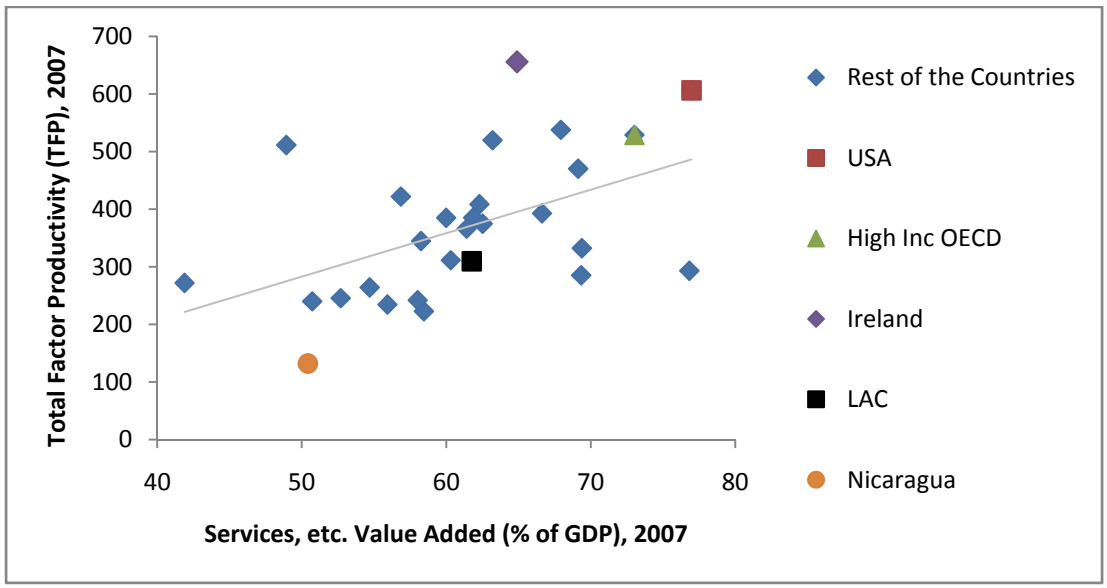
Figure 3. Value-Added as a Percent of GDP by Sector



Source: World Development Indicators

Figure 4 looks at the relationship between the value added by the service industry as a percent of GDP with the Total Factor Productivity (TFP) in 2007 in selected LAC and comparison economies. Developed countries, such as high-income OECD countries United States and Japan, have service sectors that are contributing the vast majority of value added (as a percentage) to GDP, while also having higher productivity levels. The service sector in LAC may still be contributing the majority of value added, but it tends to be closer to 50–60 percent, whereas in countries such as the United States it is nearly 80 percent. But, even if the service sector in some LAC economies is contributing to value added in relation to other sectors in the country, the sector may be lagging in absolute terms. In Ireland, for example, the service sector contributes around 65 percent of the value added (as a % of GDP), which is not so much greater than the 63 percent of value added (as a % of GDP) contributed by the service sector in Costa Rica, but the TFP levels in Ireland are drastically higher (656 compared to 375).

Figure 4. The Relationship between Services Value Added as a % of GDP and Total Factor Productivity, 2007



Source: Authors' elaborations of Daude and Fernandez Arias (2010) and World Development Indicators (2011).

Issues — What We Have Here Is a Failure to Communicate

The challenges are numerous. The first is that innovation in services may be intangible and difficult to measure (Tether, 2004). Productivity in services — especially in financial intermediation and business services — has its own measurement issues (Crespi *et al.*, 2006). The terms "services" and "innovation" can both have a multitude of meanings and characteristics. Innovation and the corresponding means (i.e., inputs such as R&D) of achieving innovation are likely to take a different shape in retail than they do in finance. See the table adapted from Bryson *et al.* (2004) in Appendix C for a summary of typical R&D activities associated with a particular type of service. The Oslo Manual provides an international set

of guidelines for collecting and interpreting innovation data (see Appendix D). The Bogota Manual was developed to conceptualize the process of technological innovation in LAC (RICYT, 2001). Innovation surveys in LAC tend to combine concepts from both the Oslo Manual and the Bogota Manual. As a result, there is a lot of discrepancy in questionnaires, making comparisons between indicators imperfect in many cases (see excerpts from the Bogota Manual in Appendix E). So, in general, not only is innovation in services hard to capture and document, international comparisons are compromised by a lack of data and lack of consistency in terms of data collection and interpretation.

Solutions/Tendencies

The good news is that steps are being taken internationally regarding the lack of standardization and data shortages that prevent meaningful comparative analysis. Recently, the OECD (2009b) released a report that was based on the *Innovation Microdata Project*, which it launched some years prior to address standardization issues with data collection and reporting methodologies. The report used a common OECD framework and a decentralized approach so that the data harvested could be more informative for the policy community. Though mostly limited to developed economies in Europe, the report includes Brazil as an example of a developing economy and notes several differences between Brazil and the rest of the countries analyzed (OECD, 2009b).[8] Several reports and publications expand traditional innovation frameworks to include innovation in services and to mainstream new concepts of innovation into measurement and policies (OECD, 2010; Miles, 2004; Gallouj and Savona, 2008; Tether, 2004).

To better understand the idiosyncrasies of the relationship between innovation and productivity in LAC, both in the manufacturing and service sectors, we need to continue making progress toward collecting, standardizing, and harvesting quality data to inform policymaking decisions. Empirical evidence at the firm level is extremely important to understand and contextualize innovation. Innovation is born in firms (not in countries or industries), and aggregate analysis (as we have seen) only presents the tip of the iceberg as far as heterogeneity is concerned. LAC is faced with a severe impediment with the limitations in available data and standardized statistical collection that would allow for analysis at the firm level. Very few countries in LAC have implemented firm innovation surveys and those that have are new to the practice and may not have collected data that allows for comparison between two points in time or in a manner that is consistent with other LAC countries.

[8] The sheer size of the Brazilian economy (measured by both geography and population) makes it the fifth largest in the world. R&D spending, at about 1 percent of the GDP, is considered low by OECD standards (although it is higher than any of the other LAC countries). Brazil's profile is found to be very different from the other countries with "few new-to-market innovators and large shares of domestic modifiers and adopters" (OECD, 2009b, p.34) and, after Japan, Brazil was found to have the largest share of non-technological innovators (OECD, 2009b, p.41).

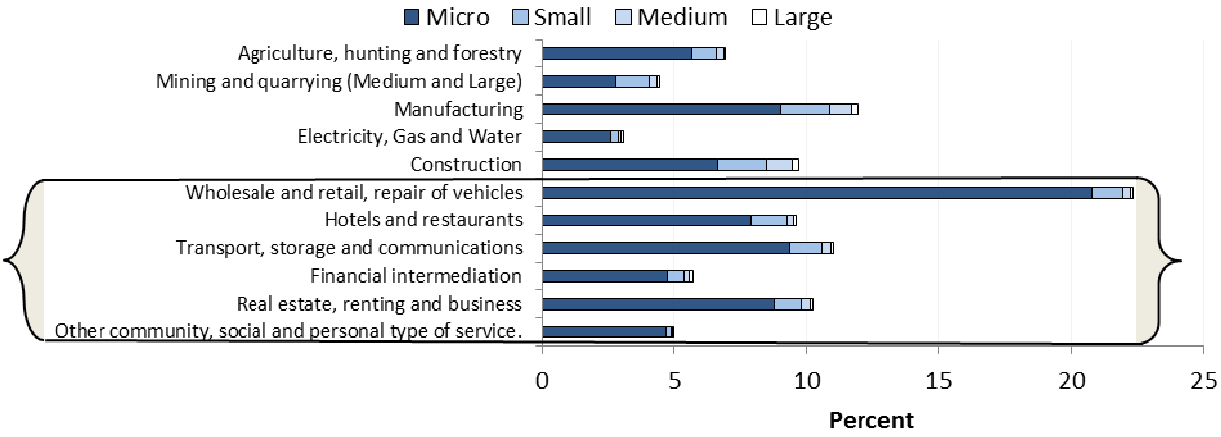
Real Cases

Uniqueness of Services: Empirical Evidence from Chile

Empirical analysis in this section is based on micro data from the first Chilean longitudinal firm survey – Encuesta Longitudinal de Empresas (ELE, 2007). This survey captures data about Chilean businesses in both the manufacturing and service sectors and is statistically representative at the country level. The questionnaire divides firms into sectors within the economy and size of business, and asks general information about the business, the relationship with the financial investment system, access to the market, knowledge and use of public instruments, innovation in the business, the financial characterization of the business, and the relationship with labor and employment.

In Figure 5, two things are immediately evident. In Chile, most firms are very small; a micro firm is defined as a firm with less than five employees. Also, not surprisingly and consistent with the region as a whole, most of the firms are concentrated in the service sector.

Figure 5. Characteristics of Firms in Chile



Source: Authors' elaboration of data from ELE (2007). Note: All ELE data presented in tables and figures have been weighted.

Table 1 separates types of innovation introduced by firms in the service and manufacturing sectors in Chile. In general, it seems that manufacturing firms are innovating more than service firms[9] and that service firms are innovating less than the rest of the firms in the economy.[10]

[9] Recall that this may be an issue of measurement (Tether, 2004).

[10] This appears to be true for all types of innovation, with the exception of the introduction of a service innovation. This makes sense, since firms in services are likely to introduce an innovation in their own field.

Table 1. Types of Innovation by Sector (Percentage of Firms by Sector)

	Service	Manufacturing	All Firms
Percentage of firms	63.8	12.0	100.0
Innovation	20.3	30.6	21.3
Product innovation	10.2	20.3	10.8
Service innovation	11.6	9.7	10.8
Process innovation	6.3	14.1	7.6
Organizational management innovation	4.6	8.2	5.2
Marketing innovation	5.0	8.8	5.0

Source: Authors' elaboration of data from ELE (2007).

Table 2 shows some reasons for innovation. The majority of firms in both the service and manufacturing sectors in Chile identified the desire to increase sales as the primary reason for innovation. The desire to reduce costs was selected by a much smaller proportion of firms. In fact, a greater proportion of firms identified improving productive processes as a primary reason for innovation than the need to reduce costs, implying that innovation may be seen in both sectors as a proactive measure for increasing productivity. A greater proportion of firms in the service sector selected improving the work environment, work conditions, and security as a primary reason for innovation. A possible reason for this is that service firms recognize that their innovation potential is linked to the quality of their human capital and thus one way to attract and retain employees is to have a desirable work environment.

Table 2. Principal Reasons for Innovation in Chilean Firms (Percentage of Firms by Sector)

	Service	Manufacturing
Increase sales	65.5	60.6
Reduce costs	7.5	11.8
Improve productive processes	11.4	19.7
Improve quality through quality control	7.5	5.0
Improve conditions of work and security	7.5	2.6
Improve the work environment	0.7	0.4

Source: Authors' elaboration of data from ELE (2007).

Table 3 looks at obstacles to innovation in the service sector. Thirty-two percent of service sector firms in Chile identified lack of finance as the principal obstacle to innovation and 14 percent of firms identified it as the second most important obstacle to innovation. Clearly there is room for smart policies and government support to assist in reducing these numbers.

Table 3. Obstacles to Innovation in Services in Chile (Percentage of All Firms)

	Principal Obstacle	Second Obstacle
None	40.2	2.9
Elevated technical risk	5.2	6.7
Difficult to secure financing	32.6	14.0
People in the organization are resistant to change	1.9	4.7
Lack of qualified or experienced personnel	2.3	5.8
Lack of technical or market information	8.9	28.6
Lack of possibilities to cooperate with other firms	2.1	12.5
Other	5.7	22.8

Source: Authors' elaboration of data from ELE (2007).

Forthcoming research by Alvarez and Crespi garners empirical evidence that financial constraints hinder innovation in Chile and that these constraints are more binding for firms in services than they are for firms in manufacturing. Table 4 shows that in Chile a smaller proportion of service firms were seeking public support for productive development than manufacturing firms. Over 55 percent of the firms in the service sector indicated that they did not have sufficient information about such funding and another 17 percent indicated that the types of funds that were available did not match their needs. Very few Chilean firms in the service sector — only 3.1 percent in 2007 — received public financial support for innovation. In the manufacturing sector, 5.1 percent of the firms received such support, and the majority of the funding went to product, process, or marketing innovations. In the service sector the distribution of innovation funding across types of innovation is more even, which could be a reflection of more intense linkages (or less distinction) between the different types of innovation in the service sector.

Table 4. Public Support for Innovation in Chile (Percentage of Firms by Sector)

	Services	Manufacturing
Asked for public support for productive development[11]	4.4	9.2
Received public support for innovation	3.1	5.1
Product innovation	19.8	29.3
Service innovation	21.0	14.6
Process innovation	17.8	22.0
Organizational management innovation	18.5	7.3
Marketing innovation	22.9	26.8

Source: Authors' elaboration of data from ELE (2007).

[11] For both manufacturing and services, the principal reason for not having asked for public support for productive development was that the firms did not have sufficient information about the funding. The second reason was that the funding instruments did not correspond with the needs of the firm. Even though this was true for both manufacturing and services firms, a greater proportion of service firms indicated this mismatch as their principal reason for not seeking funding.

Table 7 (in Appendix F) explores the correlation between different types of innovation in firms in Chile. Notably, the different types of innovation in the service sector are universally more correlated in services than they are in other type of firms, and the only types of innovation that are more correlated in manufacturing are product and process innovations. This lends some empirical credence to the assertion that the nature of innovation in services is different from innovation in manufacturing.

Conclusions about the Chilean Case

These descriptive statistics are basic but already point to some major differences between the service and manufacturing sectors when it comes to how firms answered questions with regard to (i) the types of innovation they are introducing, (ii) the motivation for innovation, (iii) the obstacles they are facing when they try to innovate, and (iv) the degree of public financial support that they are receiving to bolster their innovation efforts. There is much more that can be done in terms of empirical analysis in Chile, but there also is much more that needs to be done in many other LAC countries to generate data and information that can be used to gain a deeper understanding of how innovation in services may differ from manufacturing by country, by firm size, and by a variety of other firm characteristics.

Box 1. Dispelling Myths: Innovation *Does Not* Reduce Employment

Empirical Evidence from Uruguay

A common fear for policymakers regarding innovation is that technological innovation will reduce employment. This fear tends to be based on the notion that technological innovation (such as automated production lines) will decrease the need for human labor and therefore reduce employment. This fear has political consequences, since employment statistics are often used to evaluate the very same authorities who might be in a position to create policies regarding innovation.

This fear may be unfounded. Recent empirical evidence at the firm level in Uruguay finds that, in the service sector, there is no evidence of displacement effects from process innovation, and the **growth in sales of new products positively affects employment growth.**

The study finds that the quality of the human capital (measured in terms of employee skill level) does play a role in the sense that the findings support the hypothesis that new products introduced in the service sector are more complementary to skilled workers than to unskilled workers.

The study in Uruguayan firms analyzes the effect of the introduction of firm innovation at three levels: to produce technology itself (make), to source technology externally (buy), or to make and buy. Generally, in the service sector, the make and buy strategy was found to have the largest positive effect on employment across firm sizes, followed by the buy strategy. In most cases, however, the make strategy was found to have either no effect or a negative effect on employment.

The empirical evidence in Uruguay is encouraging for those policymakers thinking about employment. Policies that target service firms favoring skilled employees and a diverse portfolio of in-house and out-of-house strategies are likely to have positive effects on employment levels.

Source: Aboal et al. *(2011).*

Case Studies of Innovation in Services

To better understand service innovation in firms, a total of four case studies were selected, analyzed, and compared according to three criteria: innovation approach, alliances and partnerships, and national and local framework for innovation in the service sector. The data was gathered from different case studies, with each case varying in size, geographical location, innovation focus, and type of services offered.

The case studies follow a consistent systematic structure for ease of comparison. Table 5 provides comparative information about the firms, which is followed by an explanation of the case study findings. The five selected companies were Serasa Experian from Brazil, AKIKB from Chile, Interfactura from Mexico, and UPS from the United States. The choice of UPS sets benchmarks for comparison with the mode of operation of the three Latin American firms. Although Interfactura and Serasa Experian are the only firms in the technology-heavy service sector (KIBS), UPS also relies on technological components that are essential to its services. Three of the firms target other corporations as clients, while one works with both corporate and consumer clients, and one serves only consumers.

How Service Firms Are Innovating

Despite the lack of available data for a deeper case study analysis, particularly on service firms in LAC, the study identified a variance in the levels of innovation and innovation approaches across the firms. Only Serasa and UPS have a dedicated unit in charge of R&D, while the other firms do not have a central R&D unit. The findings support the literature and show that the service sector relies less on R&D for innovation and tends to innovate in processes, organization, and soft technologies, such as software development (Kuusisto, 2008b; Tether, 2004). The innovation approaches range from ad hoc, through recombination, to incremental innovation, and a few cases of radical innovation at UPS and Serasa.

Although the levels of innovation and approaches differ in the four firms, the mentality that drives innovation is the same. All the firms expressed that they innovate to increase productivity, either through reducing the cost of their services or by increasing their market share. It is the latter that AKIKB and UPS target, while Interfactura and Serasa invest in innovations that focus on cost reduction. The innovative component of AKIKB is the ability to identify a market and adapt a service that was widely provided abroad to the needs of the Chilean population. The service itself has been available for years and requires low levels of innovation to maintain profitability, but it was yet to be introduced in Chile. AKIKB identified a market, adapted the service to local needs, and became a national leader in the ministorage business. UPS primarily engaged in radical innovations by creating new services and attending to a different pool of customers during its early stages (Mansharamani, 2005). During the last decade, UPS has increased its market share by entering the heavy airfreight and retail industries. The services innovations have been steady and incremental, being ameliorations of already existing services, such as tracking capabilities, and adaptations to ICTs, such as smart phone applications. While both Interfactura and Serasa Experian were introducing new products to the market, they were also concentrating on improving their business models and innovating through organizational improvements that could help streamline or digitize services and reduce costs through the improved delivery of their services.

Table 5. A Comparison of Innovation in Services in Selected Firms

Country	Firm	Type of Service	Innovations Implemented (2000-2011)	Dimension of Innovation	Types of R&D	Int'l Patent Protection in 2005 (0=low, 5=high)
Brazil	Serasa Experian	Business	– Application manager 3: A credit processing platform – Nota Fiscal Eletronica: Digital service of documents – Me Avise: Monitoring of national registration of legal entities and national registry of individuals – Me Proteja: Identity theft protection – Entenda a sua fatura: Updated website of services payment information – R&D: Sponsorship of university research	– Customer interface innovation – Technology and product based innovation – New network, business model, and value chain configuration	Serasa does R&D through applied research in universities, university partnerships, and direct requests from clients (Serasa publishes many national and local research papers and projects). All sectors of the company are engaged in some form of research.	IPP: 3.59
Chile	AKIKB	Warehousing	– Product: Transfer and adaptation of existing services – Alliances: Formation of partnerships with banks and stores – Information database: Change to new data software – Management structure: Creation of operations and commerce positions	– Organizational innovation – New network, business model, and value chain configuration	The Projects Department conducts research on the warehousing needs of Chile to better adapt the model to local needs.	IPP: 4.28
Mexico	Interfactura	Software	– Products: Innovative technology that led to public certification – Networking pattern: Introduced online collaboration tools that helped with connecting to new clients through existing clients	– Organizational innovation – New network, business model, and value chain configuration – Technology and product based innovation	No specific R&D unit. Innovations are radically and incrementally implemented, but the research process is not documented and regular. Interfactura also partners with local universities.	IPP: 3.88

United States	UPS	Post	– Rebrand: Rebranded to "The UPS Store" – Customer access: Access to UPS services through text-messaging, web-enabled phones, and pagers – Retail: Ventured into the retail shipping business – Entered the heavy airfreight business	– New network, business model, and value chain configuration – Delivery system innovation – Organizational innovation – Customer interface innovation	– UPS has a centralized IT division in charge of research and technological innovations. – UPS e-Ventures is in charge of e-commerce research. – The UPS Strategic Enterprise Fund is designed to research emerging companies. – UPS also outsources R&D to knowledge information companies.	IPP: 4.88

Sources: Kuusisto, 2008b; MAXIMA website, accessed August 2009; Forfás, 2006; Heritage Foundation, 2011; Ross, 2001; UPS website, accessed August 2011; Meirelles and Santos, 2010; Serasa Experian website, accessed August 2011; Llisterri and García-Alba, 2008[12]; AKIKB website, accessed August 2011, IPP Index – Park (2008)[13].

[12] Some information about AKIKB and Interfactura is from internal IDB documents. For further information and case studies from a few other LAC countries please refer to Llisterri and García-Alba (2008).

[13] For an in-depth explanation of the index, please refer to Park (2008) or for a summary (IDB, 2010b).

Regulatory Frameworks

Research related to two of the Latin American firms in Table 5 (Akikb and Interfactura) found that the practice of leveraging intellectual assets was not common enough in the LAC region and attributes conservative investments and risk-taking and the preference for adaptive (aka recombinative) innovation that may tend to rely on the initial development of the innovation in advanced markets rather than attempting radical innovation, to lack of familiarity with Intellectual Property Protection and potential benefits that arise from cultivating intellectual assets (Llisterri and García-Alba, 2008).

Box 2. ICT and Skill Composition in Costa Rica

Some Indications for the Service Sector

Available evidence suggests that ICT capital, software, training, marketing investments, and knowledge acquisitions are more important for innovation in services than in manufacturing. Indeed, the different mix of innovation inputs might imply new requirements for the labor force.

Monge *et al.* (2011) assess how the use of different types of ICTs create or destroy employment and the implication in terms of skill composition in the Costa Rican manufacturing sector. They show that increased use of the Internet is positively related to increased demand for labor, skilled labor, and especially strongly in the case of skilled female labor. Hence, they suggest that the promotion of employment should include measures for the promotion of effective Internet use in Costa Rican businesses, including skills development for all workers and increased availability of broadband Internet access.

Eye Toward the Future: Where Should We Be?

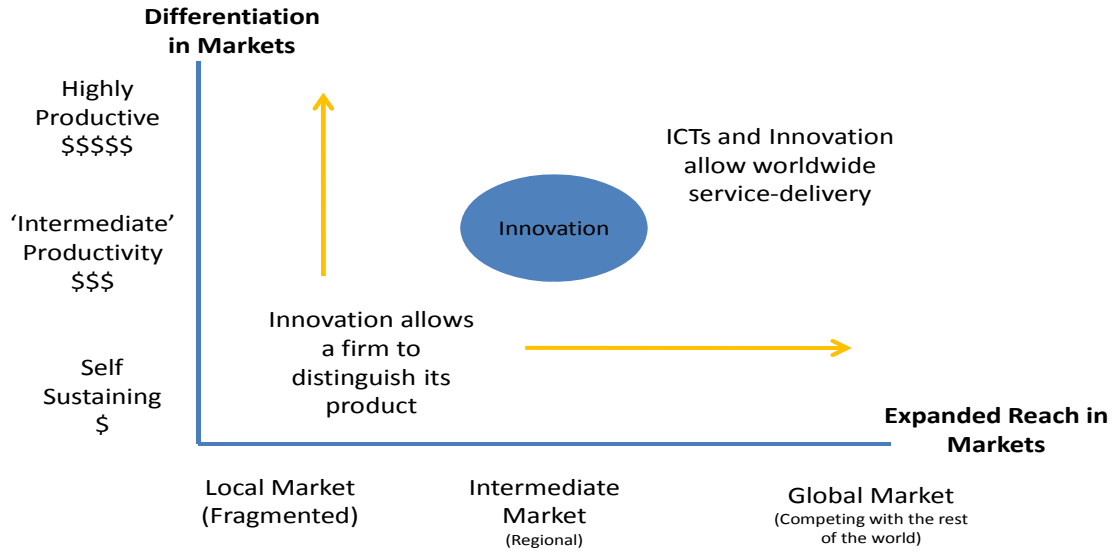
This paper is a call to policymakers in LAC to put innovation in the service sector on the priority list in terms of gathering information and data in order to have a realistic assessment of where the region is right now. To gather such information policymakers must determine, among other things, appropriate conceptual frameworks for incorporating the unique nature of innovation in services in Latin American firms and establish the role of the public and private sectors.

Opportunities for the Private and Public Sectors

As previously explored in this paper, innovation offers service firms in LAC opportunities to increase productivity levels, while the interaction between innovation and ICTs offers considerable opportunities to expand market reach. Technological and non-technological innovation activities are inter-related and ICTs have been identified as a cross-cutting theme and mechanism that is transforming the face of service industries (CEPAL, 2009). Information communication technology services that were traditionally delivered locally can now be delivered from afar, creating a global market and increasing the level of competition (Kuusisto, 2008a). This is both a challenge and an opportunity for service providers in LAC.

Figure 6 shows how innovation can differentiate a firm within its own market and give a service firm the cutting edge that it needs to rise above local competition and earn more revenue. Innovation and ICTs can also allow a firm that was once isolated in its fragmented local market to branch out and compete in the global market. For example, a small graphic design firm in Uruguay can conduct business from a distance and collaborate with international partners, allowing the small private service firm to do business outside of its locality. An important concept that is illustrated (in part) by Figure 6 is what can happen to firms that do not innovate. Innovative and non-innovative firms can fall below the self-sustaining level and go out of business. With the cross-cutting theme of ICTs, however, the connectivity to consumers and speed with which some services can now be delivered means that some LAC firms will be confronted with a do-or-die scenario in which the options will be either to innovate and adjust organizational procedures and processes alongside adopting technological changes or to close the doors.

Figure 6. Opportunities for Innovative Firms



Source: Adapted from ideas in Tether, 2004; Miles, 2004; Europe Innova, 2007.

The potential role of the public sector has more than one dimension. Empirical evidence that has been presented in this paper points to the fact that service firms in LAC are blocked from innovating as much as they would like because of financial constraints. The urgency for increasing productivity in LAC's service sector and the links that have been established between innovation and productivity strongly suggest that political action and using public finance to support innovation in service firms would have valuable micro- and macro-economic payoffs.

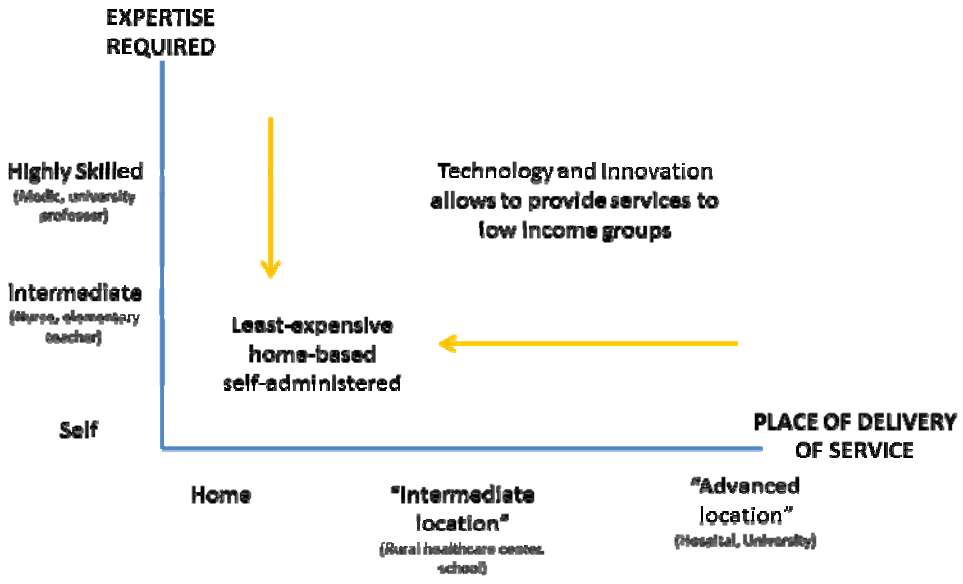
There is, however, another important dimension to the role that the public sector can play regarding innovation and particularly the combination of innovation and delivery of public services through ICTs. Certain services need to be delivered within a particular context (e.g., a hospital) and with a certain level

of skills (e.g., a medical doctor). Innovation and technology absorption allow us to rethink the processes and the channels through which certain services are delivered.

The challenge that policymakers face is to adapt the way in which services are delivered according to the purchasing power of certain groups. The aim of the process of adaptation of services is not to deliver a service of lower quality but to adapt the channels through which services are delivered, without affecting the quality of the service. Gallouj and Weinstein (2007) based their definition of a product on the Lancasterian characteristic-based approach: a product (good or service) is represented by a *linked* set of vectors of attributes and competencies. They represent a product using a set of vectors that refer to the different characteristics: users' value, technical characteristics, the competencies of the supplier, and the competencies of the user. Based on this model, a service innovation that can tackle the needs of the poor requires changes to the vector combination.

This challenge can also be explained by adapting a model (see Figure 7) developed by Chutani, Aalami, and Badshah (2011). An example is e-healthcare services provided using user-friendly interfaces that can be accessed by the final beneficiaries or by practitioners that do not need to be highly qualified. The opportunities involving ICT services are endless. And innovation can apply to other sectors, such as tourism. There are examples of successful, community-managed tourism that have not only achieved more inclusive development but also goals related to gender inclusion or environmental sustainability. Through creative thinking, it is possible to reorient the vectors mentioned above to adapt the product that is being delivered.

Figure 7. The Challenge of Adapting Services to Low Income and Developing Markets: When Innovation Can Tackle the Needs of the Poor



Source: Adapted from Chutani, Aalami, and Badshah (2011).

Box 3. Best Practices Innovation in the EU — Brief Overview

To have a better understanding of what innovation in services represents and how it can be boosted, this box aims to explore the main findings concerning innovation in services within the European Union. The European Commission, through its Directorate General Enterprise and Industry, has acknowledged the strategic importance of putting innovation at the center of political action. For this reason, innovation has been identified as one of the seven "engines to boost growth and jobs" that constitute the Europe 2020 strategy for this decade.[14] Since the conclusions were reported in "Putting Knowledge into Practice: A Broad-Based Innovation Strategy for the EU," the European Commission has undertaken a variety of initiatives aimed at learning more about innovation in services and understanding the economic potential. In September 2009, the European Commission released a Staff Working Document titled "Challenges for EU Support to Innovation in Services: Fostering New Markets and Jobs Through Innovation," which presents "the latest available statistical information on the drivers, barriers, and potential impact of services innovation and identifies a number of policy challenges" (European Commission, 2009).

Even with an update of the Oslo Manual in 2005, measurement of intangibles still appears to be very difficult. An interesting point made in the EU Staff Working Document is that R&D spending might not be the best way to measure innovation in services. It is true that R&D spending in the manufacturing sector is usually at least 2 percent of the added value, compared to 0.5 percent of the service sector (European Commission, 2009); however, such differences should be understood considering the "source of innovation" might be different. With the exception of KIBS, the service sector does not collaborate much with universities (European Commission, 2009). Moreover, service companies have declared that customers/consumers and employees represent the two main sources of ideas and innovations.

Table 6 provides data gathered by the Community Innovation Survey (CIS) in 2006 from firms in 24 of the countries in the European Union. The data shows that, although the proportion of all services that introduced innovations is slightly less than the manufacturing sector, KIBS services are innovating more than the manufacturing sector.

Table 6. Percentage of Firms that Introduced an Innovation, by Type of Innovation

	Product Innovation	Process Innovation	Organizational and/or Market Innovation
Manufacturing	30.22	31.3	44.2
Services	22.2	23.8	42.7
KIBS	37.2	33.0	53.9
Services, excl. KIBS	19.7	22.6	40.8

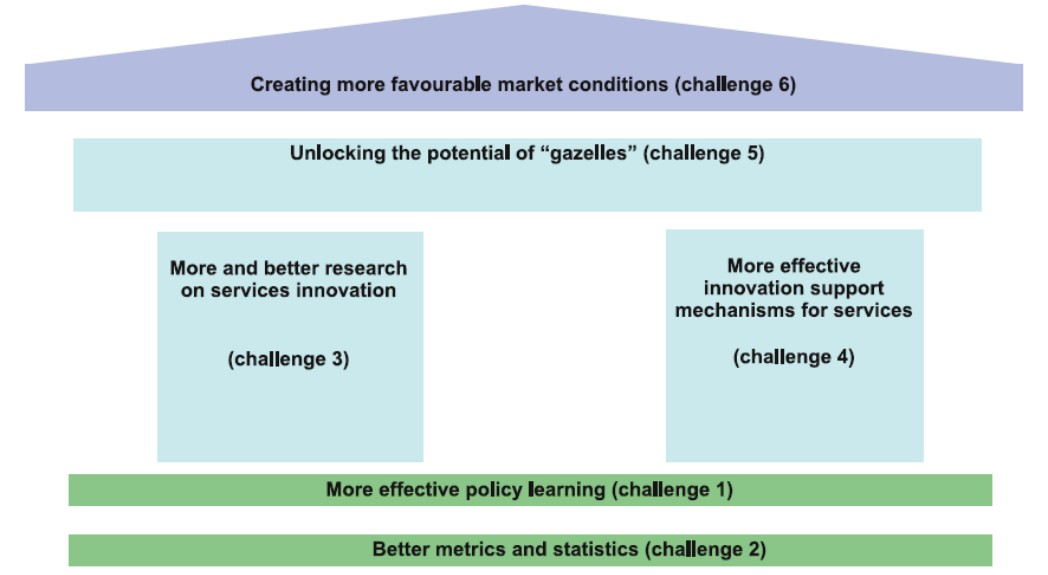
Source: Adapted from European Commission, 2009.

[14] Services constitute about two-thirds of GDP and employment in the European Union, and the European Commission reports that it is the only economic sector that has created new jobs in the last few years (European Commission, 2007).

Many obstacles affect innovation and require in-depth analysis. A classic obstacle is captured under the broader concept of market failure. Certain economic sectors are closed (e.g., KIBS such as the legal sector) and are characterized by very low competition because of specific labor regulations. Other sectors might be characterized by big competitors that prevent other actors from innovating. These two elements are also related to the partial integration of the EU service market that has not yet achieved a desired level of advanced competition. Externalities and weak intellectual property protection are other obstacles that could be mentioned. Some innovations can be easily adapted and replicated and this prevents creative companies from taking on the burden innovation. The blurring of boundaries between the manufacturing sector and the service sector, the blurring of boundaries between service categories, the heterogeneity of the EU market, the intra-national disparities, the limited availability of risk capital, and low rates of R&D spending are all elements that should be taken into account when assessing the barriers to innovation. The report by the European Commission raises an important issue concerning risk whether companies introduce small changes, substantial changes, or radical innovation. A constraint that is often mentioned is the limited availability of risk credit for companies. We can speculate that, over time, manufacturing companies may have established better tools to assess investment risk and mitigating factors of appropriability than service firms. For example, manufacturers introducing new products in technological markets are likely to apply for patent or trademark protection. In the service sector, however, there may not be equivalent legal protection for process or organizational innovations that may be just as susceptible to being copied. This lack of protection could limit prospects for economic gains in the medium to long term.

Figure 8 presents the many policy recommendations that the European Commission identified and presents the main challenges that the European Union is facing in terms of innovation.

Figure 8. Service Innovation Challenges for Europe



Source: European Commission (2009). Figure 8 was excerpted from the source.

Policy Recommendations — Straight to the Point

Expand the Conceptual Framework of Innovation

Organizations in developed regions are expanding their conceptual framework of innovation. Since the service sector dominates most LAC economies, if innovation in services is not already on the forefront of innovation agendas, it ought to be. The evidence presented in this paper from developed European economies and from a few LAC examples suggests that innovation in services may be quite distinct from innovation in the manufacturing sector. This means such innovations could respond to different types of external legal and policy frameworks. Policymakers in LAC are faced with the challenge of striking a balance between learning from the most advanced economies and understanding how the context of the LAC region or their particular country differs from the context of advanced economies. There are certainly lessons that can be learned from the countries that are at the productivity frontier, and in some ways advances they have made will help avoid pitfalls in terms of developing more standardized data collection and in testing different policy approaches empirically and in practice. The advanced economies have also learned from the LAC region. A good example is the influence that the Bogota Manual had on the revision of the Oslo Manual (RICYT *et al.*, 2001). The public sector is responsible for addressing market failures and ought to consider how innovation policies and legal frameworks such as intellectual property rights might be different in the service sector and between services (i.e., KIBS versus retail) in LAC economies.

Study Innovation Where It Happens

LAC policymakers need to know what is happening in the firms in their own countries. Since the relationship between innovation and productivity in companies in the region is marked by heterogeneity (Crespi and Zuñiga, 2010), the contextualized information is fundamental to creating sound policies. Going straight to the source (i.e., firms themselves) and asking questions about the types of innovations they are introducing, their principal reasons for innovation, the obstacles to innovation, and a variety of other questions in a standardized and uniform manner will garner a lot of data and valuable information.[15] Statisticians and researchers can analyze this data and provide empirically supported evidence to policymakers in a particular LAC country that can be compared to other countries in the region and regional averages for benchmarking exercises.

Provide Public Financial Backing for Firms to Offset Innovation Investment Risks

From the information that is currently available, it seems clear that a major obstacle to innovation in services is lack of financial support from public sources that can help to offset investment risks. The majority of firms in Chile are micro or small enterprises. Service firms that are under pressure to adapt to changing external environments and needs of consumers may be consumed with simply trying to stay in business. There may not be sufficient capital to sustain a medium- to long-term investment that has at least a certain percentage of risk of failure. For every firm that innovates, there are probably several others that have tried to innovate and failed. There will be no increase in profits from failed attempts to

[15] The Science and Technology Division of the IDB is working together with RICYT to improve the comparability of the existing innovation surveys and, especially, of the surveys in countries about to collect their first innovation survey. So far, most of the efforts have been focused on manufacturing but service sectors demand immediate attention.

innovate and this might be a frightening prospect for firms that are struggling. The public sector is in a position to assist firms by taking on some of the financial investment burdens with the anticipated outcome that investments in firm innovation will have economic payoffs at the macro level.

Action Plan

The IDB will host four Regional Policy Dialogues of the Science, Technology, and Innovation Network (STI) in the next two years. With over 20 meetings[16] organized since the creation of the network in 2006, the IDB has actively promoted the exchange of ideas, experiences, and lessons learned between policymakers of the Latin American region. The IDB's STI Network has also served as an ideal platform for the identification of regional cooperative initiatives aimed at providing specific solutions to shared challenges and for the identification and exploration of key research topics of interest to member countries. As a result of discussions between IDB member countries during the last Regional Policy Dialogue celebrated in Washington, DC, in June 2011, one of the main topics for upcoming Dialogues will be innovation in services. Specifically, at the end of 2011, the IDB will have a Policy Dialogue for the Caribbean focused on innovation in services, particularly in the sectors of energy, tourism, and ICT. Broad participation of the private sector is expected in this event.

The **IDB plans to carry out the following research** to cultivate a better understanding and more empirical evidence about innovation in services in LAC. Such research will help inform policy.

- Productivity gap analysis both within the region (based on the information from existing and newly implemented firm innovation surveys) and between LAC and developed countries (based on information to be provided by Eurostat). Better information and analysis is needed based on firm level data, on the productivity gaps between service and manufacturing sectors, and within different service industries that fall under the umbrella of the service sector.
- Enhanced information and analysis about the innovation production function based on firm level data. In the service sector in LAC, research will compare services with manufacturing across the region and service sector innovation patterns with similar sectors in Europe. This will be done by using several LAC innovation surveys and the CIS.
- Improved understanding regarding the determinants of productivity and innovation in services in LAC (by using the previously mentioned datasets for econometric analysis) and conducting qualitative and quantitative research on the different market failures that hinder innovation and productivity growth in services.
- Closing policymakers' knowledge gaps. New empirical evidence will supply the starting point for the design of service sector-focused innovation policies. Particular attention will be paid to whether and how to intervene in services and correct for the bias against services (i.e., policies that are too rooted in targeting innovation only in the manufacturing sector) in the current regional policy mix.

[16] This includes Regional, Sub-regional & National Policy Dialogues organized between 2006 and 2011.

Conclusions

The great challenge of being in the position of needing to catch-up is that it requires not only keeping pace with the front runners, but outpacing them. IDB (2010a) has identified a particular area of weakness in LAC economies — the service sector, where LAC employment is overwhelmingly concentrated. The sector has been identified as dragging the region's relative aggregate productivity levels downward. Similarly, developed economies are turning to their service industries as leading job providers, creators, and means of spurring economic growth, and as diffusers of general technologies.

While employment in both LAC and developed countries is increasingly concentrated in the service sector, somehow the service sector is adding more value to economies in developed regions than in the LAC region. The hope is that innovation in services might stimulate productivity levels in the sector, which could result in significant productivity gains that would propel the region forward, raising its relative status in the international arena, and increasing income and quality of life for its citizens.

While it has been shown many times over that innovation positively affects productivity both at the macro and micro levels in developed economies and in LAC, the evidence is almost exclusively focused on the manufacturing sector. The dearth of evidence regarding innovation in services is related, at least in part, to uncertainty with respect to how innovation in services actually works, how it can best be measured, and whether or not old measurement tools (biased toward manufacturing and R&D) are really applicable to innovation in service sector environments. This troubles policymakers, and international organizations and emerging research, publications, and dialogues at meetings are devoted to the topic of innovation in services.

So far, the limited empirical evidence available suggests that LAC service firms do innovate, sometimes even more than their manufacturing peers, but they often face burdensome financial constraints when they want to innovate. These constraints can sometimes be more binding in services than in manufacturing. A deeper understanding of the dynamics of the service sector in LAC — the relationship between productivity and innovation in services (as well as specific sub-sectors of services) — is critical. It represents a policymaking opportunity that, if ignored, could lead to prolonged productivity lags in the region, and if designed and implemented well and on the basis of reliable evidence, could have large economic payoffs.

Appendix A. NACE Classifications

The inclusion of this NACE classification table serves primarily to illustrate the very diverse nature of occupations, firms and sub-sectors would all be wrapped up under the term services. Letters G though O in NACE Rev. 1.1 and letters G through S in NACE Rev. 2 would be considered 'services'. This table is also included to demonstrate the fact that classification of services has changed and may be differently understood or classified depending on when and who is classifying the sector. For example, the categories of the data from the Chilean Longitudinal Survey are more similar to NACE Rev. 1.1 than they are to NACE Rev. 2.

NACE Rev. 1.1		NACE Rev. 2	
Section	Description	Section	Description
A	Agriculture, hunting and forestry	A	Agriculture, forestry and fishing
B	Fishing		
C	Mining and quarrying	B	Mining and quarrying
D	Manufacturing	C	Manufacturing
E	Electricity, gas and water supply	D E	Electricity, gas, steam and air conditioning supply Water supply, sewerage, waste management and remediation activities
F	Construction	F	Construction
G	Wholesale and retail trade: repair of motor vehicles, motorcycles and personal and household goods	G	Wholesale and retail trade; repair of motor vehicles and motorcycles
H	Hotels and restaurants	I	Accommodation and food service activities
I	Transport, storage and communications	H J	Transportation and storage Information and communication
J	Financial intermediation	K	Financial and insurance activities
K	Real estate, renting and business activities	L M N	Real estate activities Professional, scientific and technical activities Administrative and support service activities
L	Public administration and defence; compulsory social security	O	Public administration and defence; compulsory social security
M	Education	P	Education
N	Health and social work	Q	Human health and social work activities
O	Other community, social and personal services activities	R S	Arts, entertainment and recreation Other service activities
P	Activities of private households as employers and undifferentiated production activities of private households	T	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use
Q	Extraterritorial organisations and bodies	U	Activities of extraterritorial organisations and bodies

Source: Excerpted from European Communities (2008).

Appendix B. Three Approaches to Services R&D and Innovation

Theory / practice / policy approaches	Theory of services R&D and innovation	Empirics & statistics on service R&D and innovation	Services R&D and innovation policy
Assimilation approach	Technological R&D and Innovation is the norm and services are simply less (technological) innovative. Look at the figures!	Technological R&D and Innovation is much lower in services, however variation between industries is large.	No specific policy other than increasing service sensibility of existing generic R&D and innovation policies.
Demarcation approach	Innovation in services is unique and specific service innovation theories are needed. The peculiarities approach to services.	Major part of innovation in services is non-technological. Service innovation is mostly not managed explicitly.	Specific / vertical service R&D and innovation policies are lacking and much needed.
Synthesis / systemic approach	Differentiating between manufacturing and services no longer works. Innovative service functions need to be part of wider innovation systems. A grand unified innovation is much needed.	Service functions are ubiquitous (and intertwined) in services and manufacturing. They play a key role in creating innovative and differentiated products and services.	Services need to be built in into systemic innovation policies paying attention to innovation and 'non-innovation' policies.

Source: Hertog (2010).

Appendix C.

Excerpted from Kuusisto (2008a).

Type the service	Typical R&D activities
Finance, insurance and real estate industries Commercial and investment banking, insurance, and commercial and residential real estate industries	Insurance and financial mathematics, IT systems development for the back office and delivery, service scripts development for the front desk personnel
Business services, legal services Legal services, advertising, engineering and architecture, public relations, accounting, R&D and consulting	Creative design, socio-economic research (market research, technical science, consumer behaviour, management research, media research)
Transportation and communications Electronic media, trucking, shipping, railroads, airlines and local transportation such as buses and taxis	ICT research and development, logistics simulation, technical science, systems management, planning and socio-economic research, management research, cabin service development, marketing and communications research
Wholesale and retail trade Intermediaries between producers and consumers, restaurants, personal services, repair and maintenance services	Socio-economic research, economics, consumer behaviour, logistics, shop lay-out, logistics, purchasing management, management research, marketing research, systems management, simulation
Entertainment, hotel and motels Comprise elements of tourism, the world's largest industry	Socio-economic research, economics, environmental research, consumer behaviour, management research, food science
Government services at the transnational, national, and local levels. Public servants, armed forces, education, health care, police, fire departments.	Economics, politics-, and policy research. Socio-economic research, security research and development, planning, medical and health research, gerontology, demographics research, environmental and energy research
Not for profit agencies charities, churches, museums, private not for profit health care agencies	Socio-economic research, nutritional research, demographics research, religion-oriented research, medical research

Adapted from: Bryson, J. Daniels, P. and Warf, B. (2004), Service Worlds –People, Organisations, Technologies, pp. 1-11, Routledge, London.

Appendix D. Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data

Excerpted from OECD and Eurostat (2005).

Basic Definitions

An **innovation** is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organisation or external relations (paragraph 146, p.46).

The **minimum requirement for an innovation** is that the product, process, marketing method or organisational method must be *new (or significantly improved) to the firm*. This includes products, processes and methods that firms are the first to develop and those that have been adopted from other firms or organisations (paragraph 148, p.46).

Innovation activities are all scientific, technological, organisational, financial and commercial steps which actually, or are intended to, lead to the implementation of innovations. Some innovation activities are themselves innovative, others are not novel activities but are necessary for the implementation of innovations. Innovation activities also include R&D that is not directly related to the development of a specific innovation (paragraph 152, p.47).

An **innovative firm** is one that has implemented an innovation during the period under review (paragraph 154, p.47).

Product innovations in services can include significant improvements in how they are provided (for example, in terms of their efficiency or speed), the addition of new functions or characteristics to existing services, or the introduction of entirely new services. Examples are significant improvements in Internet banking services, such as greatly improved speed and ease of use, or the addition of home pick-up and drop-off services that improve customer access for rental cars. Providing on-site rather than remote management contact points for outsourced services is an example of an improvement in service quality (paragraph 161, p.48).

Process innovations include new or significantly improved methods for the creation and provision of services. They can involve significant changes in the equipment and software used in services-oriented firms or in the procedures or techniques that are employed to deliver services. Examples are the introduction of GPS tracking devices for transport services, the implementation of a new reservation system in a travel agency, and the development of new techniques for managing projects in a consultancy firm (paragraph 167, p.49).

Examples of Innovations

A **product innovation** is the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics (paragraph 540).

Examples of Product Innovations

Goods

- Replacing inputs with materials with improved characteristics (breathable textiles, light but strong composites, environmentally friendly plastics, etc.).
- Global positioning systems (GPS) in transport equipment.
- Cameras in mobile telephones.
- Fastening systems in clothing.
- Household appliances that incorporate software that improves user friendliness or convenience, such as toasters that automatically shut off when the bread is toasted.
- Anti-fraud software that profiles and tracks individual financial transactions.
- Inbuilt wireless networking in laptops.
- Food products with new functional characteristics (margarine that reduces blood cholesterol levels, yoghurts produced using new types of cultures, etc.).
- Products with significantly reduced energy consumption (energy efficient refrigerators, etc.).
- Significant changes in products to meet environmental standards.
- Programmable radiators or thermostats.
- IP (Internet protocol) telephones.
- New medicine with significantly improved effects.

Services

- New services that significantly improve customers' access to goods or services, such as home pick-up and drop-off service for rental cars.
- DVD subscription service where for a monthly fee customers can order a predefined number of DVDs via the Internet with mail delivery to the home, with return via a pre-addressed envelope.
- Video on demand via broadband Internet.
- Internet services such as banking, or bill payment systems.
- New forms of warranty, such as an extended warranty on new or used goods, or bundling warranties with other services, such as with credit cards, bank accounts or customer loyalty cards.
- New types of loans, for example variable rate loans with a fixed rate ceiling.
- Creation of Web sites on the Internet, where new services such as product information and various support functions can be offered to clients free of charge.
- The introduction of smart cards and multipurpose plastic cards.
- A new, self-service bank office.
- Offering customers a new "supply control system" which allows clients to check that deliveries from contractors meet specifications.

A **process innovation** is the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software (paragraph 543).

Examples of Process Innovations

Production

- Installation of new or improved manufacturing technology, such as automation equipment or real-time sensors that can adjust processes.
- New equipment required for new or improved products.
- Laser cutting tools.
- Automated packaging.
- Computer-assisted product development.
- Digitisation of printing processes.
- Computerised equipment for quality control of production.
- Improved testing equipment for monitoring production.

Delivery and operations

- Portable scanners/computers for registering goods and inventory.
- Introduction of bar coding or passive radio frequency identification (RFID) chips to track materials through the supply chain.
- GPS tracking systems for transport equipment.
- Introduction of software to identify optimal delivery routes.
- New or improved software or routines for purchasing, accounting or maintenance systems.
- Introduction of electronic clearing systems.
- Introduction of automated voice-response system.
- Introduction of electronic ticketing system.
- New software tools designed to improve supply flows.
- New or significantly improved computer networks.

A **marketing innovation** is the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing (paragraph 546). Marketing innovations can refer to any marketing method (product design/packaging, placement, pricing, promotion) as long as it is used for the first time by the firm.

Examples of Marketing Innovations

Placement (sales channels)

- First-time introduction of product licensing.
- First-time introduction of direct selling or exclusive retailing.
- Implementation of a new concept for product presentation such as sales rooms for furniture that is designed according to themes, allowing customers to view products in fully decorated rooms.
- Implementation of a personalised information system, e.g. obtained from loyalty cards, to tailor the presentation of products to the specific needs of individual customers.

Pricing

- Introduction of a new method that allows customers to choose desired product specifications on the firm's Web site and then see the price for the specified product.
- First-time use of a method for varying the price of a good or service according to demand for it.
- First-time use of in-store offers only accessible to holders of the store's credit or reward card.

Promotion

- First-time use of trademarks.
- First-time use of product placement in movies or television programmes.
- Introduction of a fundamentally new brand symbol intended to position the firm's product on a new market.
- First-time use of product seeding through opinion leaders, celebrities or particular groups that are fashion or product trend setters.

An **organisational innovation** is the implementation of a new organisational method in the firm's business practices, workplace organisation or external relations (paragraph 549). Organisational innovations can refer to any organisational method in a firm's business practices, workplace organisation or external relations as long as it is used for the first time by the firm.

Business practices

- Establishing of a new database of best practices, lessons and other knowledge so that they are more easily accessible to others.
- First-time introduction of an integrated monitoring system for firm activities (production, finance, strategy, marketing).
- First-time introduction of management systems for general production or supply operations, such as supply chain management, business reengineering, lean production, quality management system.
- First-time introduction of training programmes to create efficient and functional teams that integrate staff from different backgrounds or areas of responsibility.

Workplace organisation

- First-time implementation of decentralized job responsibility for the firm's workers, such as giving substantially more control and responsibility over work processes to production, distribution or sales staff.
- First-time establishment of formal or informal work teams to improve the access and sharing of knowledge from different departments, such as marketing, research and production.
- First-time implementation of an anonymous incident reporting system to encourage the reporting of errors or hazards in order to identify their causes and reduce their frequency.

External relations

- First-time introduction of quality control standards for suppliers and subcontractors.
- First-time use of outsourcing of research or production.
- First-time entering into research collaboration with universities or other research organizations.

Appendix E. Bogota Manual: Innovation and Innovation Activities

Excerpted from Inter-American Development Bank (2010b).

This excerpt draws heavily from RICYT / OAS / CYTED / COLCIENCIAS / OCYT (2001).

Most innovation surveys in Latin America combine concepts of both Oslo and the Bogota Manual and have further sections of national interest. As a result, there is high discrepancy in questionnaires and comparability of indicators is in many cases imperfect. Further harmonization is needed for an appropriate international comparison, even solely within the region**.**

According to the Bogota Manual, "the concept of innovation is broader than the defined in the Oslo Manual. The definition of "**Innovation Activities**" in the Bogota Manual takes into account not only what the Oslo Manual calls "Innovation Activities," that is, innovation activities for creative and technological change but also activities constituting so-called *technological effort* too (*ibid.*). Within the heading of innovation activities comes any action taken by a firm which aims to implement any concepts, ideas, and methods necessary for acquiring, assimilating, and incorporating new knowledge. It includes R&D expenditures and other innovation expenditures such as design, installation of new machinery (machinery and equipment linked to the implementation of innovations), and industrial engineering and embodied and disembodied technology,[17] marketing and training. It also includes the accumulation of physical capital as well as other forms of capital, such as human (including managerial) capital and knowledge (including informational) capital" (RICYT et al., 2001).

According to the Bogota Manual, "**technological product and process (TPP) innovations** include technologically new products and processes, as well as significant technological improvements in products and processes. A technological innovation in products and processes is considered to have been implemented if it has been introduced into the marketplace (product innovation) or has been used in a production process (process innovation). According to the Bogota Manual:

- A **technologically new product** is a product whose technological characteristics or intended uses differ significantly from those of previously produced products. Such innovations may involve radically new technologies, be based on combining existing technologies in new contexts, or be derived from the use of new knowledge.
- A **technologically improved product** is an existing product whose performance has been significantly enhanced or upgraded. A simple product may be improved (in terms of performance or cost) by upgrading its components or materials, or a complex product consisting of a number of

[17] Disembodied technology acquisition include patents, non-patented inventions, licenses, disclosures of knowhow, trademarks, designs, computer and other scientific and technical services related to the implementation of product and process innovations, as well as the acquisition of packaged software not listed elsewhere).

integrated technical sub-systems may be improved by partial changes to one of the sub-systems.

- **Technological process innovation** is the adoption of technologically new or significantly improved production methods, including product delivery methods. These methods may involve changes in equipment or the organization of production or a combination of both, or even derive from the use of new knowledge. The methods may be intended to produce or deliver technologically new or improved products that cannot be produced or delivered with conventional production methods, or even to enhance basic production or delivery efficiency of existing products.
- **Organizational innovations** are changes in the way the firm is organized and managed; changes in the organization and management of the production process; incorporation of significantly modified organizational structures and implementation of new or substantially modified strategic corporate orientations.
- **Marketing innovation** is the marketing of new products. New methods of product delivery. Changes in packaging" (RICYT et al., 2001).

Appendix F. Innovation Correlation Matrix

	Product	Service	Process	Org. Mgmt	Marketing
Product Innovation	1				
Service Innovation	0.3913	1			
Process Innovation	0.4166	0.4304	1		
Org. Management Innovation	0.3527	0.4411	0.5397	1	
Marketing Innovation	0.4134	0.3638	0.3776	0.4438	1
Innovation Correlation Matrix in Service Sector					
Product Innovation	1				
Service Innovation	0.4169	1			
Process Innovation	0.4397	0.4817	1		
Org. Management Innovation	0.3682	0.4583	0.5727	1	
Marketing Innovation	0.4223	0.3818	0.3979	0.4762	1
Innovation Correlation Matrix in Manufacturing Sector					
Product Innovation	1				
Service Innovation	0.3765	1			
Process Innovation	0.4386	0.3392	1		
Org. Management Innovation	0.3591	0.4226	0.5030	1	
Marketing Innovation	0.4180	0.3161	0.3645	0.4316	1

Source: Authors' elaboration of data from ELE (2007).

References

Aboal D., Garda, P., Lanzilotta, B., and Perera, M. 2011. "Innovation, Firm Size and Employment Generation in Uruguay: The Microeconometric Evidence." CINVE Centro de Investigaciones Económicas. Uruguay. Paper produced as part of the IDB Project "Employment Generation, Firm Size and Innovation in Latin America: the microeconometric evidence (RG-K1164)".

Abramovitz, M. 1986. "Catching up, forging ahead, and falling behind", Journal of Economic History, vol. XLVI, no. 2, 385–406

Alvarez, R., and Crespi, G. 2010, forthcoming. "Financing Gaps, Innovation gaps? New Evidence from Chile." Mimeo. Paper presented at the MEIDE Conference, June 2011 (San Jose, Costa Rica) and Atlanta Conference on Science and Technology Policy, September 2011 (Atlanta, GA, USA).

AKIKB. "About us" and "Alliances". AKIKB website. http://www.akikb.cl/en, accessed August 2011.

Bogliacino, F., Lucchese, M. and Pianta, M. 2007. Job Creation In Business Services: Innovation, Demand, Polarisation. Working Papers Series in Economics, Mathematics and Statistics WP-EMS, ISSN 1974-4110.

Bryson, J., Daniels, P., and Warf, B. 2004. Service Worlds: People, Organisations, Technologies, pp. 1-11. Routledge, London.

Cainelli, G., Evangelista, R., and Savona, M. 2006. "Innovation and economic performance in services: a firm-level analysis." *Cambridge Journal of Economics*. 30: 435–58.

CEPAL (Comisión Económica para América Latina y el Caribe). 2009. La innovación en los servicios: aspectos generales y los casos de los servicios de telecomunicaciones, turismo y bancario. Available at: http://www.eclac.org/publicaciones/xml/3/38273/LCW286e.pdf. Last accessed September 2011.

Chutani, S., Aalami, J.R., and Badshah, A. 2011. *Technology at the Margins: How IT Meets the Needs of Emerging Markets*. Hoboken, NJ, USA: John Wiley & Sons, Inc.

Cohen, W., and Levinthal, D. 1989. "Innovation and Learning: The Two Faces of R&D." *The Economic Journal.* 99(397): 569–96.

Crépon, B., E. Duguet and J. Mairesse (1998), "Research, Innovation, and Productivity: An Econometric Analysis at the Firm Level", Economics of Innovation and New Technology, 7(3), pp. 115–156.

Crespi, G., Criscuolo, C., Haskel, J., and Hawkes, D. 2006. "Measuring and understanding productivity in UK market services." *Oxford Review of Economic Policy.* 22(4):560–72.

Crespi, G., and Zúñiga, P. 2010. "Innovation and Productivity: Evidence from Six Latin American Countries." IDB Working Paper Series No. IDB-WP-218. Washington, DC: Inter-American Development Bank. Available at: http://www.iadb.org/en/research-and-data/publication-details,3169.html?pub_id=IDB%2DWP%2D218. Last accessed September 2011.

Daude C. and Fernandez Arias, E. 2010. "The importance of ideas: Innovation and productivity in Latin America". in Pagés, C. (ed.) The Age of Productivity: Transforming Economies From the Bottom Up". Development in the Americas. Washington, DC, Inter-American Development Bank-Palgrave-McMillan.

ELE Encuesta Longitudinal de Empresas, 2007. Gobierno de Chile and Obseratorio Empresas, published November, 2010.

Europe Innova. 2007. Towards A European Strategy in Support of Innovation in Services: Challenges and Key Issues for Future Actions. A Commission staff working document of the European Commission. Europe Innova paper N° 4.

----- 2011. Meeting the Challenge of Europe 2020: The Transformative Power of Service Innovation. Innovation in Services Expert Panel: Proceedings Report. February 17-18, 2011.

----- 2011. Meeting the Challenge of Europe 2020: The Transformative Power of Service Innovation: Report by the Expert Panel of Service Innovation in the EU. February 17-18, 2011.

----- 2011. Meeting the Challenge of Europe 2020: The Transformative Power of Service Innovation: Case Studies Collected by the Expert Panel on Service Innovation in the EU. February, 2011.

European Commission. 2007. Eurostat Database. Available at: http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

———. 2009. Challenges for EU Support to Innovation in Services: Fostering New Markets and Jobs through Innovation. Commission Staff Working Document, SEC (2009) 1195. Pro Inno Europe Paper N° 12.

European Communities. 2008. Eurostat Methodologies and Working Papers. NACE Rev. 2. Statistical Classification of Economic Activities in the European Community. Available at: http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-RA-07-015/EN/KS-RA-07-015-EN.PDF. Last accessed September 2011.

Evangelista, R. and Savona, M. 2003. Innovation, employment and skills in services: firm and sectoral evidence, Structural Change and Economic Dynamics, vol. 14, no. 4, 449–74.

Forfás. 2006. *Services Innovation in Ireland – options for innovation policy.* Dublin, Ireland.

Freeman, C. 1994. "Critical survey: the economics of technical change." *Cambridge Journal of Economics*. 18: 463–512.

Gallouj, F., and Savona, M. 2008. "Innovation in services: a review of the debate and research agenda." *Journal of Evolutionary Economics*. 19(2):149–72.

Gallouj, F. (2002). Innovation in the Service Economy: The New Wealth of Nations. Northampton: Edward Elgar Publishing Limited.

Gallouj, F., and Weinstein, O. 1997. "Innovation in Services." *Research Policy*. 2: 537–56.

Griffith, R., Redding, S., and Van Reenen, J. 2004. "Mapping the Two Faces of R&D: Productivity Growth in a Panel of OECD Industries." *Review of Economics and Statistics.* 86(4): 883–95.

Griliches, Z. 1986. "Productivity, R&D and basic research at the firm level in the 1970s." *American Economic Review*. 76(19): 141–54.

Harrison, R., Jaumandreu, J., Mairesse, J. and B. Peters (2008. "Does Innovation Stimulate Employment? A Firm-Level Analysis Using Comparable Micro-Data from Four European Countries." NBER Working Paper No. W14216. Cambridge, MA, United States: National Bureau of Economic Research. Available at SSRN: http://ssrn.com/abstract=1230844

Hertog, P. den, Rubalcaba, L., and Segers, J. 2008. "Is there a rationale for services R&D and innovation policies? *International Journal of Services Technology and Management.* 9(3/4): 334–54.

Hertog, P. den (2010). Managing Service Innovation. Firm level Dynamic Capabilities and Policy Options. Thesis (PhD), University of Amsterdam, Amsterdam, the Netherlands.

Inter-American Development Bank (IDB). 2010a. Pagés, C., editor. "The Age of Productivity: Transforming Economies From the Bottom Up." *Development in the Americas*. Washington, DC: Inter-American Development Bank, Palgrave-McMillan.

———. 2010b. *Science, Technology, and Innovation in Latin America and the Caribbean: A Statistical Compendium of Indicators*. Washington, DC: Inter-American Development Bank.

Heritage Foundation. 2011. Index of Economic Freedom. http://www.heritage.org/. Accessed August 2011.

Kuusisto, J. 2008a. "R&D in Services – Review and Case Studies". Paper submitted for the CREST • R&D in Services Working Group, European Commission.

———. 2008b. "R&D in Services – 17 Business Case Studies." Paper submitted for the CREST • R&D in Services Working Group, European Commission.

Llisterri, J., and García-Alba, J. 2008. "HGSMEs in Latin American Emerging Economies." Paper prepared for the OECD Kansas City Workshop, Session III. Available at: http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=1844327. Last accessed September 2011.

Lora, E., and Pagés, C. 2011. Face-to-Face with Productivity. *Finance and Development.* March, 2011. Available at: www.imf.org/external/pubs/ft/fandd/2011/03/pdf/Lora.pdf. Last accessed September 2011.

Loudiyi, I. 2010. "The Service Revolution." In: Ghani, E., editor.; blogs.worldbank.org website http://blogs.worldbank.org/growth/service-revolution. Last accessed June 2011.

Mansharamani, V. 2005. "Towards a Theory of Service Innovation: An Inductive Case Study Approach to Evaluating the Uniqueness of Services". M.S. diss., Massachusetts Institute of Technology.

Meirelles, D., and Santos, A. 2010. "Innovation in a Service Company: the Serasa Experian Case Study Analysis in the Light of an Integrative Approach." Paper submitted for the 1st Brazilian Symposium on Services Science, Universidade Presbiteriana Mackenzie.

Miles, I. 2004. "Innovation in Services." In: J. Fagerberg, D. Mowery, and R. Nelson, editors. *The Oxford Handbook of Innovation.* Chapter 16: 433–58. Oxford, UK: Oxford University Press. ISBN 0-19-926455-4 (hdbk.)

Monge, R., Rodriguez, J.A., Hewitt, J. Ruiz, K and Orozco, J. (August, 2011). "Employment Growth, Innovation and ICT Diffusion in the Costa Rican Manufacturing Sector". Paper produced as part of the IDB Project "Employment Generation, Firm Size and Innovation in Latin America: the microeconometric evidence (RG-K1164)".

Organization for Economic Co-operation and Development (OECD). 2005. Working Party on Innovation and Technology Policy: Promoting Innovation in Services. JT00191834. Paris: OECD Publishing.

———. 2009a. Measuring Innovation: A New Perspective. ISBN 978-92-64-05947-4 (PDF). Paris: OECD Publishing.

———. 2009b. Innovation in Firms: A Microeconomic Perspective. ISBN 978-92-64-05620-6. Paris: OECD Publishing.

———. 2010. *The OECD Innovation Strategy: Getting a Head Start on Tomorrow*. ISBN 978-92-64-05947-4 (PDF). Paris: OECD Publishing.

OECD (Organization for Economic Co-operation and Development) and Eurostat. 2005. Oslo Manual 3rd Edition. *The Measurement of Scientific and Technological Activities. Guidelines for Collecting and Interpreting Innovation Data,* 3rd edition. Paris: OECD/Eurostat.

Park, W. 2008. "International Patent Protection 1960-2005." Research Policy. 37(4): 761-766.

RICYT / OAS / CYTED / COLCIENCIAS / OCYT. 2001. *Standardization of indicators of technological innovation in Latin American and Caribbean Countries: BOGOTA MANUAL.* RICYT / OAS / CYTED / COLCIENCIAS / OCYT. [Accessed January through June, 2010]

Ross, J. 2001. "United Parcel Services: Delivering Packages and E-Commerce Solutions." CISR Working Paper No. 4356-0. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=3057141, accessed August 2011.

Rostow, W. 1960. *The Stages of Economic Growth.* Cambridge, England: Cambridge University Press.

Rouvinen, P. 2002. “Characteristics of Product and Process Innovators: Some Evidence from the Finnish Innovation Survey.” *Applied Economics Letters.* 9: 575–80.

Rubalcaba, L., and Gago, D. 2006. “Economic impact of service innovation: analytical framework and evidence in Europe.” Paper presented at the Conference on Services Innovation. Manchester, UK.

Tether, B. 2004. “Do Services Innovate (Differently)?” CRIC Discussion Paper No 66. Manchester.

Schumpeter, JA. 1939. *Business Cycles: A Theoretical, Historical, and Statistical Analysis of the Capitalist Process*. New York, USA and London, UK: McGraw-Hill.

United Parcel Services. “Company History”. UPS website. http://www.ups.com/content/us/en/about/history/, accessed August 2011.

Von Tunzelmann, N.; Acha, V. (2005). Innovation in „Low- Tech“ Industries. In: Fagerberg, J.; Mowery, D.C.; Nelson, R.R. (eds.), The Oxford Handbook of Innovation, Oxford, pp. 407-432.

World Bank. 2011. World Development Indicators (WDI). Washington, DC, USA: World Bank.