

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



IDB

**Science and
Technology Division**

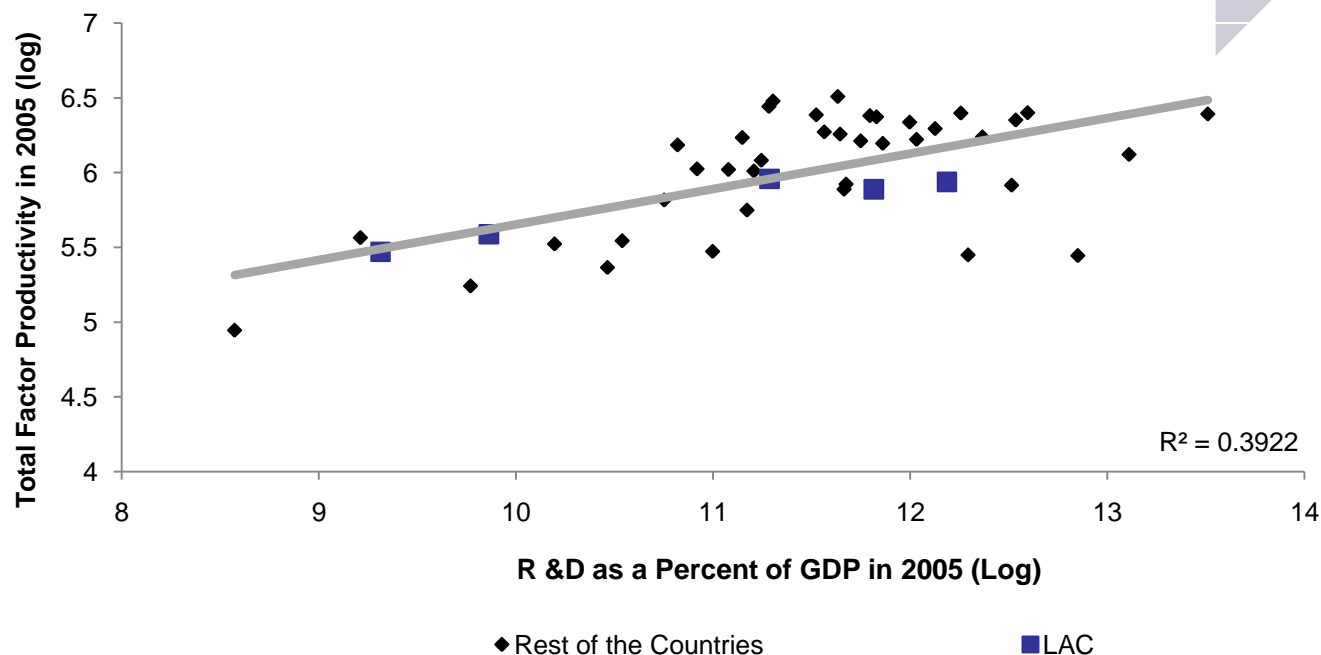
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Innovation and Productivity

Investment in innovation leads to productivity growth

Productivity growth is the foundation of economic development



More: Relative evolution of LAC Productivity Catch-Up
(Total Factor Productivity Index Relative to the United States)
<http://movingdata.bidinnovacion.org/chart04.html>



Innovation and Productivity in LAC

Impact of Innovation on Labor Productivity (Y: Log Sales per Employee)

	Argentina		Chile		Colombia		Costa Rica		Panama		Uruguay	
Technological Innovation (TI_p)	0.24 (0.14)*		0.60 (0.25)**		1.92 (0.32)***		0.63 (0.76)		1.65 (0.55)***		0.8 (0.24)***	
IE_p (predicted Innovation expenditure per employee)		0.41 (0.05)***		0.20 (0.13)**		0.61 (0.07)***		0.07 (0.19)		0.69 (0.12)***		0.45 (0.11)***
Size	0.02 (0.04)	-0.01 (0.03)	0.03 (0.04)	0.06 (0.03)**	0.18 (0.04)***	0.27 (0.04)***	-0.35 (0.092)***	-0.29 (0.06)***	0.05 (0.07)	0.08 (0.06)	-0.001 (0.05)	0.09 (0.05)*
Non Technological Innovation	0.09 (0.05)*	0.06 (0.05)	-0.08 (0.10)	-0.22 (0.08)	0.3 (0.09)***	0.31 (0.08)***	-0.17 (0.15)	-0.16 (0.16)	0.05 (0.16)	-0.01 (0.15)	-0.09 (0.08)	-0.09 (0.08)
Capital per employee	0.09 (0.01)***	0.08 (0.01)***	0.04 (0.19)	-0.02 (0.21)	0.28 (0.03)***	0.27 (0.03)***			0.03 0.01**	0.03 0.01**	0.31 0.02***	0.30 0.02***
Obs.	1192	1192	1151	1151	5934	5934	352	352	481	481	759	759
Fisher	28.84***	36.88***	12.36***	11.94***	39.54***	42.92***	4.67***	4.43	10.23***	12.47***	32.04***	30.49***
R²	0.17	0.21	0.13	0.14	0.17	0.17	0.1	0.1	0.015	0.2	0.40	0.40

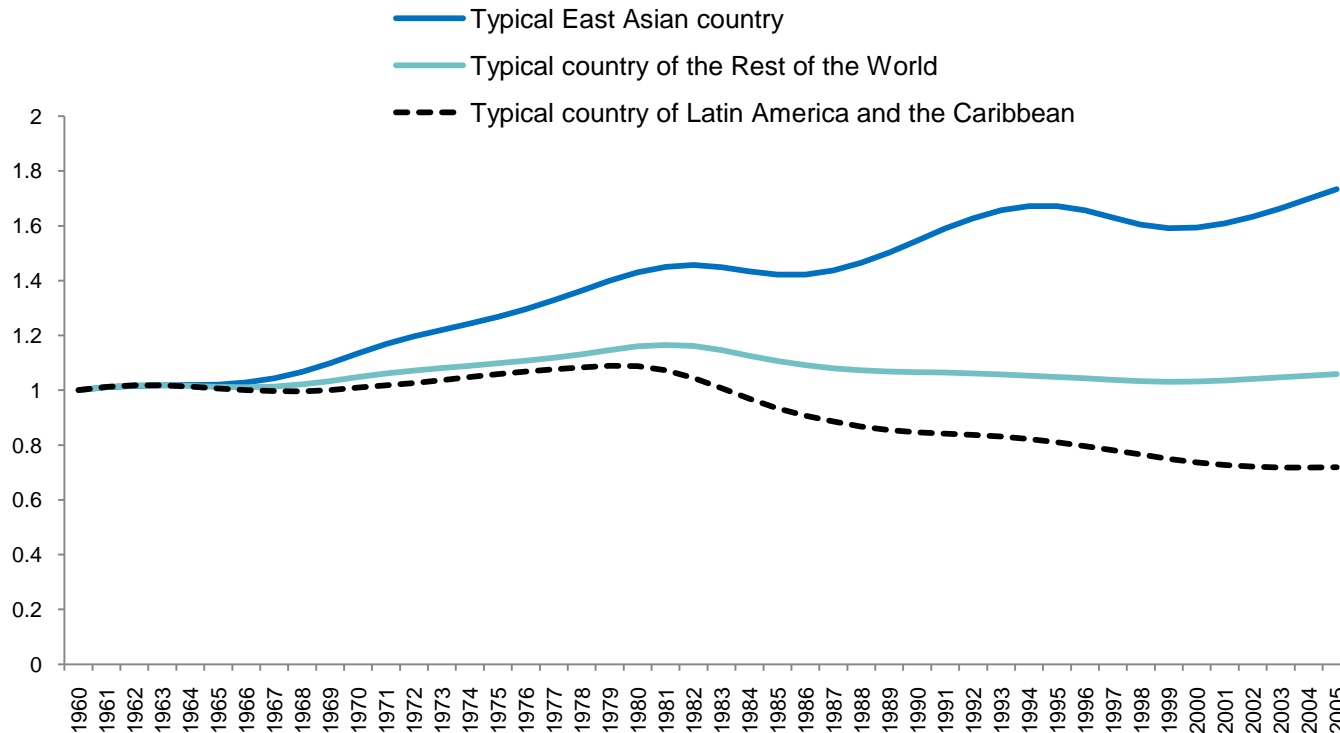
Note: Bootstrapped standard errors in parentheses (100 replications). The variable used to proxy for physical capital is investment made during the period considered for Argentina, Chile, and Panama. Uruguay and Colombia use the stock of physical capital.

* Coefficient is statistically significant at the 10 percent level; ** at the 5 percent level; *** at the 1 percent level; no asterisk means the coefficient is not different from zero with statistical significance.

Source: Crespi and Zuniga (2010)

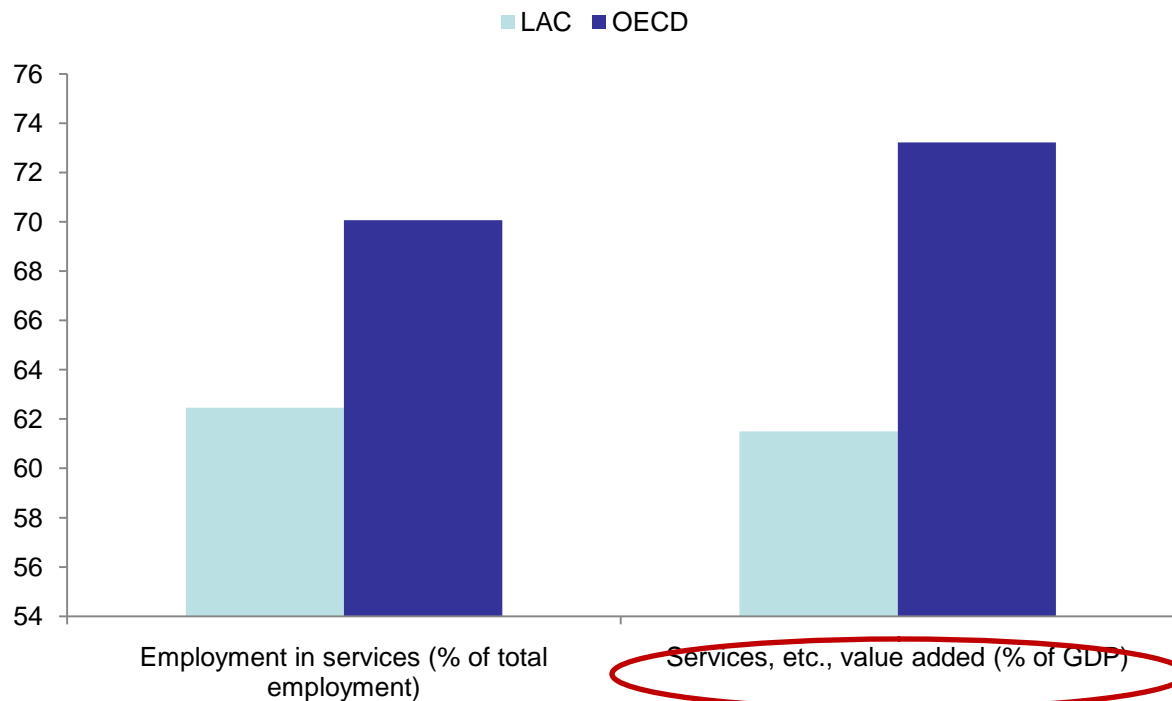
LAC Productivity is Lagging

(Total Factor Productivity Index Relative to the United States, 1960=1)



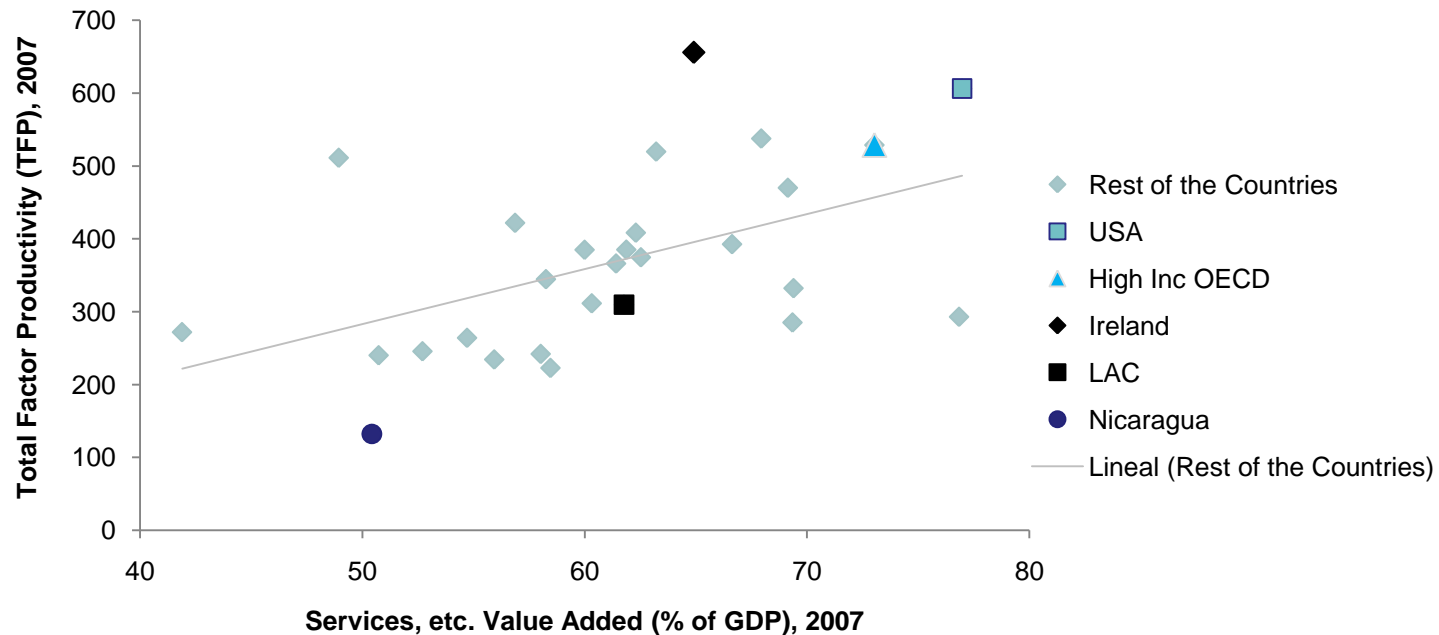
Sources: Daude and Fernandez Arias - IDB 2010

LAC Services are Dragging Relative Aggregate Productivity Levels Down



The service sector is also the dominant employer

The Relationship between the Value Added by Services to the Economy and Total Factor Productivity



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

Services in Developed Economies are a Major Contributor to Productivity Growth

- Two service sectors (trade & business services) explain around 50% of the output growth in OECD countries in the last 15 years.
- Services is the only sector with positive job creation in the last 10 years in OECD countries.
- Also **
 - In developed countries, service sectors are increasingly seen as **knowledge diffusers** to the rest of the sectors.
 - Services are **inputs and outputs of innovation processes** in the other sectors of the economy.

Overlap between Manufacturing and Services



Services Dominate Economic Activity, but they Remain Under-researched

- “Services” embodies a **huge range** of business activities with very distinct characteristics.
- The concept of innovation is rooted in the era of industrialization and manufacturing industry.
- Available evidence from the OECD suggests that the determinants of productivity growth and **innovation in services are different than in manufacturing.**
 - Innovation in services tends to be **non-technical** (organizational innovation, outsourcing, etc), implies mainly incremental changes of “ad-hoc” nature in product or processes, **not based on formal R&D**

Broad Scope for Innovation in Services

- It is important to differentiate between traditional (trade, transport) and **knowledge intensive business services** (KIBS, telecoms, finance, business services, etc).
- Recent evidence for developed economies highlights that innovation has become much broader in scope, stemming from a variety of practices and ones that are fundamentally **more collaborative in nature**.
- Innovation can be found in a variety of service sub-sectors (including government) and in a range of activities (such as those considered **low-tech**, according to the level of R&D)
- Services only recently started receiving attention – in empirical research and in policy making realms - we are just now beginning to understand services better.

Innovation in Services is far Less Understood

- **Market failures affecting innovation** in market services are far less understood.
- **Evidence is very limited** because investment is more intangible!!! Also, more continuous incremental innovations. Mixed modes – blurring of the different types of innovation (inputs are not always based on R&D).
- Services make greater use of trademarks, designs and copyrights to protect their innovations. **Service firms use a different set of IPRs** than manufacturing firms.
- So, Innovation Policy for services could be different but we do not know how different. **Uncertainties led to a bias against services by agencies in charge of innovation promotion** (in developed countries AND in the LAC region)

What we Know so Far

- **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 (more binding).
- The **motivations to innovate are similar** to those in manufacturing (but the determinants might be rather different).
- 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.**

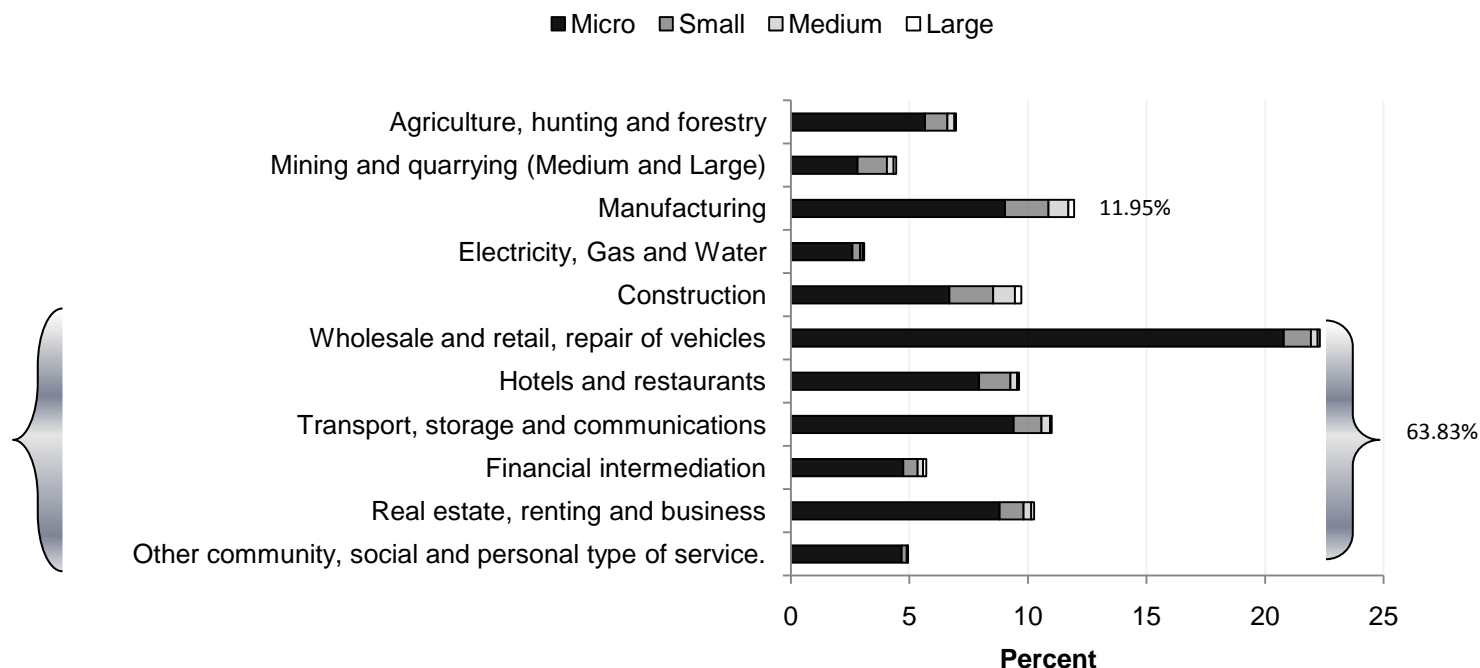
Dispelling Myths: Innovation Does Not Reduce Employment

- Recent empirical from the service sector in Uruguay finds that:
 - **There is no evidence of displacement effects from process innovation.**
 - The growth in sales of new products positively affects employment growth.
- The study on Uruguayan firms analyzes the effect of the introduction of firm innovation at three levels:
 - To produce technology itself (make)
 - To source technology externally (buy)
 - 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 all firm sizes.

Empirical Evidence from Chile

Characteristics (Typical of other LAC countries too):

Firms are **mostly Micro** (87% < than 5 workers)
and **concentrated in the Service Sector** (63.83%)



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

Maybe less likely to innovate...

Proportion of innovative firms (and type of innovation)

	Service Sector	Manufacturing Sector
Innovation	20.3	30.6
Product Innovation	10.2	20.3
Service Innovation	11.6	9.7
Process Innovation	6.3	14.1
Organizational Management Innovation	4.6	8.2
Marketing Innovation	5.0	8.8

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

...but do we know why?

Financial Constraints Tend to be Stronger for Micro Firms

Econometric Results, Potentially Innovative Firms

	Probit		Bivariate Probit		Bivariate Probit	
	Innovation	Innovation	Innovation	Fin. Const. Innovation	Innovation	Fin. Const. Innovation
Market Share	0.008 (0.22)	0.010 (0.28)	0.007 (0.22)		0.011 (0.33)	
Age	-0.032 (0.93)	-0.038 (1.07)	-0.037 (1.15)		-0.036 (1.16)	
Tech. Opp.	0.488 (11.25)**	0.489 (11.12)**	0.428 (5.35)**		0.416 (6.01)**	
Exp. Inc. Sales	0.177 (2.42)*	0.164 (2.22)*	0.145 (2.05)*		0.141 (2.09)*	
Exp. Unch. Sales	-0.036 (0.47)	-0.041 (0.52)	-0.032 (0.45)		-0.030 (0.44)	
Fin. Const. Innovation		-0.284 (4.68)**	-1.200 (2.22)*		-1.285 (3.21)**	
Group	0.264 (2.10)*	0.234 (1.83)	0.108 (0.69)	-0.268 (2.26)*		-0.307 (2.97)**
Collateral				-0.021 (3.18)**		-0.021 (3.22)**
Small	0.188 (3.61)**	0.157 (2.97)**	0.012 (0.11)	-0.267 (5.19)**	-0.002 (0.02)	-0.265 (5.20)**
Medium	0.333 (4.36)**	0.276 (3.53)**	0.016 (0.08)	-0.489 (6.40)**	-0.003 (0.01)	-0.484 (6.45)**
Large	0.589 (6.48)**	0.509 (5.44)**	0.139 (0.50)	-0.723 (7.72)**	0.127 (0.52)	-0.705 (8.02)**
Constant	-0.762 (6.10)**	-0.587 (4.49)**	0.034 (0.08)	0.225 (3.11)**	0.103 (0.31)	0.224 (3.10)**
Rho / P-Value			0.59/0.219		0.64/0.097	
Observations	7308	7308	7261	7261	7261	7261

Robust z statistics in parentheses * significant at 5%; ** significant at 1%

Forthcoming research found (not shown here) that financial constraints are stronger in services than in manufacturing or primary sectors (work in progress; Crespi / IDB).



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 on data from ELE (2007).

Public Support for Innovation in Chile

(Percentage of Firms by Sector)

	Services	Manufacturing
Asked for Public Support for Productive Development	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 on data from ELE (2007).

Human Capital as a binding constraint to innovation

Lack of Human Resources

Dominican Republic

51% of firms indicated lack of qualified personnel in the country as an obstacle to innovation

Panama

42% of the innovative service firms (2nd after small market size)

33% of non-innovative service sector firms (1st Obstacle)-67% considers that they don't need to innovate.

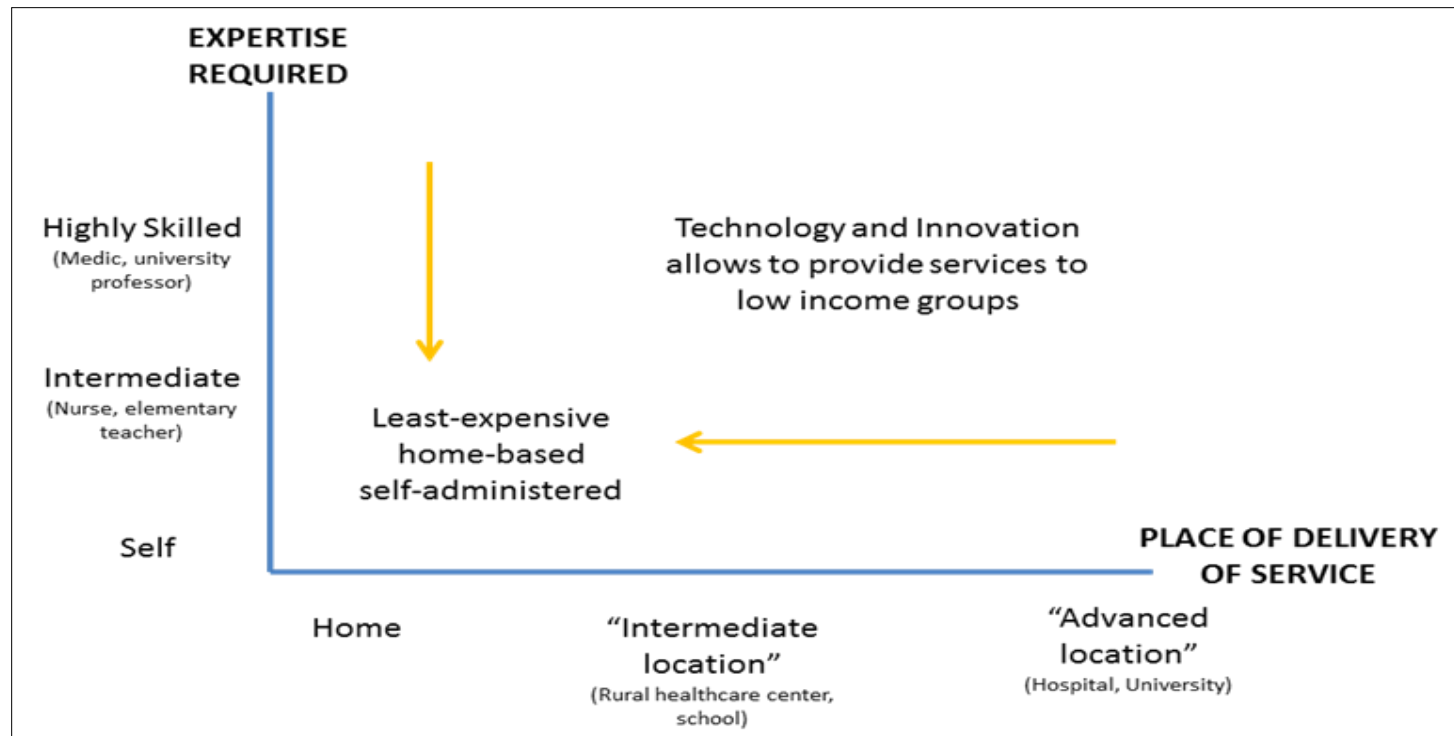
Costa Rica

45% of all innovative firms. 26% of non-innovative firms

Source: Authors' elaboration based on national innovation surveys.

Challenges that Policymakers Face

Adapting Services to Developing Markets: When Innovation Can Tackle the Needs of the Poor



**Balance between learning from advanced economies
and applications in the LAC region**



Action Plan: Research

- **Ongoing and Future:** the IDB plans to carry out the following research to cultivate a better understanding and more empirical evidence about innovation in services in LAC:
 - **Productivity gap analysis** both within the region and between LAC and developed countries.
 - Research and analysis about the innovation production function.
 - **Qualitative and quantitative research will be conducted on the different market failures that hinder innovation and productivity growth in services in LAC.**
 - Results from the research will be disseminated and help close policymakers' knowledge gaps.

Action Plan: Dissemination and Dialogue

- **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.

Action Plan: Dialogue

- **Experience:** 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 LAC region.
- **Future:** 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.



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