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Service Innovation in Developing Economies: Evidence from Latin America and the Caribbean

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ABSTRACT *This paper proposes a framework for understanding key aspects of service innovation in developing economies, based on four dimensions: first, the integration of services in national innovation systems; second, competences and preferences; third, networking and cooperation; and, fourth, outcomes in terms of socio-economic impacts. This conceptual framework is matched with new evidence from case studies performed in six different Latin America and the Caribbean countries (Argentina, Chile, Brazil, Uruguay, Costa Rica and Jamaica) and nine sectors (tourism, software-ICT, outsourcing, mining, logistics, retail, creative services, sport services and biotech services). The results reveal the importance of specificities in service innovation and suggest policy and managerial implications.*

1. Introduction

Services have become the most important economic sector in the world economy, in developed as well as in most developing economies. Even in regions where agriculture or manufacturing predominates, the growth of services in the last 30 years has been extraordinary. Today, the service economy provides more than half of all employment and value added in most countries. According to UNCTAD data, in 2010, services represent about 66 per cent of total world value added, but the path towards service economies has not been the same in all countries. The Latin America and the Caribbean (LAC) region is among the most service-oriented regions in the developing world, with services comprising 62 per cent of value added. Therefore, it does make sense that competitive strategies are based on what services can bring in terms of growth and welfare.

In the 1870s, most countries' economies were based on agriculture. Services represented about 25–35 per cent of GDP[1] in the main developed economies (Elfring, 1989; Madisson, 2007). Since then, manufacturing grew steadily, accounting for 40–45 per cent of employment by the 1960s. Later on, manufacturing began to decline in relative terms, never again reaching such high a share. Today, manufacturing accounts for about 20 per cent of GDP in developed economies. In general, the share of manufacturing in developed economies is similar to more than a century ago. The main difference, however, is that the weight of agriculture has been replaced by the weight of services. Even more striking is that this process of structural transformation is repeating itself across the developing world

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at an even faster pace. The role of agriculture is decreasing, while services are gaining in importance, even in countries that are still experiencing growth in their manufacturing base.

The international division of labour that emerged after the oil crisis of the 1970s and early in the 1980s initially suggested that while developed economies would become increasingly specialised in services, developing countries would specialise in agriculture and manufacturing. However, the growth of services in all types of economies has been staggering. A key driving force in the shift towards services is the integration of services in all kinds of productive processes. Therefore, 'the new service economy' does not refer to the growth of services as a separate sector, but rather to the growth of service activities embedded within different economic activities (Miles, 1993; Rubalcaba, 2007). What is new is the increasing presence of services in business and consumption processes and the capacity of services to become innovative, productive, and tradable. This new service economy is not only reinforcing, but also transforming the shift towards services initiated by developed economies more than a century ago.

In this context, service innovation is particularly important. It includes both innovations in the dominant service sectors and the ways in which agriculture and manufacturing are becoming more competitive by adding value through services. Service innovation can transform any industry. Myths, such as the non-innovative nature of services and the opposition between goods and services, need to be dispelled (Bryson, 2010; Gallouj, 2002a), in particular when the non-technological and 'soft' aspects of innovation are considered (Tether, 2005; Rubalcaba, Gago, & Gallego, 2010).

Service innovation is considered a particular powerful way in which innovation can perform a significant role in developing economies; not only because most of them are moving towards service oriented economies, but because services are bringing new forms of innovation that are not necessary linked to the top world concentration of research and development (R&D) and innovation in the developed world. Service innovation is becoming a prominent way to create or adapt and to implement both technological and non-technological innovation in developing economies. Besides, service innovation is also useful to fight against the sluggish productivity growth in the service sector that has been a major constraint in Latin America (Crespi, Cathles, & Vargas, 2013; Tacsir, 2011). The lack of productivity growth in services has had a negative effect on aggregate productivity growth in Latin America, where a structural shift towards services may continue for several decades before reaching a share typical for developed economies.

The objective of this article is twofold: first, to provide a conceptual framework for service innovation in developing economies and second to provide new evidence on service innovation and on its economic and social impacts in Latin America and the Caribbean. The evidence derives from case studies, funded by the International Development Research Centre (IDRC), on services innovation performed in six different LAC countries (Argentina, Chile, Brazil, Uruguay, Costa Rica and Jamaica) and nine sectors (tourism, software-ICT, outsourcing, mining, logistics, retail, creative services, sport services and biotech services).

In the following, Section 2 highlights the pertinence of the service innovation topic in developing economies. Section 3 presents a conceptual framework for understanding the role of service innovation in developing economies. Section 4 tests the framework for the case studies. Section 5 explains the main lessons learned, and Section 6 contains the conclusions and managerial and policy implications.

2. Services and Innovation in Developing Economies

The pertinence of the service innovation topic in developing economies is not obvious, since it was previously considered only to be a relevant topic for sophisticated and highly developed service economies. However, its relevance and interest is justified when seen from two perspectives, namely the innovation perspective and the service economy perspective.

Service innovation is part of a wider understanding of innovation according to a number of general innovation studies. Fagerberg, Srholec, and Verspagen (2010) place the role of innovation in economic development contrary to the popular belief that innovation is about sophisticated, well-off customers,

often the outcome of highly educated labour in R&D intensive companies. They underline the need for a perspective in which innovation is the attempt to try out new or improved products, processes and ways to do things in any economic activity. Innovation in 'low tech industries' can generate large economic and social impacts (von Tunzelmann and Acha, 2008). The same idea is behind the OECD (2012) when dealing with innovation for developing countries that 'a world-class science is not a condition for innovation'. The notion of innovation encompasses much more than highly developed technology; it includes some technological aspects, service industries and social innovation (p. 15). Innovation is important for the growth of developing countries, but also for inclusiveness and addressing socio-economic challenges (OECD, 2010).

Innovation has proven to be important for firms in developing countries with highly significant impacts on productivity, as some meta-analysis on the topic have illustrated (Fagerberg et al., 2010), even if the situation is far from being uniform across countries and across the evidence in the literature. Moreover, the innovation–performance relationship is strongly affected by factors such as size, the age of the firm, the type of innovation and the cultural context (Rosenbuschet al., 2011).

In the concrete case of LAC, where the lack of innovation may be one of the reasons behind the GDP per capital gap compared to the frontier countries (Daude & Fernandez Arias, 2010), the available evidence shows the importance of innovation in building sustainable economic advantages (Arias, Crespi, Tacsir, Vargas, & Zuñiga, 2013), providing rationale for economic support. The microdata from innovation surveys for LAC countries have shown the importance of innovation for firms in terms of economic performance, in particular for productivity and employment growth (Crespi & Tacsir, 2013; Crespi & Zuñiga, 2012). For service industries, the case of Uruguay has shown the importance of innovation in productivity gains, mainly associated with non-technological innovation and the importance of product innovation for employment growth (Aboal and Garda, 2012; Aboal and Garda, 2015; Aboal, Bravo-Ortega, & Crespi, 2015; Aboal, Garda, Lanzilotta, & Perera, 2015).

From the service economy perspective, service innovation is one of the key issues in the understanding of the new service economy together with service productivity, internationalisation of services and regulatory aspects. This is due to the emergence of services in developing economies on the one hand and the transformative role of service innovation on the other. Service innovation has a transformative role in economies in different ways: it increases the productivity of service sector; it increases the productivity of other sectors using services; and it also allows an increase of social and economic performance that goes far beyond what is visible in terms of innovation measurable outputs (Djellal & Gallouj, 2010; Rubalcaba & Kox, 2007).

The range of service innovation impacts can be explained by the interaction between three different elements (Rubalcaba, Michel, Sundbo, Brown, & Reynoso, 2012): firstly, the 'sectoral element' that refers to innovation in the service sector itself (private and public); secondly, the 'activity element' present in any economic sector, including manufacturing and agriculture is always comprising several service activities to the extent that the picture gets blurred by looking at products offering a mixture of services and goods; and thirdly, the 'agent co-production element' is based on the fact that service innovation is coproduced and often a result of innovation networks in which the various agents contribute to the creation of a service based result, such as public–private innovation networks in services (Gallouj & Djellal, 2010; Gallouj, Rubalcaba, & Windrum, 2013) or the customer involvement (Edvardsson & Tronvoll, 2013).

The most common management and marketing understanding of service innovations refers to the second 'activity business' element in which service innovation denotes (Den Hertog, 2010) 'a new service experience or service solution in one or several of the following ways: new service concept, new customer interaction, new value system/business partners, new revenue model, or new organisational or technological service delivery system'. In this approach, the non-technological aspects of innovation are particularly relevant (Coombs & Miles, 2000; Gallouj, 2002b; Tether, 2005), and as many as three schools of thinking have been developed to understand service innovation in contraposition to goods innovation (Boden & Miles, 2000; Gallouj & Gallouj, 1996), 'assimilation' (goods-like), 'demarcation' (differentiated) and 'synthesis/systemic' (integrated), although there is a growing

convergence around the synthesis/systemic approach. This is due to the fact that services and goods have become more and more integrated over time.

3. Services and Innovation in Developing Economies: A Conceptual Framework

In this section we propose a four-dimensional conceptual framework to understand the role of service innovation in developing economies (see Figure 1).[2] The basis is the national innovation system (NIS) and integration of services in its ecosystem. From this basis, service innovation is co-produced around specific characteristics given as a set of competences and preferences (intra-agent resources) and as a set of cooperation and networking among different agents (inter-agent resources). Finally, the agents interact, creating new service specific characteristics (new products, processes, organisational changes, marketing, clients interfaces and so forth) towards economic and/or social goals, that may be suitable for answering to societal challenges and achieving development goals.

3.1. National Innovation Systems and the Integration of Services

The place of services in the ecosystem can be identified through the type of service sectors in the economy (private or public services, tourism, transport, health, education, and so forth), or through the inclusion of services as elements of any economic activity. The sectorial approach may constitute sectorial innovations systems within the national one and create the type of synergies explained by Castellacci (2008b, 2009). Even if single frameworks can be applied for both manufacturing and services in understanding technological trajectories, the existence of several peculiarities in the process of knowledge creation in services has to be taken in account (Castellacci, 2008a). The sectorial patterns of innovation influence the national systems of innovation in which user–producers interactions, science-based sources of innovation and interactions with suppliers have a predominant role (Castellacci, 2009). In these three particular aspects, developing economies have struggled, because of the missing development of markets and their interactions, scarce implication of universities in innovation activities and low levels of integration of suppliers in global value chains.

This situation is accentuated by a low degree of development of knowledge intensive business services (KIBS). The focus on KIBS allows understanding the role of services, not only as sectors within the NIS, but also as activities. KIBS are the protagonists of the transformative role of services innovation in any productive activity, manufacturing and agriculture in particular (Camacho & Rodriguez, 2011; Hipp, Gallego, & Rubalcaba, 2015). In fact, emerging countries can, through service innovation can make an effective use of accompanying services providing new value added and

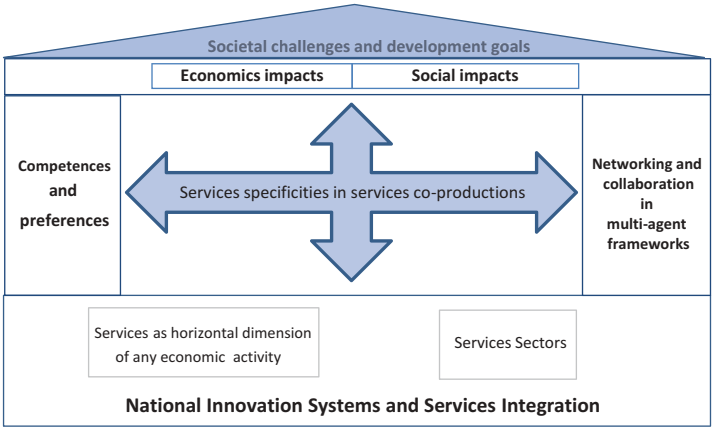

Figure 1. Framework to understand service innovation in developing economies.

product/service differentiation (in design, marketing, logistics, distribution, and so forth). Besides, services can be embedded in the diffusion of information technology that is particularly relevant for developing economies (Guy & Arnold, 1995), in the service components of technological transfer associated to exports and imports (Almeida & Fernandes, 2008) and in the technological catching up prior to innovation (Wang & Tsai, 2010; Wang, 2007). However, evidence could suggest a service innovation gap both at services sector level and at a broader horizontal level. Among the different adaptations needed from innovation systems frameworks to developing economies (Iizuka, 2013), the focus on services may be one of them.

The weak development of NIS in the region (Crespi & Zuñiga, 2012) is probably associated with a relatively minor role of services in innovation policies (Rubalcaba, 2015; Tacsir, 2011). Emerging sectorial innovation system could be expected to be found in areas such as tourism, with a high importance in the region, as well as in some parts of the innovation systems, often led by public organisations, by private firms, many linked to ICT sectors and by the adaptation of international best practices.

3.2. Competences and Preferences

Service innovation is expected to be found within particular agents where a certain level of competences and innovation-oriented preferences do exist. The preferences and the characteristics of the different agents determine service innovations which often materialise in new or improved services products, organisational changes, new interfaces and all ways of services innovation modalities (Den Hertog, 2010; Hertog, Rubalcaba, & Segers, 2008). Regarding competences, innovation in services is not very different from other types of innovation. Innovation depends on people who are able to generate and apply knowledge and ideas in the workplace and in society at large (OECD, 2011), and there is a clear need to develop skilled people through education and training in order to carry on with different innovations. Skilled people play a crucial role in each of the stages of innovation (creation, diffusion and use of knowledge). Furthermore, skilled people appear to enhance social capital of communities because of the level of engagement, networking and trust that facilitates cooperation. Such social capital can contribute to innovation by strengthening the linkages and knowledge flows that underpin innovative activities. Hence, innovation in services increases the need of new and better employment, skills and capabilities. However, some factors likely to influence the required skill sets are the stage of innovation, the type of innovation and industry structure. At the country level, adoption and adaptation skills will be more crucial for some countries, where many firms look for the introduction of innovation in the form of 'new to the firm' products/services and processes rather than radical inventions.

Competences and preferences have been defined by Windrum and García-Goñi (2008) in the Lancasterian characteristics approach originally suggested by Saviotti (1996) and later extended by Gallouj and Weinstein (1997). Service co-productions are possible through interactions between different elements constituting the basis of multi-agent frameworks in which three or more agents collaborate, including users, providers and policy-makers. The preferences aspect is also important in service innovation, since through service innovation organisations create deliberate and well-thought-out experiences. Enhancing experience-based service is critical for most organisations both in the service and the non-service sectors; hence, user preferences and their experience become key elements. At the end of the innovation process, users find the possibility of a new experience, which in fact is a new service.

3.3. Networking and Collaboration

In this dimension, the coexistence of two opposite dynamics can be expected. One is the self-development of innovation given the weakness of the NIS. Companies may decide to innovate by themselves with little cooperation from other agents in the local systems, and most innovative measures may be imported or produced in a rather isolated way. However, because of the lack of

company resources for innovation, the scarce integration of services in the NIS and the lack of sufficient development of local KIBS markets in particular, a relatively strong cooperation between firms through professional associations and with foreign institutions and companies could be expected. Innovation networks have proven to be important in services where public–private and civil society manage to cooperate in formal or informal ways (Gallouj et al., 2013). There is also room for open innovation and external cooperation in services (Chesbrough, 2011), even if R&D has been shown to be more important (vs external sources) for radical innovation in Europe in goods and services (Battisti, Gallego, Rubalcaba, & Windrum, 2015; Windrum, Battisti, Gallego, & Rubalcaba, 2013). On the same line, in-house innovation investment has led to higher impact in LAC for product innovation (Zuñiga & Crespi, 2013). In any case, the public–private–civil society cooperation in services, mainly for incremental innovation, that has been observed in the European case (Gallego & Rubalcaba, 2013) should be at least as important for developing economies. This is true, even if the endowments of KIBS generally are lower in developing economies, since they are associated with economic growth and agglomeration economies (Merino & Rubalcaba, 2013). Besides knowledge-based firms, the requirement of engagement of social actors in innovation networks as part of the NIS has also been emphasised in the case of developing economies.

3.4. Socio-Economic Impacts

Any positive innovation trends intend to cope with societal challenges that can be concretised by area (for instance, health, education, professional services) or by sector (public sector, private sector, third sector). For emerging and developing economies, innovation is seen as a way to deal with growth and productivity, but also increasingly for social inclusion and equity (Chataway, Hanlin, & Kaplinsky, 2013). These social goals, in general, are not the main purpose of most service innovation in the private sector (even if they are in the public sector). However, effects on social goals may be observed when innovative measures affect a large part of the population, specific social communities or require some empowerment for local actors. On business performance, according to the literature on service innovation higher impact on quality than on costs could be expected, especially in non-standardised services (Rubalcaba et al., 2012). Furthermore, impacts from service innovation often result in the creation of new employment. This is why it is not expected to find significant impact on productivity in the short run. All this can lead to particular societal benefits beyond mere business or economic benefits. Service innovation in sectors such as health, education, tourism and agriculture can be particularly inclusive to engage more actors in the process and disseminate the outcome to more citizens. Social innovation is considered interrelated to service innovation (Harrinson, Klein, & Browne, 2010) and can be particularly relevant in emerging economies (Reynoso, Kandampully, Fan, & Paulose, 2015).

4. Evidence from LAC Case Studies

The evidence presented in this section is based on a summary of a set of reports from the innovation and productivity in services in the LAC study (IDRC project). The study has identified a set of cases dealing with service innovation in different areas, most of them related to public support to service innovation, even if in general most support is indirect. The cases were selected by the different teams participating in the project in agreement with the coordinating team of the study, based on the relevance of proposed cases and the coverage of a full range from traditional services, like tourism, to advanced services, such as ICT services. A common questionnaire aimed at identifying useful information was distributed to all teams. However, each team had the opportunity to adapt the questionnaire to the needs of the particular case being studied. Table 1 summarises the cases analysed in the project.

Table 1. Case studies of the IDRC–IDB–CINVE project

Country	Study	Sector	Cases
Argentina	López, Ramos, and Fernández (2013)	Rural tourism	5 activities – clusters and survey to associations (n = 31) and providers (n = 59)
Argentina	Castro and Jorrat (2013), Castro, Jorrat, and Szenkman (2013)	TICs	6 individual firms and analyses of official data on ICT services (n = 73)
Chile	Alvarez, Bravo, and Zahler (2013)	Logistics, mining, retail and outsourcing	Sectors outlook and 9 firms in detail
Costa Rica	Valenzuela, Majano, Jäger, and Kilian (2013)	Tourism	Sector (survey based on n = 120 hotels) and 6 individual firms
Jamaica	Morgan (2013)	Creative and sports services	5 activities or firms representing different subsectors
Regional study (Argentina, Brazil, Chile Uruguay)	Niosi and Bas (2013)	Biotech	Sector case based on 4 countries and 22 individual firms

4.1. The Innovations

The case studies cover a wide set of innovations. In Chile, four different sectors, namely mining, transport, offshoring and logistics services, are covered. In mining, the supplier Enaex represents a characteristic example of a goods-oriented firm converted into a service firm. A new service product was offered and service innovation became the central activity. Enaex is currently an integrated service delivery company with high standards of efficiency and safety. It shifted from selling explosives to services such as transport, studies, screening of drilling, security, and others. Many types of product innovations make this firm very competitive and dynamic in its sector. Some innovations are radical and new to the world. A second case from Chile is in the logistics area, representing innovation for services enhancement to optimise freight flows. Arica Port Terminal is the name of a new innovation management model offering new client interfaces and new delivery systems both in technological and organisational fields. Extraport Store Hansen is a supplier-dominated innovation company, using services, delivery systems and client interfaces. JB logistics offers solutions for the movement of special cargo by cooperative practices and partnerships in a supplier-dominated pattern. In the offshoring sector, Chile offers a third case study where innovations mostly relate to service engineering (Metaproject and Nectia), tools (Virtual 21) and design development and project management (OscI). In the retail sector in Chile (fourth case study), Cencosud offers a case with many innovative aspects, such as those related to improved purchasing strategies with local providers. This is based on a Cencosud service experience strategy, importing shopping experiences (Paris stores) and service commitment (Techno Paris Jumbo).

In the Argentinian ICT sector, most innovations are incremental in the areas of security (Onapsis), market research (Socialmatrix), marketing (Vfound), e-learning (Wormhole IT) and linguistic services (Keepcom). There is also a more radical innovation in an online system for health (Turnosnet). The rural tourism sector in Argentina offers a broad range of innovations, oriented towards a new service experience. Specificities are present around five types of destinations: *ruta del vino* (new services on well-established market and providing differentiation); *red del turismo rural campesino* (new linkages between local supply and original village); *turismo rural en San Juan* (new gastronomy to add value added services); *meseta infinita* (new business concepts based on regional assets and environment); and *de Pampa y Gauchos* (new ethnic and cultural tourism with participation in traditional activities). Most innovations are incremental, with the wine case being the most radical.

Costa Rica offers cases on tourism as well, but related to a sustainability standard. Most innovations are process and organisational, related to sustainability or modernisation. Some marketing and

technological innovations are also promoted, among them many oriented towards personalisation of services.

In Jamaica, the types of innovation are related to very different sectors, presented as case studies: live music (process and marketing innovation and artist packages); recorded music (process); non-traditional theatre (new ways to interact with local communities to combat violence); athletics (management services in special centres); and culinary services (creation of new products).

Finally, the biotech services case studies analyse the role of KIBS in biotech services around different specialisations in different countries. Argentina is more specialised in human health and agricultural–bio products. Brazil centres more on biofuel and is the leading country in this business. The cases in Chile are in the fishing and mining and health sectors. Uruguay, a small economy, is similar to Argentina, with human health and agricultural–bio products.

The selected sectors are those in which service innovation can reinforce or promote new competitive advantages in traditionally competitive areas (for example, mining and retail in Chile, tourism in Costa Rica and Argentina, athletics in Jamaica), although some other sectors might be useful in creating new competitive sectors for the country (for example, ICT/outsourcing in Argentina and biotech services in the region).

Many of the innovations are the result of adoptions, adaptations and assimilation of foreign innovations (retail, tourism and biotech in particular). Incremental innovations are, however, new to the firms, and to a certain extent new to the countries. There are also cases of 'new to the world' innovations (for example, some mining services in Chile and creative services in Jamaica).

The selected case studies are mainly in the business area, although social goals are also aimed at in cases like tourism in Argentina and Costa Rica and the creative and sports services in Jamaica. Besides this, important social impacts are present in most of the innovations in the analysis.

4.2. Evidence from LAC Case Studies

This subsection presents the evidence of the case studies testing the previous conceptual framework above under Section 3. Table 2 describes how its different components relate to each of the case studies.

4.2.1. National innovation systems and services. Two main patterns emerge in the innovations reported in the case studies. Some are market driven, with partial participation of the public sector (mining and retail in Chile and some cultural services in Jamaica), while others are driven by a strategic decision on the part of the government where public support is considered important (rural tourism and ICT services in Argentina, offshoring in Chile, R&D biotech, tourism in Costa Rica). In all cases, service innovation addresses particular problems of firms, clients or economies.

An example of the first group, focusing on Chile, is mining services, where the move to innovate was caused by massive investment in the pipeline, concomitant with the outsourcing of services by major mining companies and the existence of few suppliers able to innovate and meet challenges. The public support to Enaex was significant, but not essential (it was particularly useful for funding a pilot plant project, a programme to disseminate innovation culture and tax deduction for R&D). In some other business cases, the reaction to foreign competition has been a particular source of innovation, such as was the case of Cencosud-retail in Chile and some cultural services in Jamaica, which faced imitation and pirating, with no IPR protection of the Jamaican products and services.

An example of innovations depending of public funding is rural tourism in Argentina. The authorities considered both the importance of the sector for the country and the need for new competitive opportunities in rural areas that lacked resources for innovation. A need to increase income from value added services was identified in programmes such as PRONATUR. Support from the Inter-American Development Bank was important, and public funding helped catalyse private funding. Public support also had a significant role in ICT business innovation, seeking new business opportunities in Argentina. Several public ICT-related programmes have supported the actions, and BAPE (Buenos Aires Emprende) has a particular role in five of the six firms studied.

Table 2. Service innovation in LAC: summary of case studies

Case study	Type of innovation	Objective	National innovation system and the role of public support	Competences and preferences	Networking and cooperation	Economic impact	Social impact: inclusive innovation
Chile mining services	Radical process or product innovations. Development based on technology, important role of R&D.	Competitiveness is the main objective.	Public innovation policies have been important, but not fundamental. For small firms, public incentives are more important. Customers, professional associations and pro-innovation culture are important.	Develop talent retention strategies, especially those who have 'soft' skills such as teamwork and flexibility.	Innovations are supported by KIBS (such as communications systems). Local and foreign partners (consumers) have been determinant.	Impact not only in mining firms, but also in regions different from those where the mineral is located, due to the geographical distribution and concentration of firms.	Potential social impact through developing solutions for more effective fragmentation, with less energy consumption and less impact of mining activities.
Chile logistics	Development of new service delivery system. Technological and organisational innovations. Mostly incremental.	Regional competitiveness. Programme aimed to consolidate a long-term strategy and improve performance of the logistics industry	Various public institutions have developed interventions to strengthen the logistics sector in the region, but the results are not satisfactory. Suppliers and partnerships are relevant.	High demand for skilled human capital. Given the scarcity of the right skills regionally, attraction of foreign professionals is common practice.	Importance of public–private cooperation. Absence of strong social capital and cooperation determinant for failure of innovations.	The development of the sector has potential spill overs all over the economy – increased infrastructure, more internationalisation, and so forth. Some firms have been able to innovate and enhance their productivity, while others remain behind.	Increase demand of highly skilled human capital.
Chile off-shoring	Service engineering, tools, and design development, as well as project management.	Regional competitiveness. Programme to achieve greater value added in service companies.	Public programmes with a regional strategy to improve the value chain integration and productivity of local actors. Association with engineering services is important.	Demand of skilled human capital, but also 'soft' skills are the keys to make innovation succeed.	Interaction with clients and association among firms of the sector are very relevant. Strong absence of associations has been a determinant of failure.	Cost reduction and increase in productivity. Enhancing competitiveness with great linkages within the industry.	Innovation in this sector requires investments in human capital and service provision, infrastructure with strong social impact.
Chile retail	New logistic optimisation system, consumer profiling, self-service devices and development of e-commerce. Technological and non-technological innovations.	Competitiveness and business consolidation.	Firms have developed their innovations with their own funds. Government funds are not important. Role of external consultancy/ KIBS. International benchmarking. Exploration of margins created by regulations.	Upgrading of skills in-house. Development of training plans in order to develop the skills needed. The relationship with the client is a very important driver of need of human capital and the innovations.	Large firms cooperate with each other, but weak partnership of foreign firms with local, legitimated local retail actors. External knowledge from KIBS is important.	Possible spillovers through the economy with the internationalisation of the sector.	Impact on customer satisfaction. Improvement in service quality.

(*continued*)

Table 2. (*Continued*)

Case study	Type of innovation	Objective	National innovation system and the role of public support	Competences and preferences	Networking and cooperation	Economic impact	Social impact: inclusive innovation
Argentina ICT	Incremental process (adaptations). Clients and internal development are key elements. R&D is important.	Growth of start-ups.	Great role of public support to help mitigate financial constraints and weakness of organisational capital. Important role of clients.	Government-based training programme to help develop technical skills was very important.	Access to networks and contacts to allow overcome financial constraints and other informational asymmetries. Interaction with clients and external knowledge from KIBS are important.	Access to new clients and new markets. Innovations have spill overs across the economy.	Increased employment, increased sales and product diversity.
Argentina rural tourism	Non-technological innovation, centred on new experience for customers. Most innovations are incremental.	Competitiveness. Social inclusion of small farmers, women, and other vulnerable groups. Human capital development and training.	Public institutions supporting innovation programmes play a significant role for the development of human capital, reduce financial constraints and reduce informational asymmetries	Need of development of human capital and training. User preferences, customer service and the experience are the innovations in this sector.	Networks and associations appear to be one of the most relevant elements for the success of the innovation.	New clients, more market share and increased earnings. Increased competitiveness in, for example, wine sectors and associated sectors.	Beneficial for small agricultural groups and associations and vulnerable groups
Costa Rica Tourism	Mainly non-technological innovations. Lead also to investment in new technologies and physical capital.	Increase sustainability of the tourism sector. Social inclusion: the programme incentives supporting schools, local producers, communities in the neighbourhood.	Public policies played a limited role. No fiscal incentives, but other incentives to innovate.	User preferences and experience are two of the main drivers of innovation.	Some interactions between civil society and firms. Associations in the sector and objectives are not aligned at the national level. Not enough networking. Leading to inefficiencies/ ineffectiveness.	Maintain market share, cost saving.	Social reputation is seen as an objective of the innovation. Increased sustainability. Some cases with direct social objectives, for example to increase social security in the local area. Client satisfaction.
Jamaica cultural services	Innovation relies on creativity, uniqueness and authenticity, which involves more radical innovation. Technological and non-technological innovations.	Increase competitiveness. Social inclusion, in particular in the case of the non-traditional theatre.	Scarce support programmes for innovation. Only one case in which public institutions helped developing the human capital needed, but most demand for inadequate policy framework (weak IPR). Civil dynamism, cooperation between university and key sectors (spin-off in athletics).	Preferences and competences play a crucial role in the inno vation.	Cooperation (the lack of it) explains success (failures). Link with university is important in the case of athletics.	Competitiveness in some cases (sports mainly). Spillover to the rest of the economy, mainly through tourism.	Some impacts on community cohesion and new skills development.

(*continued*)

Table 2. (*Continued*)

Case study	Type of innovation	Objective	National innovation system and the role of public support	Competences and preferences	Networking and cooperation	Economic impact	Social impact: inclusive innovation
Regional (Argentina–Brazil–Chile–Uruguay) biotech	These are R&D activities, with radical technological innovations, developed inside the firm with strong associations (universities, and so forth.)	Increase competitiveness.	Requires strong government incentives and support. In general, lack of continuity in policy is reinforced by inadequate funds and idiosyncratic academic practices.	High-skilled human capital is the key for innovation.	Cooperation is essential: links with universities, public laboratories are determinant of the success of innovations.	General spillover to the economy: technologies applied to agriculture, environmental remediation services, food, mining, pharmaceuticals and other industrial activities.	Strong social impact through new medicines, new seeds, key genetic information and environmental services. Human capital development.

In other cases, the role of public intervention is restricted to a particular segment of the innovation process. This is true of innovation in biotech, with public support to R&D and clustering policies essential to some of the developments, but insufficient to explain all sector development, which is rooted more in human capital, market size and other considerations. The case of Costa Rica also shows the importance of public intervention in creating and promoting the standard for sustainable hotels. However, the hotels themselves were acting in response to the crisis of 2008, attempting to reinvent themselves and acquire new strategies beyond public sector intervention.

A common characteristic in all case studies is the weakness of the innovation systems to deal with service innovation and often public policy is not adapted to the specificities of the services companies. Public interventions have been important but not essential to success. Besides this, the universities have played a marginal or no role in most service innovations considered. This will be reported below.

4.2.2. Competences and preferences. Skills and human capital are considered to be an essential source of innovation, for which training is a necessary and powerful tool. Intellectual and technical human capital is required to develop and carry out innovation, but service innovation also needs communication and inter-relational/societal skills to adapt to a client-based culture.

In all cases, the relationship with the client, experience and knowledge of preferences are key drivers of innovation in the service sector. In some cases, like the ICT in Argentina, the client preferences are the source and base for the innovation. Similarly, in the rural tourism case of Argentina, the experience of the client is the main service innovation itself. This is also true for the tourism case in Costa Rica, where the client experience is the most important driver of innovation. In all these cases, 'soft skills' of the service provider are important ingredients in successful innovation results.

In the Chilean case, irrespective of the sector, human capital is one of the most relevant factors that determines the establishment of regular routines of R&D activities of companies. Then, the production of new or improved capabilities and necessary skills is one of the tasks that firms must consider if they want to expand their services. In this vein, the logistics sector faces a regional lack of skilled workers to generate new and improved operational processes. Consequently, the attraction of foreign professionals is a strategy usually followed by big companies. Hence, buying human capital outside of the firm – and even outside of the country – is one way in which knowledge needs, necessary for innovation, are acquired. In other cases, linkages with international partners, covering the lack of required professionals, is exploited in order to solve requirements of clients under just-in-time schemes. Then, rather than piggybacking on regional or systemic strategies (which are unavailable) to solve common needs that imply constraints to innovate, individual firms develop ad hoc human capital strategies to implement improved services, mainly in topics such as engineering, project design and management.

The mining service industry in Chile faces the tension of recruiting appropriate people to develop and enhance innovation initiatives within firms. To strengthen innovation processes and their management, the firm requires skills different and complementary to engineering. Therefore, some firms have developed talent-retention strategies, especially of those who have 'soft' skills such as teamwork and flexibility. Hence, the process of human capital selection in companies establishes the availability of 'soft' skills as an important requirement for generating innovation projects.

A different way of addressing the scarcity of skills is found in the retail sector case studies in Chile. This sector has opted to upgrade the required skills in-house, developing training opportunities for current or newly hired employees depending on the goals of the new solution, which have become crucial to effectively achieving new forms of relationship with clients. There is a similar case for Argentina in the rural tourism case, where 'soft' skills are very important for innovation to succeed. Contrary to the Chilean case, training was scarce and the need to develop human capital remains an important bottleneck. However, in some cases, human capital with management knowledge and knowledge of tourism was able to develop successful innovation in the sector.

The experience in the Chilean offshoring service sector shows that despite having professionals with technical abilities in software development and coding, there is a progressive need to include complementary knowledge and skills. For instance, even in companies with a strong base of engineers, the internal composition must include professionals from social sciences that bring a complementary perspective in the relation with clients.

Finally, in the regional biotechnology case study, the production of knowledge is rather unbalanced and a small number of scientists are responsible for a large number of innovations. In this sense, the sector has difficulties in the attraction of high-skill human capita, because of language differences (for example, in Brazil almost all portals are Portuguese based) or the small size of the internal market (a clear case is Uruguay). Because these firms require advanced human capital and receive important externalities from public R&D laboratories, public support to biotechnology is a key issue. For instance, Brazil and Chile, in order to accelerate the incorporation of highly skilled human capital, have relied on generous fellowships, allowing students to increase their skills abroad. This practice is without doubt valuable, but not very cost-effective. Nearly half of the students do not complete their careers, and among those who do complete their advanced degrees half of them tend to remain in the country where they have trained (NSB, 2010).

4.2.3. Networking and collaboration. Firms in the case studies have described the existence of determinants and facilitators for service innovation. The role of R&D is considered more important in technological innovations (mining suppliers in Chile, one ICT company in Argentina and biotech services), while in-house sources have proved more important in services, following informal generation of knowledge (tourism) and by using KIBS to innovate (cultural services and logistics). KIBS are particularly relevant in promoting innovative measures. When they are already working well in other more developed markets, it is simple to adapt these measures to local markets and conditions. External knowledge from KIBS is always an important source of innovation, as demonstrated in the Cencosud case in Chile and the Argentine ICT case. However, cooperation with universities has been considered unimportant and is therefore marginal or non-existent (cases in Chile). They are only considered relevant in a few cases (for example, biotech in all countries and athletics in Jamaica). In many cases, customers and clients are considered to be important sources of innovation (for example, mining, tourism and cultural services).

Some cases indicate other particular facilitators. For mining service innovation, suppliers themselves are particularly important, as is the creation of a pro-innovative culture in the firm, beyond R&D programmes. This case also shows the usefulness of innovation management programmes. In Argentine ICT, previous expertise and interactions with clients are essential, as is international benchmarking and adaptation to local market conditions (Wormhole, on e-learning) and R&D (Keepcom, on linguistic services).

In tourism, associations play an important role in the innovation process. Rural tourism in Argentina is a case in point. These projects can be the result of public–private cooperation, as in innovation in transport in Chile. Cooperation between the civil society and private firms is instrumental in promoting sustainable tourism in Costa Rica.

In biotech services, other facilitators include funding and venture capital, cooperation with universities and access to human capital. KIBS, firm size and regulations are also drivers (Brazil and Argentina).

The results of the case studies do not permit establishing a balance between internal R&D, quite related to technological innovation and the use of networking and external sources such as KIBS and universities. Their relevance is much differentiated, depending on the context. However, interaction among different agents has proven to be significant, as well as the role of professional and sector associations representing the civil society. This means that the case studies represent different combination and levels of cooperation between the private, public and the third sector. Although most of the innovations in the cases have been led by business developments (private), the role of the third sector and the public sector is not neglectable. In fact, certain innovation failures are explained by the absence of these two sectors.

4.2.4. Socio-economic impacts and business performance. All cases have reported difficulties in measuring impacts derived from service innovation. This is mainly due to the short life of innovations, the lack of time series and time perspectives to make ex-post evaluations. To this must be added the difficulty of measuring intangible and invisible outcomes. Nevertheless, all case studies have reported important impacts of service innovation. Some of them are implicating the inclusion issue (mainly through increases in employment, diffusion of quality and improvement of life conditions on rural areas and excluded segments of population).

The innovations in Enaex in Chile shows impact on the access of suppliers to new knowledge, reductions of transaction cost in networks and improvement of internal capacity to carry out R&D activities, productivity and safety measures. There is, though, a lack of accountability, and the assessment is considered 'intuitive'. Indirect social implications derive from the increasing of sector competitiveness, and therefore their implications on growth and welfare are not directly measurable. Additional social impact derives from developing solutions for more effective fragmentation, with less energy consumption and less environmental impact from traditional mining activities.

Another example, this time using a quantitative modelling that attempts to measure the impact of public support to innovation on several dimensions, is provided by the ICT case studies in Argentina, based on official data for 73 companies. The public programmes increase the likelihood of creating new services due to important networking effects associated with participation in the programme, and also some of its components increase productivity, employment, and physical capital formation. In the analysis at the individual level, the impacts reported are access to new markets and clients and integration of new services. Increases in employment and turnover are also apparent in successful cases. Four of the firms (Onapsis, Socialmetriz, Wormhole IT and Keepcom) had 21 employees before the introduction of innovative measures and around 120 employees after, over a four-year period.

Important qualitative and social impacts are reported by the tourism case studies. The rural tourism in Argentina case study reports large impacts of innovation programmes, among others, in the areas of diversification, product differentiation, quality, cost reduction, number of visitors and employment. Impacts are more substantial in radical and novel innovations with strong leadership, knowledge and management skills, than when there are incremental innovations or when leadership and skills are weak. The innovations were beneficial for small agriculture groups and associations and other vulnerable groups. They had significant impacts on employment and training opportunities for local aborigine communities, youth and women.

In Costa Rica, the main impacts are in differentiation in the tourism activities and the degree of hospitality, but trade-offs are identified (that is, to increase some services, others may need to be reduced). Innovations for sustainability have reduced costs and increased productivity. Cost reductions amount to 30 per cent in utilities, chiefly water and electricity. The CST public programme for standards in sustainability has produced a major effect on improving operations in hotels, although other factors may play an even more important role. Evidence shows that the CST programme affects product, process and organisational innovation, but not marketing innovation. This innovation is important, not only for the large part of the society depending on the tourism sector, but for the socio-environmental challenge as well. The programme also promoted supporting schools, local producers and communities in the neighbourhood.

The biotech sector shows an increase in employment, together with patenting and productivity, despite reduced public support for advanced academic and public sector R&D. Public regulations can also be barriers to innovation. Public support generates positive impacts, to KIBS in particular. They are major components of innovation systems. KIBS are concentrated in large metropolitan areas where there is access to highly skilled labour. They have strong social impact through new medicines, new seeds, key genetic information and environmental services and human capital development.

Cultural services in Jamaica, in particular theatre performances, were successfully used as a way of dealing with violence. Cultural services have important impacts on community cohesion and new skills development.

In short, positive impacts on quality, differentiation, range of products offered and employment have been the most important economic results in most of the selected case studies, but impacts on productivity and sales have been reported as well, despite the measurement difficulties. On the social side, certain cases are very business oriented with secondary social implications, while others, like the rural tourism case in Argentina or the cultural services case in Jamaica, have strong social implications and, given the engagement of society in the co-producing of innovation, can even been considered social innovation cases.

5. Main Lessons Learned

The lessons learned from the case studies for the proposed innovation framework are manifold. Within the NIS dimension, the public sector intervention per se does not guarantee success in LAC case studies (for example, the cases of Costa Rica and Chile). The nature of such interventions and the linkages between actors are essential, as well as the involvement of the private sector. Moreover, there is no sector innovation system integrating services, surely as the result of the NSI in most countries in the region prioritising the reinforcement of current under construction innovation systems.

Competences and preferences involved in services innovation are essential. The case studies made clear that successful cases are largely based on sufficient skills, adequate training and public programmes. Training is a powerful tool. Governments in LAC supply very little, if any support for training. Intra-firm training development seems to hold the key to this problem, but at the same time most firms lack the skills to produce it (training of trainers). Meanwhile, customer and employee preferences play an important role for service innovation and customer experiences sometimes largely rely on competences and preferences of the agents, as illustrated in the case of rural tourism in Argentina and the training of the local promoters. There is a need to develop programmes for service innovation culture, like in the case of the support to mining services in Chile.

Seen from the networking perspective, case studies indicate a positive role of KIBS as catalysers, even if their presence is not high. There are different networking strategies depending on the type of service, sector and stage of innovation. However, in LAC case studies there is a clear absence of co-operation. In only exceptional cases are there associations which work with positive results. The triple helix university–industry–government does not work very efficiently. At this point, the networking is at an initial stage, with mainly bilateral relationships and no well-established innovation networks. The rule is in general ad hoc cooperation. Users play a weak role, except in social innovation-based cases (rural tourism in Argentina and cultural services in Jamaica). In these cases, target populations have even been engaged in the coproduction of innovation with empowered local communities.

Finally, in terms of socio-economic impacts, positive spillovers do exist. Despite the difficulties on reporting economic and social impacts, most cases have reported some positive or very positive impacts, and the main valuable impacts depend on each case study. Sometimes, the key issue is cost reduction, while in other cases it is the business performance or the numbers of jobs. There are multi impacts on firms and on the overall economy, but quality impacts are not as central as in developed economies. Reported cases on service innovation are about to solve more basic firms and social short-term necessities. In the two social innovation cases, social impacts are more appreciated than economic impacts, as expected, although economic benefits are also significant.

The lessons learned from the case studies also suggest a complementary role of technological and non-technological innovation, the usefulness of taking into account an open and inclusive way of performing incremental innovation, and the need for reinforcing the NIS by placing service innovation as an essential ingredient where different policy strategies apply.

6. Concluding Remarks and Policy and Managerial Implications

Service innovation has become a crucial issue for developing economies. This is not only for the growth of services, but even more for the transformative power of service innovation in developing economies.

This article has proposed an analytical framework for understanding service innovation in developing economies based on four dimensions, namely, the role of services in the NIS (systemic base), the role of competences and preferences (intra-agent resources), the role of networking and cooperation (inter-agent resources), and the socio-economic impacts (outcomes). Service innovation shows specific characteristics in this framework. The framework is useful for understanding service innovation in its very diverse contexts.

The article has tested the framework for new empirical evidence from IDRC-funded case studies on services innovation performed in six different LAC countries (Argentina, Chile, Brazil, Uruguay, Costa Rica and Jamaica) and nine sectors (tourism, software-TIC, outsourcing, mining, logistics, retail, creative services, sport services and biotech services).

Service innovation has proven to address major societal challenges by its transformative power in basic agricultural and industrial sectors (mining suppliers in Chile), traditional services sectors (tourism in Costa Rica and Argentina, retail in Chile, some sport and music services in Jamaica) and new emerging service activities (ICT in Argentina, logistics in Chile and biotech services in certain countries in the region).

The proposed framework applied to the case studies allows the identification of common challenges in four dimensions. Firstly, in the placement of services within the NIS, where the role of the private sector has been deemed to be important, given the lack of relevant public-specific innovation policies for the service sector in the region. Secondly, it is in the role of competences and preferences, where most successful cases are based on strong human capital skills and on the empowerment and training of agents in charge of participating in the innovations. Thirdly, in the necessity of reinforcing networking and cooperation on innovation, especially in a context where the triple helix is not working well and where KIBS could play a stronger connectivity role. And fourthly, in the socio-economic impacts where multi-impacts on firms and economy are not so much focused on quality, but on specific business-cost-based or product-range performance. The case studies have also illustrated the role of social impacts, mainly in the cases that can be considered social innovation cases in services.

Policy implications can be derived from this work, and are related both to the market and systemic failures for services innovation policies (Rubalcaba, 2015) and to the particular obstacles found through these case studies. The common problems in most of the selected case studies are a lack of funding, missing skills and no guarantees for investment in innovation. These three concerns require policy action in the areas of R&D and innovation programmes, training and education, IPR and guarantee systems.

In Chile, mining services find major obstacles in risk aversion, the need for insurance for innovation (through a competitive fund) and access to financing. In Argentine ICT, the lack of suitable skills is the most quoted complaint, as well as the lack of funding and of bureaucracy. In the Argentinian rural tourism case, the major obstacles are lack of resources for innovation, lack of availability of skills, insufficient knowledge about the market, uncertainty and risk, over dependency on the state and resistance to working with associations. The case of tourism in Costa Rica shows that incentives are lacking. The CST can be improved for suppliers, because they have a role to play, but suppliers need to have a comprehensive understanding of the programme (not just hotels). Tourism associations need to be more involved, skills must be strengthened, and best practices need to be promoted. In the Jamaican cultural services, the main concern refers to IPR and to high interest rates for loans and entrepreneurship. Finally, in the biotechnology case studies, policy implications centre on the importance of promoting venture capital and guaranteeing continuity of the funds, as well as on patenting, regulations, competition, clusters, skills, research and training, public procurement, data and information. Policies should promote private investment and developing human capital is essential.

The case studies raise awareness of the advantages of service innovation and of the need for service innovation policies in certain areas. However, it is important to recognise the difficulty to design service innovation plans without a thorough analysis of the situation in specific countries/sectors and of the possible solutions. Existing initiatives reveal that no single policy fits all situations and all countries. Each country

must adopt a particular strategy, building on past experience in innovation policies and on strengths. Some countries would prefer to opt for horizontal policies while other may prefer concentrating on vertical sectors. Others may take a systemic approach to building or rebuilding policies to promote service innovation. What clearly follows from the framework and the empirical evidence is the need to go beyond the mainstream R&D spillovers approach for moving into the evolutionary economics approach that is more related to systemic failures (Castellacci, 2008a), particularly useful to justify service innovation policies in both developed and developing economies. International experiences for service innovation (United Nations, 2011) show this move towards an evolutionary approach, where own policy design has to be permanently adapted to the needs and local peculiarities.

As a final policy implication and in order to maximizise the impact of a given policy, it is essential to develop service innovation policies in cooperation with stakeholders. Since service innovation policies are not a priority in many R&D programmes, the design must be interactive in order to address as many requirements as possible. Furthermore, service innovation policies must be experimental and periodically refined or revised to maximise impact and correct the mistakes. Many service companies are badly represented and under-associated in the political and administrative systems. In the service field, public policies can play an active role in promoting service associations with representation of service companies and service innovation stakeholders. The role of public/private innovation networks is particularly useful in this sense.

Most policy-makers dealing with service innovation are prioritising horizontal actions adapted to promote service innovation broadly. Existing programmes should be redesigned to include service innovation and all other associated intangible aspects, such as organisational aspects, marketing components, ICT-related services and KIBS when developing innovative measures. Some specific vertical programmes may also be required to favour strategic sectors, such as tourism, KIBS, cultural services and other sectors, which have growth potential. Service innovation policies should include actions such as grants, tax incentives, venture capital and guarantee funds, business support networks, incubators and vouchers. Service innovation policies should be complementary to other regulatory and non-regulatory policies regarding services in order to promote synergies.

From these policy implications, it follows that there is no single policy receipt for all service innovation purposes: firstly, because services and countries are heterogeneous and different sectors and countries (and regions within countries) may require different approaches; and secondly, because some services specificities, such as the relatively lower importance of R&D and patents and the relatively higher importance of impacts on quality, have to be taken into account in order to promote services-oriented components in horizontal innovation actions (for example, ICT services beyond pure ICT) or to promote services innovation in some specific sectors, requiring a vertical approach (for example, tourism). Besides this, attention to service innovation issues is in itself an instrument to reinforce the NIS.

On top of these policy implications, the research also provides some managerial implications, mostly related to the competences and preferences, and the networking and collaboration dimensions of the framework; since the other two dimensions are more related to public policy implications. In the competences and preferences dimension, the studies have shown that external knowledge coming from KIBS is always an important source of innovation, and managers must be aware of this seeking the right balances, often complementary, between in-house KIBS and outsourced KIBS. In addition, innovation processes and their management require skills. Therefore, innovation processes that fail to be accompanied by human capital and capabilities formation have a high likelihood of failure. The upgrading of required skills by developing training opportunities for current and new employees depending on the characteristics of the new solution can be done in-house, when external public support is not available. From the network and collaboration perspective, the interaction with clients and suppliers is key in order to promote a corporate innovation culture to reinforce the competitive and pro-innovation preferences of staff and managers and to generate innovations. Cooperation and networking is also possible with other providers in the sector. In this context, business association has shown to be important for the internalisation of agglomeration economies in the generation of innovations. Even though the evidence shows that in some cases public funds were used for funding innovation activities initiatives, the role of the management and

the pro-innovation culture of the firm is always vital. Many service innovation activities were initiated on the basis of new technological applications, but non-technological innovation activities (for example, training, external consultancy, and so forth) are key for innovation in the sector and its management (Sundbo, 1997).

Finally, the research has led to open questions for further research. The proposed model should be tested using some quantitative modelling to assess which factors are more decisive behind service innovation and in which context. The interrelations between the multi-agent approach, based on competences and preferences and the role of networking and collaboration, also deserve further research. A critical debate of how service innovation can be situated in the context of weak innovation systems is also required, since service innovation should demand less institutionalisation and research infrastructure than goods innovation. In this way, it could be a 'shortcut' for knowledge and technological creation, absorption and adaptation, but at the same time evidence shows that the most advanced countries in service innovation are developed economies. In addition, further research is needed to better understand the role of social service innovation in developing countries and their social and economic impacts where the different varieties of services economies may be at least as important as those in developed economies (Daniels, Rubalcaba, Stare, & Bryson, 2011). In any case, additional research is necessary to continue exploring the essential potential of service innovation as a transformative power for developing economies.

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Notes

1. Average of the percentages in France, Germany, Japan, the Netherlands, Sweden, the United Kingdom and the United States (Elfring [1989] and statistics from Angus Maddison).
2. This framework is both inspired by the theory and by the evidence presented in the article; therefore, in some sense it can be seen as a result of both a deductive and an inductive process.

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