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Fifteen advances and fifteen challenges for service innovation studies

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Abstract:
In an article entitled "Twenty challenges for innovation studies", Ben Martin (2015) lists the twenty challenges that "innovation scholars" will haveto face over the coming decades. This prospective exerciseis based on a review of twenty major advances in this field of research since itscreation. In this contribution, wecarry out a similar exercise, but focusing only on services. Our goal is twofold. It is, first, to account for the main advances of the "Service Innovation Studies"over the last twenty five years, distinguishing, on the one hand, advances in theoretical conceptions, and, onthe other hand, advances in innovation modes and institutional arrangements. It is, second, on this basis, to provide an agenda establishing a certain number of research priorities in this area.

Keywords: service innovation studies, research advances, research challenges

Introduction

In an interesting programmatic article entitled "Twenty challenges for innovation studies", Ben Martin (2015) lists and discusses the twenty most important challenges that "innovation scholars" will have, according to him, to addressover the coming decades. This prospective exercise is based on the review of twenty major advances in this field of research since its creation fifty years ago under the name of "science policy research" (see Appendix 1).

In this contribution, we wish to carry out a similar exercise, but focusing only on services. Therefore, our aim is to account for the major advances in "Service Innovation Studies" (SIS) and to provide an agenda setting research priorities in this area.

However, services are not absent from Ben Martin's analysis. First, some of the challenges envisaged are horizontal: they concern all sectors. Second, even if Martin didn't explicitly mention it, others mainly originate in service activities. This is the case, for example, owiththe "shift from visible innovation to dark innovation". But above all, the shift frominnovation in manufacturing to innovation in service is designated by Martin as one of the most important of the twenty challenges for IS over the coming decades. However, the place given to services in the major challenges for IS is not, in our view, sufficient and satisfactory. It deserves to be further clarified. A focus on services and the challenges they raise is justified, if only by the centrality of services in contemporary economies. Is it necessary to remindthat

they now account for over three quarters of the wealth and jobs in all developed countries and that the emerging and developing countries are no exception to this universal process of tertiarisation?

However, the exercise that we propose to carry out suffers from several limitations. First, it is not possible to provide an exhaustive list of challenges, butour purpose ismerely to identify a sufficient (necessarily arbitrary) number to establish a research agenda and generate debate among service innovation scholars. Second, it should be admitted that the “newness” of the identified issues is relative. In some cases, these issues have already been addressed in the literature, even on an ad hoc basis. It is seldoman absolute novelty. These issues are sometimes the exploitation of particular aspects of a major advance (already acknowledged). For example, reconciliation of service innovation and social innovation is a new challenge (challenge n°2), which can be interpreted as an enrichment of the recognition of the existence of specific forms of service innovation (advancen° 3). Similarly, the “smart service ecosystems”challenge (challenge n°4) can be considered as the deepening of the research trajectory illustrated by the endogenization of technological innovations (advancen°2).

However, the exercise that we propose keeps all of its interest for different reasons. *First*, although it will still be possible for an attentive reader to identify an existing reference on a challenge considered as new, including it in our list means it is a rich research field which exploitation is still in its infancy. Such a field constitutes a powerful research trajectory, which has not revealed all its secrets, and that we must keep on exploring. *Second*,whatever the degree of real novelty (which is arbitrary), as highlighted by Martin (2015), the interest and novelty of the proposed exercise is to bring together in a single analysis, these different challenges.

As with IS in general, a good way to consider the major challenges in SIS is to start by reminding the main advances since the establishment of the SIS field. Indeed, the survey of the advances is a useful tool for identifying the gaps and the potential directions for further research.

On the whole, thismainly theoretical work is organized in two sections. In the first section, we state the main fifteen advances achieved in the area of SIS over the past two decades, distinguishing two different but linked groups: on the one hand, advances intheoretical concepts, and, on the other hand, advances in innovation modesand institutional arrangements. In the second section, we examine the fifteen main challenges that could structure our research agendasover the future.

1. The fifteen major advances in SIS over the past two decades

SIS are a relatively young field of research which we can date the emergence in the second half of the 80s and early 90s.This field was born from the convergence of two originally independent research trajectoriess. The first is the trajectory of “service studies” concerned by the rise of service activities and how it affects public policy and business management. The second is that of “innovation studies”, concerned about providing policy makers and business managers with tools for managing and supporting innovation.

Despite its young age, this field of research is relatively prolific and it has already resulted (which is a sign of maturity of the field) in a number of “surveys”, whether these are general surveys devoted to innovation in services in general or specific surveys devoted to a particular (sectoral or thematic) aspect of innovation (see table 1).

Table 1: General and specific surveys on innovation in services (non-exhaustive list) (enriched from Galloujand Djellal, 2015)

General surveys	
- Droege et al.(2009) - Bryson and Monnoyer (2004) - Coombs and Miles (2000) - Gallouj (1994, 2002a, 2010) - Gallouj and Savona (2009, 2010) - Gallouj and Windrum (2009) - Miles (2002, 2005)	- Gallouj and Djellal (2010) - Howells (2007, 2010) - Windrum (2007) - Pilat (2001) - Drejer (2004) - Rubalcaba et al. (2012) - Carlborg et al. (2014) - Djellal and Gallouj (2015)
Specific (sectoral) surveys	
- Innovation in hospitals - Diffusion of innovation in health services	- Djellal and Gallouj (2007a) - Greenhalgh et al. (2004)
- Innovation in public services	- Djellal et al. (2013) - Windrum and Koch (2008) - Gallouj and Zanfei (2013) - Miles (2013) - Arduini and Zanfei (2014)
- Innovation in Tourism	- Hjalager (2010),
- Innovation in logistic services	- Chapman et al.(2003)
Specific (thematic) surveys	
- Typologies of innovation in services	- Snyder et al. (2016)
- The servitization of manufacturing	- Baines et al. (2009)
- New service development	- De Jong and Vermeulen (2003), - Johne and Storey (1998)
- Innovation indicators	- Djellal and Gallouj (1999) - Drejer (2004) - Gault (1998) - Evangelista and Sirilli (1995)
- Innovation and employment	- Djellal and Gallouj (2007b)

Relying in particular on these surveys andcarrying out a survey of surveys, we have compiled a list of what we consider the fifteen major advances in the field of SIS since their advent, nearly a quarter century ago (see table 2). This survey of surveys and the identification of these fifteen advances will make it possible to identify a certain number of knowledge gaps in SIS and a certain number of challenges for this field.

The first seven advances reflect changes in the recognition of SIS, in the general theoretical perspectives andthe understanding of the fundamental nature of service innovation, while the other eight rather correspond to advances in innovation modes and institutional and regulation arrangements.

Table 2: Fifteen advances in service innovation studies

•*Advances in the recognition of SIS, inthe general theoretical perspectives andthe understanding of the nature of innovation*

1. From non innovative services to services as simple adopters of technological innovations
2. From services as simple passive adopters to services as active adopters or even producers of technological innovations
3. From services as adopters/producers of technological innovation to services as producers of specific innovation forms
4. From innovation in some specific service sub-sectorsto innovation in all service activities
5. From innovation *in* services to innovation *through* services
6. From innovation in services to service innovation (everywhere)
7. From publications in existing journals to the creation of specialized journals

• *Advances in innovation operating modes and institutional and regulation arrangements*

8. From Oslo Manual 1997 edition to Oslo Manual 2005 edition
9. From assimilation surveys to demarcation and integration surveys
10. From assimilation policies to demarcation and integration policies
11. From the search for productivity to the quest for performance
12. From services industrialization to goods servitization
13. From the linearization of the innovation process to the recognition and strengthening of a multifaceted natural interactivity
14. Balancing the intrinsic tension between service standardization and service customization
15. Balancing the intrinsic tension between service regression and service extension

1.1 The advances in the recognition of SIS andin the general theoretical perspectives

Innovation economics, like many other fields of economic theory, was built on the manufacturing field. Economic analysis has long considered that the innovation issue does not concern services. Services do not innovate orto a negligible extent. The conquest of IS by services has been gradual. It is possible to account for the gradual recognition of SIS, its legitimacy, through successive changes, which reflect advances in the general theoretical perspectives.

Advance 1. From non-innovative services to services as simple adopters of technological innovations

After an outright denial phase, the first advance achieved by SIS is the recognition of a minimalist innovation activity, limited in its nature and in its source, which is reduced to the adoption of technical systems produced by the manufacturing sector. The technologies in question are technologies for the transportation ofinformation or material (ICTs, road, air, rail, sea transport systems, etc.). This advance illustrates a technologist and industrialist or assimilationist view of innovation (Gallouj, 1994, 2010):just as in manufacturing, service innovation is primarily supposed to consist ina material artefact. Besides the *exogenous* dimension of technologies (these are indeed only considered as service production factors), this progress also reflects a *subordinate* position of services vis-à-vis manufacturing. After all, services simply adopt, relatively passively at this stage, innovative technologies produced in manufacturing sectors. Technological trajectories at work in services are therefore “supplier-dominated”according to Pavitt’s typology (1984).

Advance 2. From services as simple passive adopters to services as active adopter or even producers of technological innovations

The second advance achieved by SIS is the shift from services as simple *passive adopters* to services as *active adopters or even producers* of technological innovations. This vision is still technologist and industrialist or assimilationist, since innovation is still limited to technical systems. But a double movement of endogenization and autonomisation of innovation dynamics in services characterizes this advance. The *endogenization* of technologies (especially ICTs) means they are no longer subject to a simple passive adoption, but instead to more complex managerial mechanisms of integration or embedding in the organization. *Autonomisation*for its part reflects the fact that service organizations can, in some cases, stop depending on suppliers frommanufacturing sectors, by producing their own innovative technical systems. In some cases, the autonomisation (vis-à-vis the manufacturing sector) can go so far as to the inversion of the balance of power. Indeed, service providers may dominate their industrial suppliers and orienttheir technological trajectories, for example, by imposing the functional and technical specifications of new products. Such “customer-dominated” trajectories manifestthemselves, for example, in large-scale retailing (where large-scale retailers often dominate their industrial suppliers).

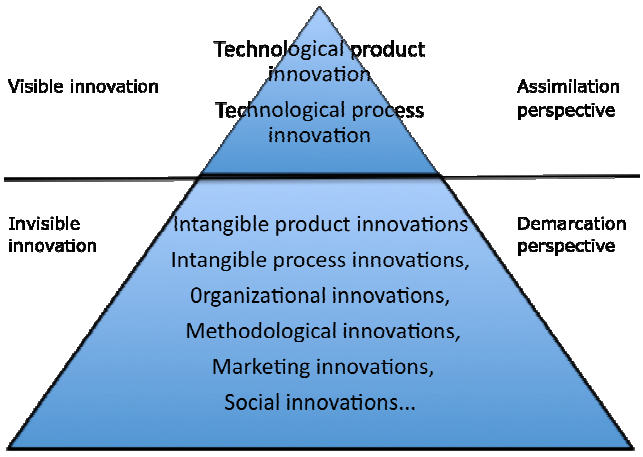
Advance 3. From services as adopters/producers of technological innovations to services as producers of specific forms of innovation

The concepts of innovation, we have discussed in advances 1 and 2 makes it possible to onlygrasp the tip of the iceberg of innovation in services (Figure 1). This visible part of innovation is the one that is perceived by traditional indicators, such as R&D and patents. It is reduced to technological product and process innovations.

SIS highlight an innovation gap, that is to say, the existence of invisible or hidden innovations. Thus, advance 3 consisted in focusing on the submerged part of the innovation iceberg, and in accounting for non-technological forms of innovation: intangible product and process innovations, organizational innovations, methodological innovations, marketing innovations. Therefore, this advance reflects a displacement of the analytical focus from visible innovation to invisible (hidden or forgotten) innovation. It illustrates the transition from a technologist, industrialist or assimilationist perspective to a non-technologist, service-based or demarcationperspective(Gallouj, 1994, 2010). It assumes, for SIS, to free themselves fromconceptualizations inherited froman industrialist culture and to begin to unlock the cognitive process. It should be noted that, in his research agenda for IS, Ben Martin (2015) evokes the shift from visible innovation to dark innovation. But he does not explicitly recognize what this progress in IS owes to SIS.

The non-technological character of these invisible innovations does not mean that they are not basedor cannot be based on materialtechnologies (IT or telecommunication systems, means of transportation, for example), but that they are not consubstantial to them and that they canin some cases dispense with them.

Figure 1: The innovation iceberg (Source: Djellal and Gallouj, 2016)



Advance 4. From innovation in some specific sectors to innovation in all service activities

The search for the specificity of innovation in services was initially performed using as main field of investigation knowledge intensive services: knowledge intensive business services (KIBS), but also information services, in particular financial services. Several reasons can be given to explain this empirical focus. First, knowledge-intensive services are the purest of the pure services. They are the ones that best meet the technical criteria of intangibility, heterogeneity, inseparability (of production and consumption) and perishability (non-stockability), which are supposed to distinguish services from goods. This "purity" is an asset when one seeks to identify the characteristics of services innovation (related to the fundamental nature of these activities). Second, these services are knowledge and information intensive, which makes them inherently particularly sensitive and open to innovation issues.

However the question of the specificity of the forms of innovation has rapidly disseminated to many other empirical investigation fields. These include, among others, transportation, trade, cleaning, hospitality, tourism, health[1], public services, etc.

Advance 5.From innovation in services to innovation through services

An important advance in SIS is the recognition of the key role of knowledge intensive business services (consultancy in its various professional or technological forms, engineering, R&D) in their clients' innovation dynamics (especially industrial clients). KIBS are not only the most innovative service sector and the main sector addressed by SIS (see advance n°4), but as knowledge processing andproducingmachines, they also support innovation activities in other organizations. They not only play the role of facilitator, diffuser of industrial innovation, but also the role of sub-contractor or co-producer of this innovation. Recognition by SIS of the role of KIBS reflects the

[1]The innovation which is addressed here is not biomedical and pharmacological innovation that has been the object of a long-standing and abundant literature, but innovation in services peripheral to the provision of care (e.g., catering, hospitality, cleaning, trade, etc.)

shift from the recognition of innovation *in* services to the recognition of innovation *through* services.

This *essential* relationship (innovation *through* services) may be considered at themicro or macro level. At the micro level, the literature describes the existence of an interactional model of innovation (Gallouj, 2002c), which complements the traditional Schumpeterian entrepreneurial and monopolistic models (Schumpeter 1 vs. Schumpeter 2 models). Whereas in the latter models, respectively, the individual entrepreneur and the R&D department embody the entrepreneurial spirit, in the interactional model, it is embedded in the external service providers (KIBS). At the macroeconomic level, European statistical analysesunderline a strong correlation between the share of KIBS in total employment and national performance in terms of innovation (European Commission, 2008).The theoretical perspective illustrated by this recognition of the role of KIBS in innovation dynamics is called*inversion* (Gallouj, 2010). It reflects an inversion of the balance of power between manufacturing and services in terms of innovation.

Advance 6. From innovation in services to service innovation(everywhere)

The most complete theoretical advance is the one that consists of replacing the opposition between goods and servicesby the idea that all is service andconsequently, that everything is service innovation. Thereforethere is a shift from anassimilation/demarcation perspectiveto a synthesis or integration perspective (Gallouj, 1994, 2010), which waives opposing goods and services to try to develop unifying theoretical models that account for innovation in all its forms (visible and invisible) in both goods and services.

A number of theoretical models have emerged, that share the common assumption of a blurring of the boundaries between goods and services and therefore suggest integrative analyses of goods and services and innovation in goods and services. These analyses include the functional economy (Stahel, 1997), which defines both goodsand services by the function (service) theyprovide, the experience economy (Pine and Gilmore, 1999), which defines them by the experience they provide to consumers, the approach in terms of characteristics developed by Gallouj and Weinstein (1997) (see also de Vries, 2006; Garcia-Windrum and Goñi, 2008), which defines any good and service as the implementation of competence and technical characteristics in order to produce services characteristics (utilities or use values). In this approach, it is the action on the characteristics (their addition, deletion, association, dissociation, formatting) that defines innovation and its various modalities.

Among the more recent integrative approaches, which are very popular, one can also mention the “Service-Dominant Logic” (Vargo and Lusch, 2006), which defines value by the value-in-use, therefore blurring the difference between goods and services,and the new “science service” perspective (Maglio and Spohrer, 2008), which is a science of both services and goods. Therefore there is a shift from a situation wherescience was not interested by services and service innovation to a need to develop a (multidisciplinary) services science (see challenge n° 14).

Advance 7. From publications inexisting reviews to the creation of specialized reviews

The early important works on innovation in services have been published in general management or innovation management journals as well as in industrial and innovation economics journals. The journal *Research Policy*in particular has published a number of seminal articles in the field (especially the pioneering work of Barras)[2]. Theedition of scientific journals specialized in services is one of the important advances in SIS that testify to their growing legitimacy. Table 3 provides a list of these journals, indicating their date of creation and theireditor. The table does not take into account a certain number of journals covering specific services sub-sectors, e.g., health services, tourism, transportation and logistics...

Table 3: List of scientific journals in the field of services economics and management

Journal	Creation date	Publisher
Economia dei Servizi: Mercati, Istituzioni e Management	2006	Il Muliano
European Review of Services Economics and Management (ERSEM) (replacing Economies et Sociétés, EGS series)	2016 1995	Les Classiques Garnier Les presses de l'Isméa
e-Service Journal	2001	Indiana University Press
International Journal of Service Science, Management, Engineering, and Technology (IJSSMET)	2010	IGI Global
International Journal of Services, Economics and Management (IJSEM)	2009	Inderscience
International Journal of Services and Operations Management (IJSOM)	2005	Inderscience
International Journal of Services Operations and Informatics (IJSOI)	2006	Inderscience
International Journal of Services Sciences (IJSSci)	2008	Inderscience
International Journal of Services Technology and Management (IJSTM)	2000	Inderscience
Journal of advanced Research in Service Management (JoARSM)	2014	Advanced Research (ADR) Publications (India)
Journal of Service Management (JOSM) Formarly International Journal of Service Industry Management	2009 1990	Emerald
Journal of Service Research (JSR)	1998	Sage
Journal of Service Science Research (JoSSR)	2009	Springer
Journal of Service Science (JSS)	2008	The Clute Institute
Journal of Service Science and Management (JSSM)	2008	Scientific Research
Journal of Services Marketing (JSM)	1987	Emerald
Managing Service Quality	1991	Emerald
Manufacturing and Service Operations Management (MSOM)	1999	Informs
Service Business	2007	Springer
Service Management	2005	Scientific Journal of University of Szczecin (Poland)
Service Science	2009	Informs
The Service Industries Journal Formarly known as Service Industries Review	1983 1981	Taylor & Francis

[2]Within the book published by Gallouj and Djellal (2015), bringing together 43 reference articles in the field of SIS, 12 articles were published in Research Policy.

1.2 Advances in operative modes and corresponding institutional and regulation mechanisms

The next eight advances concern the organization modes and the institutional environment of service innovation. These advances are part of two separate groups. The first group includes advances that express the shift from one state to another, while the second (which includes only two cases) brings together advancesthatrather involve a dialectic relationship (tension, confrontation, balance) between two opposite states. In most cases, these advances illustrate, for operational fields (managerial, institutional or political), changes in theoretical perspectives (assimilation, demarcation, integration) or tensions between these perspectives.

Advance 8. From Oslo Manuel 1997 editionto Oslo Manuel 2005 edition

Theoretical advances outlined above induced significant institutional advances. Thus, the Oslo Manual published by the OECD, which sets international conventions for the definition and measurementof innovation (especially in order to homogenize national surveys) has undergone several revisions, according to the theoretical advances in SIS and the rise of their legitimacy. Thus, the first version established in 1992 (OECD, 1992) illustrates the ignorance or denial phaseof the serviceinnovation issue. Indeed, the guidelines suggested by this first version only addressmanufacturing activities and explicitly exclude market and public services.

The revised version published in 1997 (OECD, 1997) also addresses market services, but it only takes into account technological products and processes innovations. It therefore corresponds to the theoretical perspective that we have labelled technologist and industrialist or assimilationist. A major institutional advancewas made in 2005 (OECD, 2005), as far as, in particular in order to take into account the specificities of services in a service-based/demarcation perspective, the Manual also now recognizes some forms of non-technological innovations: “marketing innovations” and “organizational innovations”.

These institutional advances that were induced by theoretical and empirical advances in SIS in turn have driven a powerful dynamic of empirical research in this area (see advance n° 9).

Advance 9. Fromassimilation surveystodemarcative and integrative surveys

The previous institutional advances have led to advances in surveys devoted to innovation in services. Thus, again as part of the shift from assimilation to demarcation and integration theoretical perspectives, assimilationist surveys have given way to demarcative and integrative surveys. The assimilationist or “subordinate” surveys (Djellal and Gallouj, 1999) simply apply to services questionnaires designed for manufacturing and focus on technological innovation. They usually reflect a simple transposition to services of the OECD Oslo Manual guidelines (1992 version) developed to provide definitions of technological innovation in manufacturing. Demarcative or “autonomous” surveys for their part are based on definitions and questionnaires developed to address specific forms of innovation in services.

The questionnaires designed on the basis of the latest revision of the Oslo Manual (OECD, 2005) can be considered as integrative surveys, insofar as they apply the same innovation indicators for goods and services. It is, one might say, a demarcative integrationas far as new types of non-technological innovation (organizational innovation, marketing innovation) are introduced to address, in a new way, innovation in goods and services.

The general lessons to be drawn from Community innovation surveys carried out on the basis of these last conventions include the following ones:
- The performance of services in terms of innovation is significant. The myth of services as stragglers in terms of innovation is questioned.
- Some service sectors are even more innovative than manufacturing sectors. This is the case with KIBS and engineering.
- Organizational and marketing innovations (non-technological innovations) occupy an important place in services, often more important than in manufacturing.
- Services are not the only ones to introduce new services. All economic sectors are introducing this type of innovation.

Advance 10. From assimilation policies to demarcation and integration policies

Advances in terms of public policies to support innovation in services have naturally followed the same path as that of theoretical perspectives, ranging from assimilation to demarcation and integration (Rubalcaba, 2006). It should be noted that these advances more often reflect an evolution of the theoretical consciousness than of concrete political achievements. Thus, public support for innovation policies in services has first of all focused on an assimilationist (and technologist) perspective: they were content to apply to services industrial (mainly scientific and technical) policy. These policies are inadequate and it is necessary to implement differentiation or demarcation policies that take into account the specificities of services: i) the often interactive dimension of their product and thereforeof their innovation and the inability to distinguish the product, the process and the organization; ii) a lower R&D activitythan in manufacturingandan R&D of a particular nature; iii) less visible results of innovation due to the immaterial dimension of the service; iv) higher risk levels and stronger market failures; v) difficulty of appropriation of innovation and easy imitation... Finally, given the convergence between goods and services, integrative innovation policies are emerging which aim in particular at promoting “product-service systems” and at supportingboth the tangible and intangible dimensions of innovation strategies in service firms.

Advance 11. From the search for productivity to the seek for performance

The productivity and performance issue in services has been addressed in three ways, which reflect three stages in the evolution of the theoretical thinking and managerial, institutional and policy practices.

The first stage is the observation of low productivity in services. This finding is in particular expressed by pioneeringstudies by Clark (1940) and Fourastié (1949). It results in considering the low productivity as an intrinsic characteristic which constitutes the criterion for defining services in a positive way in orderto distinguish them from the two other sectors conversely characterized by a higher productivity growth rate. This conception of stagnant services (given their low technology

intensity and low productivity growth rate) is at the heart of Baumol's unbalanced growth model (Baumol, 1967).

The second stage was to challenge the idea of low natural productivity of services. This challenge is based on two arguments, one methodological and the other managerial (Djellal and Gallouj, 2008). The managerial argument highlights the systematic and often effective implementation of productivity growth strategies in all service firms and organizations, whether public or private. The search for productivity gains (particularly through the standardization and industrialization of the service and the use of technical systems) has long been a strategic imperative in many service organizations (Levitt, 1976). The methodological argument for its part consists inthe questioning of the productivity measurement methods, which are faced with a difficulty of defining the output and measuring it in volume. In this case, the hypothesis is that the measurement of productivity in services is flawed. It is probably underestimated and in all cases different from what manufacturing-biased indicators and methods do measure.

The third stage suggests to substitute to the measurement of productivity (industrialist concept) a multi-criteria evaluation of performance, and to renounce a religion of growth (GDP) in favour of sustainable development and growth of well being (gross domestic happiness). Convention theory, for example, provides an interesting heuristic framework for addressing, in a pluralistic way, the question of the definition and justification of products and performance, distinguishing between the industrial world (the world ofvolumes and technical operations) and other worlds favouring other systems of definition and justification of value. These include the market and financial world (the world of monetary and financial values), the relational and domestic world (favouring the interpersonal relationships, empathy and trust relationshipsconsolidated over time, a world that gives central importance to the quality of relationships in the product evaluation), the civic world (that of social relationships based on the concern for equal treatment, fairness and justice), etc. The performance of an organization or a nation can be assessed according to these different worlds, which may be complementary or competitive.

Advance 12. From services industrialization to goods servitization

These two contradictory processes of services industrialization and goods servitization contributed to blur the distinction between goods and services in contemporary economies. In these economies, these two processes historically follow one another. Indeed, within a basic principle of assimilation to the dominant economic and theoretical models, service firms and organizations have made efforts to industrialize, make their product more material and less blurred. The process of goods servitization, which reflects the rise (in different forms) of the service-based dimension in the supply of manufacturing firms, appearedlater. It is this time lagthat is expressed by the idea of a shift from services industrialization to goods servitization. However one process does not replace the other. In contemporary economies, both industrialization and servitization coexist, either in a given organization, sector or economy.

The industrialization of services is an old trend well described by Levitt (1976), who defines it as a strategic imperative for service firms. It is part of theassimilation perspective (assimilation of services to goods). It is basedon the increasing

mechanization, the application of industrial production methods (Taylorism, Fordism), the addition of goods to services[3] and the search for productivity gains. It is a real "natural trajectory" within the meaning of evolutionary theory (that is to say, a trajectory which applies to many sectors if not to all). This trajectory is powerful as far as it continues to be at work today. It is manifested especially in the implementation of low cost business models in a growing number of service sectors.

The goods servitization is for its part a generic strategy to transform in different modes (more or less old), the supply of goods in service delivery. It therefore covers the following different modes whose relationships to the issue of innovation are evident:
1) (Mechanical) addition of services to a supply of goods, in order to differentiate it and increase its quality (Furrer, 2010). Thus, the addition of pre-sales and after-sales services, which made the success of Fordist economies, is alongstanding modality of servitization.
2) Simultaneous (though not necessarily integrated) offer of goods and services by manufacturing firms so that iconic industrial firms (particularly in IT)[4] have become primarily service providers, as far as the major part of their turnover and their profit comes from the sale of services.
3) The rise of integrated "products-services" offers which literature refers to using a variety of different terms[5]: complex packages or compacks (Bressand and Nicolaidis, 1988), Product-Service Systems (Goedkoop et al., 1999; Mont, 2000), Product-ServiceBundles (Vandermerwe and Rada; 1988. Stremersch et al, 2001), (customers) solutions (Matthyssens and Vandenbempt, 2008; Evanschitzky et al., 2011, Bonney et al., 2009), hybrid products (Shankar et al., 2009), hybrid solutions, hybrid offerings (Ulaga and Reinartz, 2011), hybrid innovations (Shankar et al., 2007)...
4) The change in the use or consumption mode of the good by the consumer, combined with a change in the "business model" of the producer. The firm no longer provides a good, and the consumer no longer acquires ownership of a good, but both respectively sell and buy the use of this good and the service it provides. Thus, in this perspective, it is not anymore, for example, cars, copiers, machines that are sold, but the kilometrestravelled, the quantities of photocopies made, the workings hours, etc.

The industrialization of services is an assimilationist modality of innovation in services, while the servitizationof goods is a generic (integrative) modalitythat places service innovation at the heart of the industrial innovation dynamics. Indeed, service innovation becomes central in manufacturing firms and sectors. It is a key source of competitive advantage.

Advance 13. From the linearization(closing) of innovation processes to the recognition and strengthening of a natural and multiform interactivity (openness)

[3]It should be noted that the addition of goods to services contribute to the industrialization of services, while the addition of services to goods falls within the scope of the process of servitization of goods. These are two different ways to build Products-Services Systems.
[4]IBM and Benetton have long been cited as the archetypes of this trend, which has spread to many manufacturing firms.
[5]The references are only intended to illustrate the variety of terminologies used to describe the same economic reality. They do not necessarily indicate the inventor of each concept discussed.

In the field of IS, Ben Martin emphasizes, as an important advance in theoretical analysis and corporate practices, the shift from the linear model to the interactive model. The linear model describes a planned and systematic innovation process, which sequentially connectsR&D, production and marketing phases. It is often associated with well formalized, specialized and rather closed innovation structures. This linear model is in difficulty to quickly respond tothe dynamics of a turbulent environment. It is often replaced (in the organization of enterprises, as in the theoretical debate) by a more flexible, interactive and open model of innovation, which was recently popularized by the fashionable concept of open innovation (Chesbrough, 2003).

This change in management practices and theoretical approach (underlined by Ben Martin in his survey of advancesin IS) does not homothetically apply to services. Indeed, first, the R&D activities that constitute the initial phase of the linear model are rare in services. Second, the first empirical worksdevoted to the organization modes of innovation in services converged on the pre-eminence of flexible, less programmed and institutionalized innovation processes. But above all it appeared that services are interactive and open by nature as far as they give a central place to the consumer, who is, in many cases, co-producer of the service.

Given these findings, first of all, we are witnessing, in service organizations, efforts triggered to the linearization of innovation modelsand, in managerial sciences, recommendations in favour of linearization strategies. Thus, inspired by the New Product Development (NPD) perspective, which provides very precise methodologies for the design and production of new goods, within the general framework of the linear model, the service management specialists developedNew Service Development (NSD) methodologies (Scheuing and Johnson, 1989; Easingwood, 1986; De Brentani, 1989; Edvardsson and Olsson 1996).

However, if it continues to attract the interest of researchers in management science, this linearization is increasingly challenged by interactivity, co-production and opening up, which seem, as we have already pointed out, to be natural technical characteristics of services. Thus, one cannot say that SIS shifted from the linear innovation model to the interactive innovation model, but instead that they shifted from linearization efforts (again in an assimilationist perspective) to the recognition and the strengthening of an existing natural reality: interactivity and smooth and flexible openness.

The interactivity and openness in question covers a wide variety of different (internally and/or externally) cooperative models, more or less sophisticated and formalized.

They include, in particular a certain number of unplanned or emerging models (rapid application model, practice based model, bricolage innovation model and ad hoc innovation model) whose characteristic is to be closely linked to learning by doing, using or interacting. These micro-models we do not detail here (see Toivonen and Tuominen, 2009; Gallouj and Weinstein, 1997; Fuglsang, 2010; Toivonen, 2010 and Fuglsang and Sørensen, 2011) describe various “mechanisms”at work within organizations for producing incremental innovations related to the dynamics of internal or external change.

Open innovation also covers at different analytical levels, innovation dynamics in interactionwith customers and users, with consultants,and with multiple partners within innovation networks or systems. The latter is a research challenge we will address in section 2 of this work (challenge 11).

Advance 14. Balancing the « intrinsic tension » between servicestandardizationandservice customisation

The advances we look at from now do not involvea transition from one situation to another,but rather the search for a balance between two states (or two dynamics) in tension, within an organization, a sector or the whole economy.

We previously mentioned service industrialization in its opposition to goods servitization. It is another tension (well documented in the literature) which is raised here, namely the tension between the industrialization/standardization of service and its customization, that is to say the opposition between repetition and personalization. Indeed, while industrialization/standardization aims to erase the specificities of the service in order to provide a homogeneous service, customization, in contrast, emphasizes the diversity and strives to offer a particular service tailored to the specificities ofthe customer. Taken separately, these two processes are important innovation trajectories in services.

But a new innovation potential is provided by the reconciliation of these trajectories in the same firms or the same sectors. The assimilation-demarcation-integration paradigm can once again be applied here. The implementation by a firm of an industrialization strategy for its service offering (McDonald's, for example) falls within the scope of an assimilationperspective. Customization strategies fit into the demarcation perspective. Finally, when the same organization mobilizes both, reconciling industrialization/standardization and customization, it is an integration perspective that is at work (Djellal and Gallouj, 2008). For example, banks, through their multi-channel offers, reconcile, on the one hand, standardized quasi-products and automated self-service and, on the other hand, customized high value-added services.

Advance 15. Balancing the intrinsic tension between service regression and service extension

Another important advance in SIS is the recognition of the idea that innovation can originate not only in the extension/complexity of the service, but also in itsregression. This tension between two opposing basic principles is not independent of the previous one (the tension between standardization and customization). While the previous advance (the tension between standardization and customization) is based on the reorganization of the service offering, this new tension assumes a positive or negative development of the range of services offered.

On the theoretical level, this advance in the innovation modes is based on the old idea, developed in the field of services marketing, according to which the service consists of one or more central services associated with a certain number of peripheral services. It is also based, in the field of economics, on the Lancasterian approach to the product as a combination of services characteristics. In both conceptions, innovation can come not only from the addition of services (or services

characteristic), but also from the removal of services (or services characteristics). This paradoxical idea that innovation can also come from service regression is of course illustrated by low cost services that develop in all services sectors (air transportation, fast food, hard discount, etc.).

2. Fifteen challenges for service innovation studies

If, as has arlready been noted, there is a significant number of surveys of the literature on innovation in services, and if most of the works suggest in their conclusion some research directions for the future, however, publications exclusively devoted to prospective studies and research agendas on innovation in services are scarce. Nevertheless, one can mention the following few exceptions: Gallouj et al., (2015); Maglio et al., (2014); Ostrom et al., (2010) (which reflection, it is true, concern management research prioritiesfor the science of services in general including service innovation; Spath and Ganz (2008) and Ganz and Meiren (2003) (both focused on the future of service research in general); Dahl et al., 2014 (focused on innovation in social services)…

If some of the advances we have outlined in the previous section reflect historical established and irreversible findings, others are research fields that have been the object of sufficiently numerous studies that they cease to be priority challenges. We now turn to a selection of fifteen major challenges for SIS over the next decade (see table 3).

To formulate these fifteen major challenges, we do not anymore use the formulation “from... to” that was used to account forthe main advances, but we identify general themes which SIS must address (or focus on more) in the future. The major advances that we accounted for concerned, essentially,the recognition of innovation in services (its legitimation as a research object), its definition, its organization and implementation, its measurement, the institutional arrangements designed to promote it. Research should now be extended to other topics that relate to important socio-economic issues.

It should be noted that taking into account these new issues often brings us back to reconsider, in new ways, some of the previous issues, particularly the definition of service innovation and its measurement. It should also be noted that these challenges are not completely independent one of each other. They overlap in some respects. For example, “population ageing” and “developing countries” are not independent of “social innovation” insofar as service innovation in developing countries and service innovation in its relationshipswith ageing are partly based on social innovation. Similarly, the “new evaluation challenges” are transverse to most other challenges. Finally, the challenge concerningthe development of religious innovation trajectory is linked to the challenge concerning service innovation in developing countries. After all, many religious services innovation (especially in the field of tourism and financial innovation) are implemented in these countries.

Table 3:Fifteen challenges for service innovation studies

1. Service innovation and the environmental challenge
2. Service innovation and social innovation

3. Service innovation and developing/emerging countries
4. Service innovation and smart service ecosystems
5. Service innovation and the religious trajectory
6. Service innovation and population ageing
7. Service innovation and the gender agenda
8. Service innovation and new evaluation challenges
9. Service innovation in forgotten sectors
10. Service innovation and ethical and societal issues
11. Service innovation, innovation networks and innovation systems
12. Service innovation and entrepreneurship
13. Service innovation, employment and skills
14. Service innovation and multidisciplinarity: towards a service science?
15. Service innovation studies and service innovation degrees

Challenge 1. Service innovation and the environmental challenge

In a post-industrial and service economy, environmental economics was, essentially, built in response to damage caused by intensive industrial and agricultural economy (depletion of non-renewable resources, proliferation of waste, pollution, desertification, deforestation, global warming...). It continues to convey a strong industrial connotation, although some services (tourism, transportation, etc.) can play an important role in environmental degradation. Thus, as rightly pointed by Gadrey (2010), “services are ignored by political environmentalism,whileenvironmentalism is neglected by theservice economics” or “with a few exceptions, the economics of services, as currently constituted, takes little account of environmental or social considerations”. The effects of services on the environment are seldom at the heart of the concerns of researchers.

This research gap is even more evident regarding the issue of innovation in services in its relationships with the environment issues. The theoretical but also political challenge of these issues is yet huge, because, as highlighted by Gadrey (2010), the future of the service societywill be primarily played out in the ecological field, either positively or negatively, and it is closely related to the nature of the innovation trajectories it can generate. It is therefore necessary for SIS to address the nature of the ecological impacts of service innovation and to discuss the public policies that are likely to promote the most positive impacts.

In this general research agenda, an important hypothesis deserves further theoretical and methodological exploration. This is the positive myth[6]claiming that services are, by nature, environmentallyfriendly.

This supposedly green nature of services mainly relies on analytical and theoretical arguments. Chief among them is the idea that the immateriality of services makes them, by definition, more environmentally friendly than material goods.For example, some arrangements (or business models) related to the rise of services that have sprung up in firms or society in general, mechanically induce a dematerialization and therefore positive environmental effects. This is illustrated by the goods servitization processes and especially by one of itswell-known operative form, namely the

[6] It should be noted that this positive myth contrasts with the many negative myths that describe the supposed weaknesses of services: their unproductive nature, their low capital intensity, their low-skill labour, their low productivity, their inability to trade and innovation (Gallouj, 2002b).

Products-Services System (SPS) (see advancen° 12). SPS in their various forms (product, use or results oriented SPS, cf. Tukker, 2004), which were implemented in order to improve competitiveness are increasingly analysed as factors of positive environmental externalities. The underlying idea is that adding services or service to goods or consideringgoods through their uses, their results, the services they provide, contributes to the overall dematerializationof the solution offered to the client and thus to make it greener. The so-called sharing economy or collaborative consumption, which favours the shared use of goods (carpooling, car sharing, rental or exchange of personal goods, etc.) and their reuse, rather than their private use and their disposal, is another illustration of these mechanisms that induce dematerialization of economic activity.

Some of the theoretical arguments mentioned above in favour of the green nature of services are questionable including from the theoretical point of viewitself. Thus, services are far from green by nature and they are more “material”than it appears. After all, their production requires material resources and energy, and above all, the service transaction is often based on an interaction that requires displacements that are particularly harmfulto the environment (Djellal and Gallouj, 2016; Fourcroy et al., 2012). Moreover, it is not sure that environmental benefits generated by an increase of immateriality are not encumbered by the so-called “rebound effect”. The success of a more eco-friendly service can after all lead to an increase of its consumption, which contribute to cancel the ecological benefit achieved. However, even if environmental benefits are achieved, they are not necessarily reallocated to green practices[7]. Other undesired effects may occur, which may also strain the ecological benefits of the sharing economy. The environmental benefits achieved through the service innovations of the collaborative consumption (especially extending the life of the product) can, for example, contribute to slow technological progress in energy saving. Furthermore, the effectiveness of certain formulas of the sharing economy such as carpooling can influence public transportation policies over time, leading them to reduce their efforts in terms of public transportation.

If theoretical arguments exist both to justify or question the natural sustainability of services and the positive or negative correlation between the rise of the service content in the solution provided to the client (in the SPS, for example) and environmental sustainability,on the other hand, the arguments are seldom supported by measurements and evaluations.Research efforts should therefore focus both on further theoretical argument, but also and especially on measurement and evaluation.

Challenge 2. Service innovation and social innovation

Service innovation studies and social innovation studies are two research areas that have developed separately but which resemble each other in many ways. 1) They have developed on the margins of the dominant academic schools (especially innovation studies) and have struggled to establish their legitimacy. They nevertheless managed to establish significant research communities, organizing their own recurring conferences and publishing their own scientific journals. 2) The construction of their legitimacy was more based on the needs of the real world (the socio-economic world: companies, associations, citizens, etc.) than on the academic

[7]For example, profits or savings made by carpooling via BlaBlaCar or housing rental through the Airbnb platform can be reallocated to the purchase of a plane ticket to go on holidays, which is not eco-friendly.

sphere. It was supported by government initiatives (national funding, European funding). 3) Their research object is complex, as far as it is unwilling to existing analytical categories. It is essentially “human-centred” even if technologies, especially information technologies, play an increasingly important role in it. Its boundaries are blurred and shifting. Thus this object hardly lends itself to measurement.

Paradoxically, these two research fields, similar in many ways, seldom intersect. Thus, the cross-references between them are very reduced. Conferences organized by one field seldom welcome scholars from the other. This lack of interaction is partly explained by the different disciplinary backgrounds: sociology for social innovation studies, economics and management for service innovation studies.

However, service innovation studies and social innovation studies can enrich each other on many points, which are worth exploring (Djellal and Gallouj, 2012): theoretical perspectives which are favoured, the nature of innovation and the question of its identification and its measurement, its modes of organization, its ownership regimes, the evaluation of its effects, public policy to foster innovation. Better mutual understanding of social innovation and service innovation in the light of each other should help to further reduce the gap of hidden or invisible innovation in our economies, and allow us to move towards a new comprehensiveinnovation paradigm.

Challenge 3. Service innovation and developing/emerging countries

Except for certain traditional sectors such as tourism (source of currency) or public administration (source of malfunctions), the services issue remained for a long time absent from the research on developing countries (DCs). Development economics was naturally also built on industrial and agricultural models and references. However, although itappeared later than in developed countries, the universal process of tertiarisation has not spared the DCs. For example, as they develop, emerging and transition countries cease being only “the world's factories” to also becometheir “offices and research centres”.After all, in 2014, services represent nearly 70 % of GDP in Brazil, 63% in Russia, 57 % in India and 51 % in China.

The rise of services in developing countries opens up new fields of research, involving important economic and political issues. The countries concerned by this structural change are aware of this, as illustrated, to some extent, by the creation of research centres on services and the establishment of learned societies in this area.One example is the creation of REDLAS (Latin American Network for Research on Services) on the model of the European Association of Research on Services (RESER).

A key question that of coursearises in this general framework of services and development is that of innovation in services. This question is largely unexplored. However it is as strategic for developing countries as for developed countries and researchers will have in particular to consider to what extent it needs to be addressed in different ways, not only compared to developed countries, but also for the different types of DCs concerned (least developed countries, emerging countries, etc.). One of the problems to overcome, especially in order to achieve quantitative studies, is the difficultyto access to data.

Using once again the assimilation/demarcation/inversion/integration analytical framework, we can formulate a certain number of assumptions and raise a certain number of questions that need further exploration in the future.

Taking the point of view of the assimilation/subordination[8] perspective,several assumptions can be formulated.

- First, in developing countries, assimilation/subordination is twofold. Indeed, services are certainly subordinate to manufacturing (supplier-dominated). But they are alsosubordinate to the manufacturing industries of the developed countries (North-dominated), since most of the technological innovations used by services originate from manufacturing firms in Northern countries: computers, trains, boats, airplanes, incinerators, scanners, etc.
- Second, as in developed countries, in developing countries, ICTs are expected to play an important role in the service innovation issue. Thus electronic services (e-commerce, e-banking, e-government, etc.) seem to have reached advanced stages of development in some emerging countries (BRIC), much more advanced than SIS in this field. Moreover, ICTs offer many opportunities to the economies of the South. They allow a certain autonomisation (vis-à-vis developed economies) of the innovation dynamics, and the beginning of the transition from an assimilation to a demarcation perspective. For example, ICTsare used to produce social innovations targeting inclusive purposes: mobile telephonesare for example the source of many innovative services (e.g. in the microfinance field).

Taking now thepoint of viewof the demarcation perspective (that is to say seeking for specific forms of innovations usually invisible because of their non technological nature), it can be assumed that developing countries benefit from greater degree of freedom and more opportunities for innovation.After all, the innovations highlighted by this perspective have several characteristics that can help their emergence in developing economies: i) they are relatively cheaper than technological innovations, because they do not require significant investments in R&D and patents (frugal innovation); ii) they do not necessarily require complex, institutionalized and permanent structures; iii) they may be the result of mere imitations; iv) they are based on the participation of clients, users or even civil society.

The demarcation perspective applied to services innovation in developing countries is manifested, for example, by innovation trajectories thatoriginate in sustainable development and social innovation issues (see the previous two challenges). Social innovation (which, as pointed out in our discussion of challenge n° 2, is essentially a service innovation) plays an important role in these countries that experience significant social problems. These innovation trajectories concern all sectors: tourism, finance, retailing, public services, etc. They include, among others: green tourism, which aims to preserve the natural, social and cultural heritage, ethical and inclusive finance, fair trade, urban mobility, etc. In should be noted that some of these social innovations (born South) can spread in developed countries.

However the demarcation perspective also manifests itself through more traditional innovation trajectories, which may be inspired by innovations from developed

[8]This assimilation/subordination perspective hypothesizes, it should be remembered, a similarity of innovation in manufacturing and services. This innovation is mainly reduced to technical systems originating from manufacturing firms (which dominate services).

countries, but which are most often different from them by their adaptation to local contexts. These include, for example, tourism in its multiple forms, including medical tourism in response to the needs of rich countries; the extremely rapid spread of large scale retailing in some developing countries, linked to rapid urbanization and the increasing entry of women into the labour market; mobile services and service innovations it creates; traditional banking system and financial innovation.

The inversion perspective, it should be remembered,raises at the micro, meso or macro level, the question of the role of knowledge intensive business services (KIBS) in the innovation of their industrial or service clients. KIBS are thus essential components of innovation systems. They are a knowledge infrastructure that complements that of the state (education and research system). They are most often deficient in Emergent (National)Innovation Systems. They are therefore an interesting research topic from both the theoretical and the public policy point of view. The question of conditions of constitution and strengthening of a KIBS sector in developing countries is essential in view of the strategic role of KIBS in growth and innovation. The offshoring of high value-added services such as product development, R&D projects, IT development, etc. contributes to the growth of KIBS. Serviceschola rs should devote more attention to these issues.

Finally, as regards the integration perspective, it may be askedwhether, somehow, the developing economies did not invent the functional economy and the strategies for extending the life of goods (to be convinced it may suffice to take into consideration the age of the vehicle fleet in some developing countries). However, “services around the product” and “product-service systems” are still weak in most developing countries, while these are important areas of service innovation. All these issues provide interesting challenges both for research and organizations management.

Challenge 4. Service innovation and smart service (eco) systems

SIS were initially built in opposition to the technologist perspectivewhich reduces innovation in services to the mere (passive) adoption of technologies by service activities, i.e.to the diffusion of industrial innovations in services.

In firms and organizations practices, as well as in academic work, this concept of a technology exogenous to services gives way to a concept that endogenizes technologies in the service or in the service organization. This means that services integrate these technologies, incorporate them and modify them in order to adapt them to their organization and the idiosyncratic nature of their activities. These technologies are not anymore production factors that are analysedthrough their impacts on productivity and other economic variables (such as in the strictly technologist configuration discussed above), but they are hardware components of the product, inseparable from their intangible components. To describe such an incorporation of technology in services, the literature replaces the concept of diffusion with the new concept of technology infusion (Bitner et al., 2000).

The advent of the so-called *Smart Service Systems* (SSS) is an additional step, a higher level of complexity in the process of endogenization or incorporation of technology in services. SSS reflect the highest degree of infusion. They combine smart technologies, individuals (customers, producers, citizens...), organizations that

interact to share resources and co-create value. These service systems are “smart” because they automatically collect information during service transactions and turn them into knowledge. They are able to learn and transform themselves, and use the knowledge gained to adapt the service offered or to design new services. These SSS are open systems. They are connected to other SSS from which they can learn and that they can transform themselves. Various agents of different sizes can implement SSS: firms, public administrationsand associations.

The social media platforms, like Facebook, Twitter, and LinkedIn are SSS. These strongly developing social networks interact in many ways with the economic networks that can rely on them to co-produce service innovation (Uratnik, 2016). The interconnection between social and economic networks (the blurring of boundaries between them) is a research topic thatneeds further development.

However other systems also belong to this category of SSS: smart vehicles, smart roads (which are integrated into the more general category of smart mobility), smart grids, smart buildings (which are systems capable of ensuring better air services quality, better energy efficiency, better earthquake safety) and, more broadly smart cities. All of these are systems that are in their infancy, and which represent considerable economic and research issues. Thus, within the framework of this smart dynamics, there is a shift from the smart object to the intelligent infrastructure and then to thesmart city. However, the evolution potential of SSS ishuge: smart region, smart nation andsmart planet.

New horizons are open to SSS and service innovation by the so-called Internet of Things and Big Data. The Internet of Things, which is the third revolution of the Internet (Web 3.0), means the connectionbetween objects in various fields. It is responsible for the exponential increase in data on the network and therefore for Big Data. Big Data leads to an extremely detailed knowledge of the customer and his/her needs and behaviours. It is therefore the source of significant reservoirs of new services and new products. But it also raises ethical issues related to data secrecy and privacy protection (cf. challenge n° 10).

SSS are, up to now, mainly envisaged from a practical and descriptive angle. They therefore constitute a clear priority for theoretical and empirical future research.

Challenge 5. Service innovation and the religious trajectory

In contemporary economies, religious dynamics are the source of sometimes violent political upheavals, regularly related by medias. A brighter side of these dynamics is however also at work. Religious dynamics are also at the origin of innovation dynamics. Thus, religious values can be the source of economic values.

This paradoxical convergence between religion (synonymous with conservatism) and innovation (synonymous with change) is an interesting field of investigation, particularly but not exclusively in developing countries. This field of religion push service innovation is not new. Throughout history, many social and service innovations have had religious roots. In Christian civilization examples include, among others, orphanages, hospitals, charitable organizations, etc., and, in another perspective, the creation, in their time, of cooperatives and mutuals foundedby Christian trade unionism. The flourishing theme of Islamic finance (renamed and

generalized into ethical finance) is another obvious illustration of religion push service innovation.

The religious innovation trajectory has long been closely linked to that of social innovation (cf. challenge 2). After all, religious organizations have always been heavily involved in arrangements created to support people in need (health, education, etc.). But this religious innovation trajectory increasingly manifests itself in many other sectors, resulting in many innovative services: financial innovations we have already mentioned, religious tourist packages, innovations in hostelry (e.g. Islamic hospitality and especially the so-called Sharia-compliant hotels[9]), halal shelves in retailing...

Thus, the religious innovation trajectory (in the field of services) is a powerful trajectory, which potential areas of application are manifold, but which is not enough addressed by research inservice economics and management. Here again, academic research is very late compared to the practices of firms and organizations.

This religious innovation trajectory may be facedwithmore or less important institutional, legal or cultural obstacles. These obstaclesemerge, for example, in the case of a tourist package that would involve gender segregation (pool or beach for women only, schedules adapted to gender, women but also men dress codes). They also manifest themselves through the principle of secularism in public services, which prohibits certain religious innovations, where it is applied.

We are not dealing here with the ability of religious minds to innovate (some studies tend to show a negative correlation between individual and national religiosity and propensity for innovation, others conclude that innovation is religion-neutral). But what we are concerned with is how organizations innovate (introducing technological or service innovation) to meet the “religious need”.

Religious organizations, it should be noted, are also service organizations, that can be studied from the perspective of innovation. They may provide religious or secular “clients” (literally or figuratively) with religious or not religious innovative products or services. They can also innovate their process and their organization. The supply of education and health services is well known. But many other examples can be envisaged: the Internet distribution of religious (or monastic) products (Pasquier and Morin-Delerm, 2012) and more generally using the Internet for religious community building.However works on this topic are scarce, the main reason being again that innovation and religion are considered contradictory (see also challenge n° 9 devoted to the service sectors forgotten by SIS).

Challenge 6. Service innovation and population ageing

The population ageing issue in its relationshipwith innovation is not mentioned by Ben Martin in his list of challenges for IS (Martin, 2015). However it constitutes an important socio-economic and research issue for the future. Indeed, projections from the European Commission (European Commission, 2012) forecast that, in European Union, the share of seniors (those over 65) will reach 30% in 2060, while it was 17% in 2010. Such a demographic shift will have significant consequences on the

[9]These hotels that even develop in some European cities, provide many peripheral services, for example, a player mat, a marker (or a compass) to indicate the direction of Mecca, a prayer room, halal food, etc.

production system as a whole and on the structure of consumer needs. We consider, for our part, that in a service economy, service innovation has to play an important role in dealing with this major societal challenge, i.e. to take careof senior citizens and provide them with appropriate services. We must therefore devote a sustained research activity to this issue in the future.

Population ageing can take many facets that can be sources of innovation. The *first facet* is the human resource gap in manufacturing or service firms. This gap and the declining productivity that can result from it may be offset by technological innovation efforts in goods and in services (robotics and automation). The *second facet* is the rise of the so-called “silver economy”. After all, senior citizens are a population whose purchasing power and availability for consumption are above average. Offering them relevant services and products is an important economic (and hence research) issue. The *third facet* is the dependency and vulnerability of the elderly. It is also a major source of services innovation.

Whatever facet of ageing is considered, the major targets of innovation in services for the elderly,that SIS should exploreare the following ones (Djellal and Gallouj, 2006):1) The forms of assistance and residential provision (institutions, domiciliary services, networks, etc.); 2) The technologies (technical systems, architecture and ergonomics, smart housing, methods, etc.), which may have medical or non-medical purposes (telehealth v.s. telecare); 3) The human environment of the elderly, whether that be family carers or care personnel; 4) The services provided to the elderly (domestic services, care services, financial and insurance services, leisure services, retailing services, catering services, transportation, etc.).

Challenge 7. Service innovation and the gender issue

In his 20 challenges for IS (see Annex 1), Ben Martin (2015) identifies the need for a shift from “boy's toys” to “women's liberation”. He considers that IS have mainly focused on innovations that reflect males’ interests, what he calls the “boy's toys” (electronics and IT, automobiles and pharmaceuticals, for example). They showed little interest, so far, for other both economically and socially important technological innovations, which promoted, to some extent, the liberation of women, namely the technologies of the domestic sphere: refrigerator/freezer, microwave oven, washing powder/detergent, washing machine/tumble drier, vacuum cleaner, etc.

In the field of services as well, where the female workforce holds a dominant position in certain activities and sub-sectors, the question of the relationship between service innovation and gender is an important research challenge for the future. It is not sufficiently explored, while different characteristics of services (their centring, in some cases, on the domestic sphere and social issues, their relational nature) seem to provide fertile ground for the expression of female creativity and innovation.

The question of service innovation in its relationship with the women issue can be seen from at least two different angles: i) the role of service innovation in women’s liberation, women's empowerment and gender equality; ii) the role of women as actors in service innovation. In the former case (i), onemoves the liberating power of innovation, not from innovation as boy's toys to the technological innovations of women liberation (such as in Martin’sanalysis), but from technological innovation (in all its forms) to non-technological and service innovation. After all, there is a long list

of service innovations that allowed the women to leave the home confinement for insertion in the labour market. These include, among others, childcare services, home delivery, etc. In the latter case (ii), the question of the place of women in the innovative service entrepreneurship (see also challenge n° 12) should also be considered. The research agenda should assess both their contribution to service innovation and innovative entrepreneurship, i.e. to estimate the “gender gap” in terms of service innovations and entrepreneurship.

Challenge 8. Service innovation and new evaluation challenges

If certain aspects of the innovation gap have been filled, as we pointed out in Section 1, others remain or emerge. Thus the evaluation challenge is not closed. It particularly concerns the following areas: non-technological product innovations (e.g. a new insurance contract, a new financial product, a new area of expertise in consulting), non-technological innovation processes (methodologies, protocols), ad hoc and tailor-made innovations, innovation in complex packages, new concepts, new formulas (for example, in retailing, hotels, restaurants, etc.), social innovation, innovation in public services.

These new evaluation challenges are often closely related to the first seven challenges listed above. After all, it is the challenges linked to ecological issues, social innovation, developing countries, population ageing, the place of women that raise new measurement and evaluation challenges for service innovation and service performance in all their forms.

Another problem of definition and evaluation is still pending. It concerns research and development. Thus, if the Oslo Manual has been revised several times, and if a new revision is under consideration, this is not the case with the Frascati Manual, which provides definitions and indicators of R&D. Thus, the latest version of the Manual (OECD, 2002) is still technology and science biased, while R&D activities in services often have a composite character, mixing aspects of S&T, H&SS, organizational engineering, etc. H&SS are not sufficiently taken into account, and organizational engineering is not regarded at all (Djellal et al., 2003; Miles, 2007).

It should be noted that this evaluation and measurement issue is also complicated by the changing nature of the boundaries between services and goods. Given the changing nature of the products, international classifications setting these boundaries are increasingly questionable, and dealing with these issues are research priorities forservice studies and SIS (see Broussolle, 2016 and Hill,1999).

Challenge 9. Service innovation in forgotten sectors

As we have stressed in the advancen° 4,research on innovation is eligible to spread in all service sectors. The literature has however focused on particular sectors (KIBS and informational services) before spreading to other sectors (trade, hotels, transportation, etc.). However it should be pointed that some service sectors continue to be forgotten by SIS. These neglected sectors include, among others: religious organizations, prisons, driving schools, hairstyles services or beauty treatments, body care services, laundry services, funeral services, police, fire services, social housing services, non-profit organizations... SIS should establish a systematic list of

these forgotten sectors and undertake empirical investigations to understand the possible innovation dynamics.

Challenge 10. Service innovation and ethical and societal issues

Service innovation is the source of a number of ethical and societal questions that are important and interesting research issues for many disciplines: economics, management, sociology, psychology, law but also engineering sciences, philosophy, etc. Here we only mention three particularly suggestive examples.

The first example is the many problems of security and data protection linked to the proliferation of digitized information in some service innovations (particularly in the context of smart service systems). Problems arise in the economic sphere. These are the usual problems of protection of innovation. But they also arise in the private sphere. Service innovationsrelated to what is generically called social media raise many issues of infringement of privacy, trust and confidentiality.

The second example is the loss of freedom caused by automating many technology based service facilities, particularly in the private sphere. This applies, for example, to the automation of all forms of transportation (especially motor transportation), which provides a powerful service innovation trajectoryfor the near future (The National Academies, 2014). This loss of individual freedom is offset by an expected social benefit thatis increased safety and comfort.

The third example is the manifestation of a social opposition to some services innovation. A typical example is, in some countries, the opposition from taxi drivers to Uber services (private cars with driver). As Schumpeter masterfully theorized, technological innovations are both destructive and creative. Economic history tells us many events where workers revolted and broke the innovative machines they accused of destroying their jobs: silk workers revolt in France, Luddites revolt in England in the early 19th century. In the service economy, this opposition to innovation manifests itself, not necessarily against technological innovations as such, but against new business models and service innovations, which challenge incumbent market structures.

Challenge 11. Service innovation, innovation networks and innovation systems

One of the important advances in the field of ISunderlined by Ben Martin (2015) is the shift from “individual actors to systems of innovation”.A considerable increase in work on networks and innovation systems can be observed, stimulated in particular by the umbrella concept of open innovation. However services and service innovation are most often excluded from these works. Indeed, the concepts of innovation networks and systems that have been very successful in evolutionary economics and sociology of innovation were constructed (both on the theoretical and empirical point of view) as industrialist and technologist concepts and organizational arrangements. Although public research (and therefore public services) plays an essential role, the key players of innovation networks and systems are manufacturing firms and the form of innovation that is the main purpose of these networks and systems is technological innovation (with a focus on High Tech). Thus, essentially, the “Low Tech”sectors and the services, which account for the major part of our wealth and our jobs, are relatively absent from network and systemic analysis.

A research priority that began to emerge some times ago, but which deserves special effort is the question of innovation networks and systems in which service organizations would occupy a central place (and would not be content to be support agents) and in which the production of non-technological forms of innovations could take the place it deserves. The purpose is, somehow, to tertiarize the concepts of innovation systems and networks. One can therefore ask, for example, whether the concept of sectoral innovation system (Malerba, 2002) can be applied to the service sectors. It would also be necessary to continue the work recently initiated on public-private innovation networks in services (Gallouj et al., 2013).

Challenge 12. Service innovation and entrepreneurship

No one can dispute that, in contemporary economies, most of the creations of firms either innovative or notare achieved in the service sector. However, scientific works on the relationship between entrepreneurship and service innovation are too scarce. The effort undertaken within SIS to bridge the innovation gap (see the first six advancesdiscussed inthe first section) does not seem to be applied to innovative service entrepreneurship. Thus, paradoxically, the research on this topic is lagging behind. It is necessary to fill this research gap given the strategic importance of the dynamics of entrepreneurship in our economies. This important question can be addressed in parallel with some other general thematic issues discussed above: namely social innovation (potential source of social entrepreneurship), environmental issues (source of ecological entrepreneurship), gender issues (and women's entrepreneurship), the ageing challenge (and what could be called the silver entrepreneurship, to designate not entrepreneurship supported by seniors, but entrepreneurship based on innovations for seniors), etc.

Challenge 13. Service innovation, employment and skills

One of the main myths about the servicesociety is that it would be “a society of servants”, certainly creating jobs, but low-skill or “Mac”jobs (Gallouj, 2002b). This myth is easily invalidated by the statistical analyses, which show a dual service society, which is both the main employer of low-skill andhigh-skill jobs. Thus, the service society seems to be as much a society of servants as a society of engineers and managers.

If the worksdevoted to the relationship between services and employment and qualifications are not uncommon, this is not trueof those devoted to the relationship between service innovation and employment and qualifications. This is a research topic that deserves to be explored in the future, as it involves significant challenges for the future of firms.

After all, the development of certain service innovations creates job categories and skills types that did not exist before. Thus, most of the IT-related professions that thrive today did not exist a few years ago. This applies, for example, todata scientists, social media analysts (The National Academies, 2014). Similarly, most of those that will be important in the near future do not exist today. In total, the prospective analysis of how service innovation will change the panorama of jobs and skills is a priority for research, business management and public policy.

Challenge 14. Service innovation and multidisciplinarity: towards a service science?

Given its evolution, particularly its hybridization with technical systems (IT platforms), the “service”entity that was originally a fuzzy and quite simple entity (which even led to its denigration by economic analysis) has become a complex object, a “service (eco) system”linking sophisticated and scalable technical systems, increasingly competent human actors and multiple organizations (see challenge n° 4). If one wishes to understand how these “complex human-centred”service systems” (Maglio et al., 2014) function, a strictly disciplinary vision is inadequate. It is necessaryto mobilize and confrontapproaches and methods that borrow from different disciplines: economics, management, sociology, psychology, computer science, operations research, industrial engineering, etc.

This is the great ambition of the advocacy for the construction of a “service science” originally launched by US researchers, but which is increasingly relayed in Europe (Chesbrough and Spohrer, 2006; Larson, 2008; and Maglio al., 2010). The service science project is to develop, on a fundamentally interdisciplinary basis, a theory of services and service innovation. Although it attaches great importance to information technology, it doesn’t fall into the scope of an assimilationist perspective that would seek to industrialize and materialize an initially immaterial object, but rather ofan integrative approach thatgives human beings an equally central position in the “complex human-centred services systems”. The association of the terms “science” and “service” reflects the desire to introduce in services and their innovation dynamics, more measurement, formalization, systematization, modelling, sustainability, possibility of replication, although the human component of the system makes this aspiration difficult. This interesting research projectthat has already given birth to four scientific journals featuring the expression “Service Science” in their title (Service Science, International Journal of Service Science, Management, Engineering and Technology; International Journal of Services Sciences, Journal of Science Service) is still in its pre-paradigmatic phase and it is therefore a promising research program.

Challenge 15. Service innovation studies and service innovation degrees

The final challenge that we now address is not strictly a research challenge. It is an educational challenge, which is, it is true, closely linked to research challenges. This challenge raises the question of the ability of SIS to support the creationof specialized lectures or specialized degrees (bachelor degrees, master degrees, MBA) in the field of innovation in services.

In universities, many degrees in economics and management of innovation are backed by IS. However, up to now, to our knowledge, too few universities offer specific courses devoted to economics or management of innovation in services and none offers specialized masters backed by SIS. In economies dominated by services, this decoupling of research on service innovation and education in the same field is a sign of infancy of SIS. Therefore to permanently establish theacademic legitimacy of this research field, efforts remain to be undertaken in the educational sphere.

Conclusion

SIS are now about a quarter of century old. Although still marginal compared to the well-established field of IS, they nevertheless bring enough work together so that it is possible to consider to take stock of progress. Literature surveys are regularly carried out which demonstrate that a critical threshold has been reached in terms of publications volumes. Our survey enabled us to identify no less than fifteen of these surveys devoted to innovation in services in general and about twenty specific surveys devoted to a particular sector or theme over the period 1994-2015 (see table 1).

In this work, building on these surveys, we began by remembering the major advances achieved in SIS (fifteen in total). On this basis, we tried to identify key research priorities for SIS in the future (fifteen thematic priorities also on the whole). These priorities complement or illuminate from a new angle the twenty priorities established by Martin (2015) for the widest field of IS.

In a relatively new field such as SIS, which is not stabilized, the boundaries between the acquired knowledge (advances) and knowledge to develop (the challenges, research priorities) are not always well drawn. Thus, some of the issues that we have outlined in the “advances” are still very fertile research fields that could therefore, easily, be integrated into the “challenges”. Thus it could be noted, for example, that in Gallouj et al. (2015), “The reconciliation of industrialization and customization of services” and “The Service regression vs. the service extension dynamics” are discussed as “emerging developments”, while in this article we consider the tensions between the opposing principles described by these couples as advances in the SIS. Conversely, some of the issues that we have assigned to the “challenges” or “research priorities”category are not necessarily always completely new (a careful reader would certainly be able to point out a possible existing article addressing the issue in question). Nevertheless, they are included in the challenges, because their exploitation by SIS is still in its infancy.

The number of research priorities selected (fifteen) is obviously arbitrary. It would be possible to add much more challenges to be addressedby SIS. These include de following ones that we will just mention without developing them:
- The link between service innovation and economic crisis. As noted by Martin (2015), who identifies it as one of the challenges for IS, financial innovations that are at the origin of the latest economic crisis are not (sufficiently) addressed by IS. It is even more surprising that SIS have neglected them, as far as financial innovations are service innovations.
- New customer roles in service innovation. While recognizing the customer's role in service production is an old and well-documented phenomenon, new research avenues are open especially by new technologies that lead to consider new roles for clients in service co-creation and innovation.
- Service innovation and international trade. It is important to discuss, for example, how service innovation contributes to the growthof international trade in services and what types of service innovation are the most successful in this contribution.
- Service innovation and public policy. Despite political recognition of the importance of service innovation, political actions to foster service innovation and academic research on these actions are still far from sufficient.
- Service innovation and geographic issues. Thus, for example, the mapping of the geography of service innovation is largely lacking.

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Annexe 1:

Twenty advances in science policy (Martin, 2015)

1. From individual entrepreneur to corporate innovators
2. From *laissez faire* to government intervention
3. From two factors of production to three
4. From single division to multidivisional effects
5. From technology adoption to innovation diffusion
6. From science push to demand pull?
7. From single factor to multi-factor explanations of innovation
8. From a static to a dynamic model of innovation
9. From the linear model to an interactive "chain-link" model
10. From one innovation process to several sector-specific types
11. From neoclassical to evolutionary economics
12. From neoclassical to new growth theory
13. From the optimising firm to the resource-based view of the firm
14. From individual actors to systems of innovation
15. From market failure to system failure
16. From one to two "faces" of R&D
17. From "Model 1" to Model 2"
18. From single technology to multiple-technology firms
19. From national to multi-level systems of innovation
20. From closed to open innovation

Twenty challenges for innovation studies (Martin, 2015)

1. From visible innovation to "dark innovation"
2. From innovation in manufacturing to innovation in services
3. From boy's toys to "women's liberation"
4. From national and regional to global systems of innovation
5. From innovation for economic productivity to innovation for sustainability ("green innovation")
6. From innovation for economic growth to innovation for sustainable development
7. From risky innovation to socially responsible innovation
8. From innovation for wealth creation to innovation for well-being (or from "more is better" to "enough is enough"
9. From "winner take all" to "fairness for all"
10. From government as fixer of failures to the entrepreneurial state
11. From fait-based policy (and policy-based evidence) to evidence-based policy?
12. Balancing the intrinsic tensions between intellectual property and open source
13. Balancing the intrinsic tensions between exploration and exploitation
14. Balancing the intrinsic tensions between closed and open innovation
15. Balancing the intrinsic tensions between competition and cooperation
16. Pricking academic bubbles
17. Identifying the causes of the current economic crisis
18. Avoiding disciplinary sclerosis
19. Helping to generate a new paradigm for economics – from Ptolemaic economics to ???
20. Maintaining our research integrity, sense of morality and collegiality

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