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A SOCIOTECHNICAL PERSPECTIVE ON INNOVATION IN SERVICES

UMA PERSPECTIVA SOCIO-TÉCNICA SOBRE INOVAÇÃO EM SERVIÇOS

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RESUMO

O objetivo deste artigo é discutir os conceitos de inovação em serviços e rede tecno-econômica e desenvolver uma abordagem sociotécnica para análise da inovação no setor de serviços. Dois pressupostos servem como diretrizes para esta perspectiva: primeiramente, serviços podem ser vistos como resultados sociotécnicos e, portanto, são adequados para uma abordagem integradora da inovação; segundo, a RTE tem uma visão sociotécnica do fenômeno inovação, sem uma visão dualística das inovações tecnológicas e não tecnológicas. Conceitos de inovação são discutidos e a isso se segue uma discussão das características dos serviços e da RTE, de forma a articular esta abordagem para a pesquisa no setor de serviços. O artigo apresenta uma proposta baseada na análise da literatura existente do tema, assim como faz propostas que podem tornar-se integrantes de uma agenda de pesquisas no campo da inovação em serviços.

PALAVRAS CHAVE:

Serviços. Inovação. Inovação em Serviços. Redes Tecnoeconômicas. Teoria do Ator-Rede.

ABSTRACT

The objective of this paper is to discuss the concepts of services, innovation and Techno-Economic Networks (TEN) and to come up with a sociotechnical framework to the analysis of innovation in the service sector. Two presuppositions serve as guidelines for this analysis: first, service may be seen as a socio-technical result and, therefore, suitable to be studied in an integrative innovation approach; second, the TEN has a socio-technical view of innovation phenomena, without a dualistic view of technological and non-technological innovations. Concepts of innovation are discussed and this is followed by a discussion of the characteristics of services and the TEN, in order to articulate this approach for research work in the service sector. The paper involves a proposal consisted in exploring and describing pertinent literature to the theme, as well as making proposals that may become component issues for a agenda in the innovation in services research field.

KEYWORDS:

Services. Innovation. Innovation in services. Techno-Economic Network. Actor-Network Theory.

INTRODUCTION

The service sector was given its greatest boost at the time of the Second World War, in both developed and developing countries. The proportion of jobs in the service sector in leading countries such as the USA, Germany, Japan, France, Sweden, the United Kingdom, the Netherlands, Spain and Italy, rose by around 35% to 55% in 1965 to levels of 55% to 70% in 1997 (KON, 2004).

Despite of this economic importance, there is relatively scarce knowledge about the dynamic of business service activities what results in a lack of public policies for the sector and - which is our focus here - of management practices for innovation in service. To face up the challenge of boost business services performance and their impacts in the whole economic system, the management of innovation in this sector

seems to require increasingly closer articulation between the actors involved, who represent the most varied branches from both within and outside the service sector.

These features present an opportunity to carry on the Techno-Economic Network (TEN) approach in the analysis of service innovation dynamics and management. In this sense, the objective of this paper is to discuss the concepts of innovation in services and TEN and to come up with research questions involving these concepts in an articulated form.

Innovation from the economic perspective

Innovation has a fundamental role to play in socio-economic development and in the competitiveness of organization and business in general. Without innovation, the economic sector would probably be unable

to offer anything more than a disinterested and predictable production of goods, services, financial and material means of production (HEERTJE, 1988).

From a Schumpeterian viewpoint, there are five ways to characterize an innovation: 1) the introduction of a new product; 2) the introduction of a new method of production; 3) to opening and/or creating new markets; 4) to conquer a new supply source; and 5) to establish a new organization of any type (for example, to create a position of monopoly or a fragmentation of a position of monopoly) (SCHUMPETER, 1985, p. 48-49).

The concept of innovation process has evolved away from the idea that change must be an abrupt, spontaneous and destabilizing process to a viewpoint based on “pathways”, something that is cumulative, learnt and incremented during the course of time and supported by a technological paradigm. If in the first instance, there happens “creative destruction” (SCHUMPETER, 1961), in a second phase of discussion about innovation via Schumpeter and neo-schumpeterians scholars, for instance Giovanni and Dosi (1988), Richard R. Nelson and Sidney G. Winter (1982), there is the consideration that a continual learning process and the accumulation of knowledge and experience are the driving forces that impel the innovation process. Thus, “creative destruction” becomes “creative accumulation” (MALEBRA, 2004).

The climate of uncertainties, the opportunities available, the search, appropriateness and cumulative procedures, amongst other factors that distinguish contemporary societies and organizations, characterize technological progress. For Dosi (1988, p. 1164), the endogenous nature of market

structures, associated with the dynamics of innovation, the asymmetries of technological capabilities amongst firms, historical dependence, the dynamics of improvement and the evolutionary nature of the diffusion and innovation processes, are some of the components of the process of technological change.

The technological paradigm and the standards of innovation are the technological pathway conductors. For Dosi (1988, p. 1128-1129), these pathways “are activities of the technological process during the course of economic and technological trade-offs, defined by a paradigm”. According to Dosi (1988, p. 1131), “each technological paradigm [...] entails a specific balance between exogenous determinants of innovation [...] and determinants that are endogenous to the process of competition and technological accumulation of particular firms and industries”.

The endogenous determinants of the pathways that are subject to technological paradigm are the tacit understanding and organizational capabilities and as exogenous determinants there exist the interests of “institutional bridges” (for example: military, as in the case of aeronautical advances), the “public agencies”, the level of changes in demand, (size of the market, elasticity etc.) amongst others (DOSI, 1988).

Two ingredients are important in the process of innovation: routines and capabilities. The definitions of the management patterns of these two ingredients push the process of innovation. The routines may be learnt, they are specific features of the business firm concerned and show the development of abilities involved in the process of innovation. These routines are what

Nelson and Winter (1997) call the memory of the organization, i.e. routines describe how things are done and, therefore, "... are the fundamental, though not the only, pillars of capabilities" (DOSI; NELSON; WINTER, 2000, p. 4).

A discussion of routines, therefore, is related to a discussion of capabilities that, according to Barney and Hesterly (2007, p. 64) are "a sub-complex of a company's resources, defined as assets, which enable the company to take full advantage of the other resources that it controls". Thus, dynamic capabilities have been part of present studies which, through the resource attributes (the VRIN model – Valuable, Rare, Inimitable and Non-substitutable) developed by them, support the maintenance of an organizational competitive advantage.

According to Eisenhardt and Martin (2000, p. 1105), the dynamic capabilities are a process, experimental and non-linear, especially in high-speed dynamic change markets; these form a "set of specific and identifiable processes, such as product development, building a strategic decision or an alliance". According to the authors, dynamic capabilities are the driving force behind the creation of sources or resources that, in turn, generate competitive advantages. Therefore, routines create or form the resources that later become the basis for a competitive advantage.

In high speed changing environments there needs to be a new definition of dynamic capabilities (EISENHARDT; MARTIN, 2000, p. 1111). In a traditional view of dynamic capabilities, mainly in industrial sector, the resources attributes (the VRIN model) sustain a competitive advantage; the outcomes are normally foreseeable and detailed patterns of routines are adopted.

Nevertheless, to deal with services, it becomes necessary to accept that routines strongly depend upon market dynamics and customer relationship, resource attributes can be replaced and that the practices and errors resulting from this process contribute towards learning mechanisms.

This discussion has become necessary to signal that paradigms and technological pathways are important factors to see the possibilities that exist for the development of capabilities. Dynamic capabilities and the need for their re-definition, when dealing with the service sector, can lead to the adoption of a weakly articulated (SUNDBO; GALLOUJ, 2000) and non-linear dynamic character that governs innovation in this sector. One of the presuppositions of this essay is that innovation also requires a non-linear, loose, fluid character, in order that a creative process – or creative accumulation - can occur, especially when discussing innovation in services. This debate is carried out in the next section.

Innovation in services

Gallouj (2002) analyses evolutionary theory contributions to construct an integrated focus on innovation in services. This proposal comes from the identification, made by the same author (GALLOUJ, 1994), that the literature about innovation in services could be grouped into three approaches: 1) a technical approach; 2) a service-based approach; 3) an integrated approach.

In the **technical approach**, there occurs an over-estimation of the technological dimension of innovation in services, in which greater importance is given to the use of Information and Communication Technologies (ICT), which contribute

as much to innovation, as to the diffusion thereof. The Automated Teller Machines (ATMs), equipment that is placed at the disposal of service users, such as those found in bank agencies, are examples of the type of analysis objects preferred by this approach (BARRAS, 1986, 1990).

Sectional taxonomies are associated with this technical approach. Those described by Pavitt (1984) and Soete and Miozzo (1989) are compared by Gallouj (2002), considered as criteria used in the creation of taxonomies: the source of technology, the type of user and their needs, an appropriation of a regime of innovation, the size of the firm and the level of technological diversification. These are: a) intensive scale-based sectors; b) specialized suppliers sectors; c) science-based sectors; and d) supplier-dominated sectors. There are, in addition, the information-intensive sectors, as exemplified by banking firms. Miozzo and Soete (2001) introduce four types to their taxonomy: a) large-scale physical networks; b) information networks; c) science-based and specialized supplier firms; d) supplier-dominated firms.

Gallouj (2002) identifies improvements in the taxonomy presented by Miozzo and Soete (2001) in comparison with that of Pavitt (1984), because these authors had already included the notion of networks as one more form of taxonomy. Nevertheless, Gallouj (2002, p. 11) suggests that the two taxonomies are equally limited by the fact that in both: “firms and industries are imprisoned within certain pathways”. It is as if the possibility of transferring from one pathway to another or combining pathways is something that cannot be considered.

An important contribution was given to the technical approach to service in-

novation by Barras (1986) that proposed the “Reverse Product Cycle”, which, as its central argument, introduced the same description of the innovation process as is given to the product industry, operating in a parallel way to the normal product cycle, though occurring in an opposite sequence of stages. The author suggests three phases in the innovation process: 1) an incremental innovation process; 2) a radical innovation process; 3) product innovation. The competitive effort increases, from the search to reduce costs and improve services in phase 1; to service quality improvements in phase 2, and the emergence of new services as innovative products in phase 3. An example on banking sector would be: computerizing support activities responsible for controlling information related to the financial movement of bank clients; followed by (phase 2), the installation of ATMs in the agencies. And, finally, introducing a new service of ‘home banking’ (phase 3), with the aim of offering clients the possibility of making their bank transactions via Internet.

It has been noted that, while the product industry starts off with a new product in the first phase so that, in following stages, thought can be given to increments or improvements, in the service sector and especially in those where there is an intensive use of ICTs, such improvements occur during the initial stages. In this sense, during the final stages of the cycle a new service emerges. The criticism expressed by Gallouj (1998, 2002) in respect of the Barras (1986) model, is based on its technical nature. In the view of the Reverse Product Cycle, technology, and in particular the ICTs, will be the pushing factor for innovation. Once technology originates in industry, Gallouj (2002) indicates that the Barras

model, as well as being specific for some service sections, especially financial services, can be better described as a means of interpreting the diffusion of technological innovation in services than as a theory of service innovation, as was intended by Barras (1986).

In the **service-based approach**, Gaudrey, Gallouj and Weinstein (1995) state that service innovation is only precariously understood, because it should not be analyzed as if it were the same as innovation in industry. Gallouj (2002, p. 20-21) presents what he considers to be the three main forms of service innovation in this perspective: a) ad hoc innovation; b) anticipated innovation; and c) formalized innovation. In the first case, there is an interactive process between the client and the service provider. The solution to the problem begins with the client's experience. In the second case, the environment and the needs of the client are monitored constantly and, in this way, anticipated innovation consists in collecting and accumulating new knowledge and expertise that are relevant to the 'problem', or in anticipating the bottlenecks of technological, economic, social or institutional changes. In the third case, which is the formalization of an innovation, the author introduces the example of the BCG Matrix (proposed by the Boston Consulting Group) as an intangible mechanism. The innovation stems from a "new method", a script; the design or use of analytical tools and instruments that contribute towards formalizing behavior.

The **integrative approach** (GALLOUJ, 2002) is based on two presuppositions. Firstly – necessity is a function that can be satisfied through the consumption of a good or a service. Secondly – there

should be taken into account, symmetrically, technological and non-technological innovations (DJELLAL; GALLOUJ, 1998). Thus, goods and services would be understood in an integrated analysis, within the framework of a single innovation theory.

The starting point of this approach is the notion of a product (goods or services) as being a collection of characteristics (GALLOUJ; WEINSTEIN, 1997; GALLOUJ, 2002), as proposed in the 'Lancasterian' consumer analysis. According to Lancaster (2001, p. 322) consumption is "an activity in which goods, singly or in combination, are inputs and where the outcome may be a collection of these characteristics". The collection of characteristics of a good (from its intrinsic properties to those called "esthetic") is what exerts a strong influence on choices made by individuals in their consumer behavioral patterns. What generates the use of a good is a combination of characteristics related to its offer. Later, Saviotti and Metcalfe (1984) used the Lancasterian approach to analysis the interpretations of a tangible good in the automobile industry, stating the idea of a product as a set of service characteristics, technical characteristics and process characteristics so as to analysis the process of innovation from a neo-Schumpeterian perspective. Gallouj (2002) expands this interpretation, mainly by including a vector of competencies (from the provider and from the client) to analysis innovation in services.

Taking into account the technological content of innovation in services, technological innovation is that in which technology dictates the rules for the process of innovation, when there is the intervention of a technical precept, of an artifact that represents incorporated knowledge.

Non-technological innovation can be attained by means of incorporated knowledge. In the analysis of Research and Development (R&D) activities for innovation in services, Djellal, Francoz, Gallouj *et al.* (2003) highlight the contribution made by psychological and human aspects observed in human and social sciences, arguing that these could contribute just as much as an intervention in technical precepts (GALLOUJ, 2002, p. 18). In “external relations” innovations, for example, Djellal and Gallouj (1998) verified that 82% were of a non-technological type. An example of this type of “external” relationship is the alliances or partnerships established with suppliers and/or competitors.

Thus, Gallouj (2002) proposes an approach to innovation based on the characteristics of services, according to which services result in a combination of technical, human and social aspects and, therefore, innovation in services reflect this complex combination. It is possible that, based on several combinations, innovation is attained, irrespective of whether or not technical artifacts are involved. A presupposition emerges, therefore, that innovation is also a network production, resulting from the multiple combinations that can derive from mobilized characteristics, in which one should not underestimate either the importance of technology or the role played by non-technological forms of innovation (GALLOUJ, 2002, p. 27).

The notion of integration and convergence seems to better address to study innovation in services since the service itself, as discussed previously, is a combination or a convergence of technical and human and/or social characteristics. The best arrangement should be sought in this relationship

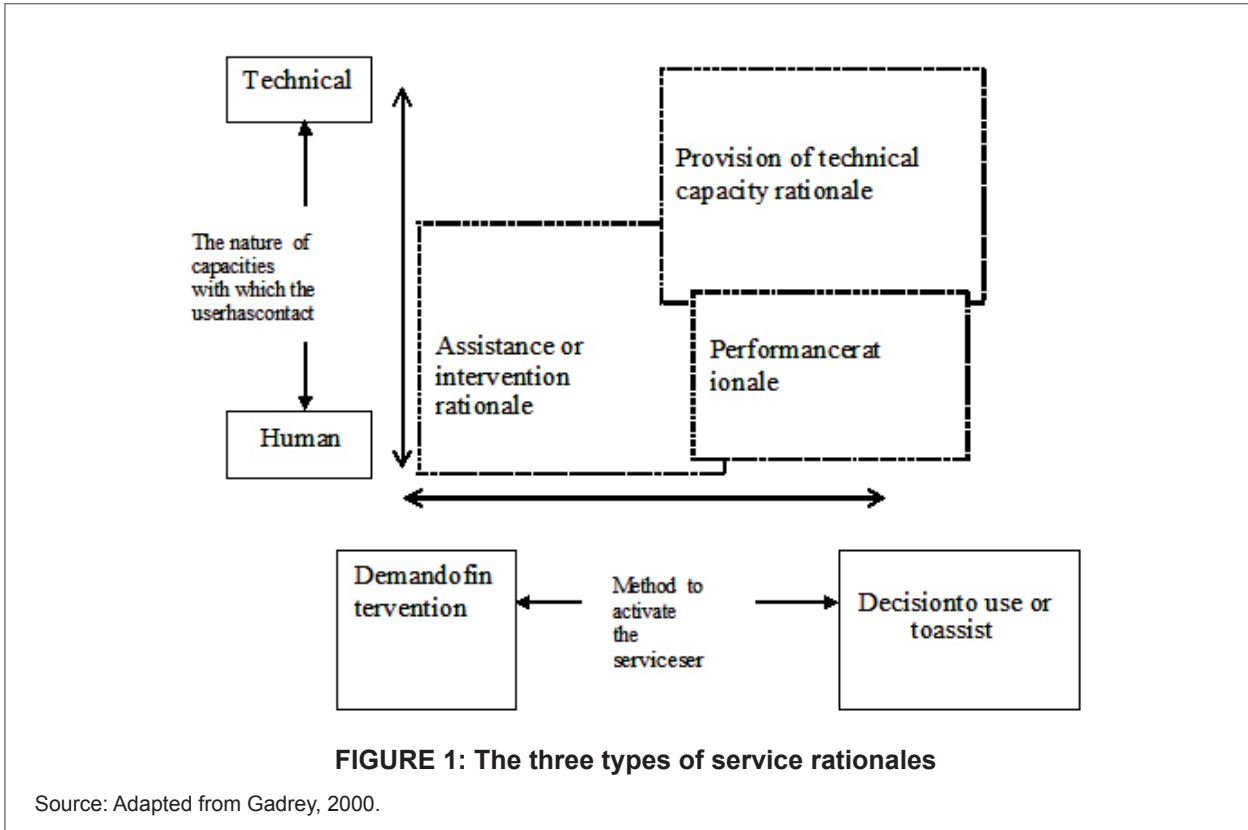
between human beings and non-human artifacts. In this sense, it is possible to suggest that, within the different network approaches, this kind of perspective of Techno-Economic Networks (TENs), is the one most appropriate for studies on innovation in services. The following section discusses the concept and the main characteristics of this approach.

Services and Innovation in a Techno-Economic Network Perspective

To overcome some myths and partial definitions of services (GALLOUJ, 2002), an integrative approach of innovation applied to services needs a socio-technical basis. Following this point of view it is important to introduce the Gadrey’s view (GADREY, 2001), for whom the providing of services reflects a “socio-technical interplay”. The author presents three types of service rationales, in which it is possible to observe a greater or lesser degree of interplay between the technical devices and people (service users or providers), as presented in Figure 1.

Gadrey (2000) proposes a “critical relationship perspective”, different from the traditional economic perspective which separates goods from services. Gadrey (2002, p. 4) introduces co-production, cooperation or interaction between producer and consumer into the concept of services to produce a ‘service product’. Thus, several service presuppositions are strengthened as a form of socio-technical interplay: a) the services are interactive; b) the service product is a process difficult to specify; c) services involve, to a certain degree, consumer participation in the production process.

Regarding as being a service product



as an outcome of socio-technical interplay, Gadrey (2001, p. 56) highlights the “intrinsic, uncontrollable” doubt that “destabilizes” the construction process of “agreements” in numerous services. The different perceptions of quality related to what is offered by the provider to the user, according to the diversity of conventions in action (BIGGART; BEAMISH, 2003) will define the strong or weak points of service standardization.

Callon, Méadel and Rabeharisoa (2002) also understood goods and services as socio-technical devices. To clarify this concept, an example that can be given is that of the iPod product, that includes features that are functional (technological), social and also involve status (social, symbolic). The product (static) or the set of characteristics and performances (service) is valued, qualified and re-qualified based on

conflicts and negotiation between the producer and the user. According to Callon, Méadel and Rabeharisoa (2002, p. 199) a product is a “strategic variable of different agents engaged in the process of successive qualifications-re-qualifications”. Therefore, we meet the socio-technical interplay claimed by Gadrey (2000, 2001).

After discussing the socio-technical nature of a service and the attributes of those involved in this interplay it seems appropriate to discuss innovation as a continual strategy for performance improvement (CALLON *et al.*, 2002, p. 199) in this sector. The intention here is to gather together arguments to propose that services and the respective socio-technical interplay should be considered in an analysis on innovation in a network perspective.

The concept of network has been used in studies and research in different areas

of knowledge, in some situations even in a fairly indiscriminate way. Nohria (1992, p. 3), observed that: “this indiscriminate proliferation of the network concept threatens to relegate it to the status of an evocative metaphor, applied so loosely that it ceases to mean anything”. In the TEN approach which originated from the Actor-Network Theory (ANT), various non-human actors should also be taken into consideration within a network.

Thompson (2003, p. 72-73) suggests that the objective of some predecessors of Actor-Network Theory (CALLON, 1986, 1991; LAW, 1999; LATOUR, 1994, 2005) was “to dissolve the dualistic view that establishes distinctions between society and nature; humans and non-humans; social and technical, what is “within” and what is “outside” a network. They sought to show that no detachment should exist between “agency” and “structure”, or between “actor” and “network”, but rather a “combination”. In the view of Latour (1994), it is these blends, the intertwining between such elements by which the world is woven.

Based on ANT perspective, Callon (1991, p. 133), on analyzing the process of innovation that originated from the interplay between different points of performance (scientific, technical and commercial), suggests the concept of a Techno-Economic Network (TEN), defined as: a coordinated set of heterogeneous actors: government laboratories, centers for technical research, companies, financial organisms, users and political powers that collectively participate in the conception, elaboration, production and distribution-diffusion of the production procedure, of goods and services.

ATEN is composed of **actants** – actors, mediators and intermediaries. “All that cir-

culates between actors and which places them in a relationship” can be understood as an “intermediary”, according to Vargas (2006, p. 115). For Callon (1991), there are four groups of intermediaries which contribute towards a study of innovation in a TEN perspective: scientific texts; technical artifacts – not human ones, such as machinery, equipment etc.; human beings and their competencies; and, finally, money. The intermediaries both describe as well as constitute the established network. It is important to explain that, in a semiotics perspective, an actant is the whole and any component of a piece (a text, billboard, etc.). The ANT does not define a priori who are the actors. It is from an analysis of the associations that it is possible to see who is the actor and who is the mediator. That is to say, an **actant** is a type of “generic” name for any component of the network, meaning anything that operates in a scheme (of humans and non-humans), including the attribution of a figurative or non-figurative role (“citizen”, “weapon”) (PINHO, 2005).

According to Green, Hull, McMeekin et al. (1999) innovation is not just the result of isolated human processes, generated by entrepreneurs who are ‘geniuses’, but rather a continued historical standard of development, based on economic, social and technical variables. The importance of using the TEN approach to study innovation rests on the fact that it deals with a process, the initial stage of which does not, always, have to be provoked by a human being, but can also be provoked by a non-human. To exemplify: a certain defect in the engine of a vehicle will instigate the need to ‘alter’ the project of that engine. The engine may not be considered to be

an actor, but it is acceptable to state that it relates to a non-human element that was capable of “translating” the innovation network to which it belongs, since it was responsible for carrying out a fundamental role, generating the need for “action” to bring about changes at the factory.

The translation of a TEN is carried out in stages. Callon (1986) points to the four stages of network translation: 1) problematization, where actors and the nature of the problems related to them in relation to an objective are defined; 2) interessement, where the terms of agreements related to problems are negotiated; 3) enrolment of the actors, where the objective is what defines a set of strategies aimed at distributing roles related to each actor involved; and 4) mobilization of the actors (allies), as a set of methods that ensure that all those involved can properly carry out their roles. Callon (1986, p. 1) states that “translation is a process, never a completed undertaking, that can even fail”. The “unfinished” nature observed in the composition – and translation – of a techno-economic network is exactly what gives it its individual value. Andrade (2004, p. 11) states:

This is a suitable approach for those who need and manage to cope with constant uncertainties that are still to come, and who like to improve transformations. For those who appreciate a safer port of certainties and established orders, it might be better to keep at a distance and remain in your unique and magical world of structures and systems.

There are several actants, human and non-human, that will influence the process of innovation, including the ecological environment, a new technical norm, the regulating role of the state, new scientific discov-

eries and other elements like the power of ‘microbes’ in Pasteur’s work that led to the production of antibiotics (LATOUR, 1994).

In this sense it is possible to state that the TEN approach is close to the integrative perspective proposed by Gallouj (2002) to study innovation in services. Gallouj (2002) proposal does not only consider the role of technology, or that of the entrepreneur, but also the role of the service relationship, of money and of all the actors and artifacts that contribute towards the innovation effort.

Nevertheless, it is important to stress that the combination of these two perspectives – Callonian and Galloujian – can contribute greatly towards a study of innovation if they serve as a theoretical context. These compose, broadly speaking, the backcloth of never-ending interactions between heterogeneous actors who, quarreling, having doubts or negotiating, find, in these processes of change, the solution to their differences.

It might be more appropriate to say that Gallouj (2002) and Callon (1986, 1991) contribute towards the discussion by showing how important it is to consider a certain phenomena in an integrative network, in such a way that a scenario is established, and where changes will occur. However, Latour, very often with inputs from Callon (1986, 1991) shows step-by-step details of how this scenario – the network perspective, the integrative perspective – provides fertile ground for the work of a researcher: to seek to understand a phenomena by means of a reasonable methodological argument. Latour is not full interested to bring a strict set of methodological technologies to study certain phenomena. This author is extremely critical of the one way

method. “Science has two sides: one that knows the other that still does not know. We prefer to follow the first one (...). We will retain the minimum possible of ideas” (LATOUR, 2000, p. 21).

Even so, the author exempts himself from the responsibility of suggesting a set of steps, a methodology, for the study of phenomena that imply interaction between heterogeneous actors. For Latour (2004, p. 214-215), the scientist should be sensitive to the necessity of an “exteriorization” process of “all” who are part of (and represent or translate) certain collective groups.

It is important to stress that, in the view of techno-economic networks, the “collective” is defined not by its static character, but rather for its movement, and this is why it is understandable that the methodology used for the composition and/or decomposition of a collective is, indeed, transitory. It is as transitory as the formation of the network itself. Therefore, the methodology proposed by Latour (2004, p. 208) distinguishes four methodological steps needed for the study of the network, which seems to us to be a qualitative descriptive effort, as follows:

1) Perplexity – taking into account that there a more complex external reality than it seems to be. The world, at least while things have not yet become institutionalized and stabilized, is not really such a black box. The author therefore warns that a researcher should not limit the number of proposals to be taken into consideration in this debate. It is not the task of a researcher to delimitate arguments and proposals, but rather the situation as it presents itself. “Nothing should so suddenly subdue the perplexity in which the agents find themselves submerged due to the fact that new

realities have been introduced” (LATOUR, 2004, p.190).

2) Consultation– the researcher should be sure that he will not abbreviate “suddenly and arbitrarily the number of voices of those (actors) who take part in proposal discussions” (LATOUR, 2004, p. 188). In a certain way, this is not a new methodological piece of advice, since Bardin (2008), when discussing the technique of content analysis back in 1970, had already warned about the need for careful and exhaustive regimentation of research subjects, showing the importance of testing all possibilities. No actor who is important to the study should be left out of the research. Does Latour (2004) provide any new developments in relation to Bardin (2008)? It should be said that he does not. Bardin (2008) stated that other sources of information – not only human ones – but also documents, “conditions of context” etc., are equally important to tell us something about a certain phenomenon.

3) Hierarchy – although an adherent of confusion (LATOUR, 2000), this author proposes that, as an important third stage of a whole set of methodological steps, a discussion should be held about the “compatibility of new proposals together with those that have already been established, so as to maintain all these within the same common universe where each will be given its proper place” (LATOUR, 2004, p. 188). Thus, the criticisms received by the author with regard to his complacency with a network that has, as its main characteristic, a transitory nature and weak articulation between its constituent actors, and his methodological proposal also has the same fragile characteristics seem to be not appropriate. In fact, La-

tour (2004, p. 188) follows a straightforward path in studying different actors and respective proposals, in a way that would enable these “to live together”.

4) Institutionalization - Latour again shows (2004) consistency in his methodological proposal when he states that, to study the collective properly, one must not renounce the demand for institutionalization. At this stage, the presence or importance of a certain proposal or actor will no longer be discussed, since these discussions would have been already resolved during previous phases, when such differences first emerged and were confronted. Once these differences have been resolved, it then becomes possible to institutionalize the collective proposals that have been analyzed.

Nevertheless, one cannot forget that, since we are dealing with a proposal put forward by Latour (2000, 2004) and Callon (1986, 1991), this stage of institutionalization serves as one degree towards the following step, which Latour (2004, p. 234) calls “setting the scene of the totality” – where the transitory composition of the collective being studied may be examined. According to our interpretation, this is when the network is designed. Although one always has to be alert to the fact that, at any moment, this composition can undergo changes due to the incursion of new proposals and new actors who push a new cycle.

In the TEN, the components of the process of innovation are grouped together. Their configuration is always hybrid (CALLON, 1986). Thus, if the service is a socio-technical construction as presented by Gadrey (2001), innovation in services can occur at any point in the network that demonstrates the capacity to define – or

translate – this construction. No technical or relationship priority exists, but rather an integrated perspective that allows for an analysis of innovation in services in all its complexity.

CONCLUSION

This essay carried out an articulated discussion about innovation in the service sector from a Techno-Economic Network (TEN) perspective, as being a suitable path for the construction of an integrative approach to innovation studies in this sector. The study of innovation, especially in the service sector, does not appear to admit isolated, static and linear analysis of this phenomenon. Service development itself is already something that has resulted from dynamic combinations between technological artifacts, but also from social conventions, shared competencies between the service provider and user, amongst other peculiarities discussed in this paper. Such characteristics are compatible with the Techno-Economic-Network approach, both with respect to the diversity of the actors involved, as well as with the symmetry that exists between them. Questions related to such matters as the predominance of technical devices vis-à-vis the importance of a service relationship, which are discussed at the core of the different approaches to service innovation, are absorbed and dealt with adequately within the symmetry of a TEN. Furthermore, the TEN approach seems to be a greater contribution to the analysis of innovation in services in a broad perspective, including all the actors concerned, instead of the extremes contemplated by the services innovation literature (macro-economic studies or firm-level studies).

It is hoped that the theoretical framework articulated here could contribute to empirical studies that answer the following questions that may generate research hypothesis within the scope of innovation in services: a) which areas or sections linked to the service sector would be better suitable to use the TEN perspective as a theoretical-methodological support to study the processes of innovation? b) taking into account the TEN perspective, which translators have made the greatest effort and given most importance to instigate innovation in certain areas of the service sector? c) in which of the four translation stages suggested by Callon (1986) in the TEN perspective are the greatest encouraging or

discouraging factors in the innovation process in the service sector? And, in a more general way, d) how TEN perspective studies on innovation in services could gather together all the actors, in different levels of analysis, that are responsible for the innovation dynamic in organizations?

From the TEN perspectives the service sector gives a huge opportunity to enlarge the field of observation and to put the finger on a very critical question: the interplay of human and non-humans in the action of providing new services. The innovation, as a special action that evokes change and novelty, has intrinsically the potential to enlighten other contributions of TEN perspectives in typical controversial situations.

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