



THE CO-PRODUCTION OF INNOVATION: A CASE STUDY IN A REHABILITATION HOSPITAL

REGIS SILAS CARDOSO

Master's Degree in Production Engineering from the Production Engineering and Systems Department at the Universidade Federal de Santa Catarina (UFSC).

Doctorate student in Business Administration from the Department of Academic Areas I at the Instituto Federal de Goiás (IFG).

Rua 75, Número 46, Setor Central, Goiânia – GO – Brasil – CEP 74055-110

E-mail: cardosoregis01@gmail.com

ANTONIO ISIDRO DA SILVA FILHO

Doctor in Business Administration from the Graduate Program in Business Administration at the Universidade de Brasília (UnB).

Coordinator for the Professional Masters Program in Public Administration and Coordinator of the Center for Studies and Researches in Innovation and Strategy at the Universidade de Brasília.

Campus Universitário Darcy Ribeiro, Edifício FACE, Sala BT, 41/7, Asa Norte, Brasília – DF – Brasil – CEP 70910-900

E-mail: antonio.isidro.filho@gmail.com

LEAR VALADARES VIEIRA

Master's Degree in Business Administration from the Graduate Program in Business Administration at the Universidade de Brasília (UnB).

Doctorate student in Business Administration and Researcher of the Center for Studies and Researches in Innovation and Strategy at the Universidade de Brasília.

Campus Universitário Darcy Ribeiro, Edifício FACE, Sala BT, 41/7, Asa Norte, Brasília – DF – Brasil – CEP 70910-900

E-mail: learvaladares@gmail.com

ABSTRACT

Purpose: Understand how the user, the provider/supplier and the decision maker interact in the innovative process, as well as identify how the co-production occurs.

Originality/gap/relevance/implications: There is evidence that the innovation derives among other factors from elements that characterize the co-production. Studies involving co-production of innovation are scarce. This study contributes to increase the theoretical knowledge in innovation in hospitals, mainly regarding co-production of innovation.

Key methodological aspects: It is a qualitative study with case study strategy. Data collection through interviews and documentary research. Analysis of the data by technique of content analysis.

Summary of key results: The logic of product development is still applied in the development of technological solutions for the hospital, against the logic of services, involving the interaction of customer with supplier. The results also suggest the possibility of relationship between innovation capacity and occurrence of innovation, pointing out the need to test this relationship in future works.

Key considerations/conclusions: It is necessary to understand and investigate the mechanisms that allow the interaction of users, from design to implementation of innovation. It is also important to investigate whether the elements that characterize the co-production are relevant to explain innovation in hospitals, because elements were identified related to the concept of innovation that deserves to be better understood, including in contexts of public and private hospitals.

KEYWORDS

Innovation. Interaction. Co-production. Hospital. Electronic patient record.

1 INTRODUCTION

Innovation in services has produced a large literature, being the work of Gallouj and Weinstein (1997), a landmark to establish three approaches or perspectives – assimilation, demarcation and integration or integrationist – to innovation and, in a subsequent work, there was the insertion of another perspective, which was the investment (Gallouj, 2010). In this study, the integrative approach is adopted in order to eliminate the distinction between goods and services.

This study has as object of study a reference hospital in rehab, located in Goiânia, State of Goiás (Brazil). Understanding innovation in hospitals can emphasize aspects that involve directly the use of technologies, but also the interaction between the actors involved. In this context, the activities of hospital services, public or private, are mostly subject to the technical approach (Gallouj, 2002; Gallouj & Zanfei, 2013). The analysis of innovations in health services, hospitals in particular, requires the confrontation of these biases under an integrative approach (Gallouj, 2002).

Gallouj and Zanfei (2013) claim that the sectors of public services have been neglected and underestimated, except the health services and research. For hospitals, the literature is abundant, but studies generally emphasize the role of science and technology in innovation, although the administrative innovation, including those involving the adoption of technology, remains a poorly understood phenomenon (Farias, Guimarães, & Vargas, 2012).

One important point to understand innovation in services and the main purpose of this study is to identify how the user, the service provider and the decision maker interact in the innovative process, demonstrating how the co-production of innovation in a hospital occurs. It is proposed as a starting point that innovation also derives, among other factors, of elements that characterize the co-production between organisations and service users. In this sense, this study is relevant, because it is intended to contribute to the increase of theoretical knowledge in innovation in hospitals, as suggested by Djellal and Gallouj (2005; 2007). This article is structured in five parts. The first is dedicated to this introduction. The second is intended to the theoretical discussion involving innovation and co-production. The third part describes the the method. In the fourth part, the results are analyzed and discussed, and in the last part we present the findings and recommendations.

2 THEORETICAL FRAMEWORK

Innovation in services presents different elements in comparison to the innovation in manufacturing. In manufacture, it is essential the dependence on technological path (Dosi, 2006). According to Sundbo (1997), innovation in services does not follow a technological path, but a history of services in which the technology is only a vector among multiple others. The proposed definition as a result of technological dependency is seen as reductionist (Gadrey, Gallouj, & Weinstein, 1995; Gallouj & Weinstein, 1997; Gallouj, 1998; Gallouj, 2002).

For example, the work of Barras (1986; 1990) presents a proposal of systematization in search of a theory of innovation in services. The model proposed by Barras provides for the application of new technologies to increase the efficiency and effectiveness in the provision of services. This template is more directed to explain the technological diffusion derived from a model of technological innovation based on manufacture than a theory of innovation in services. It is also important to point out that Barras says that innovation in services occurs especially by information technology (IT).

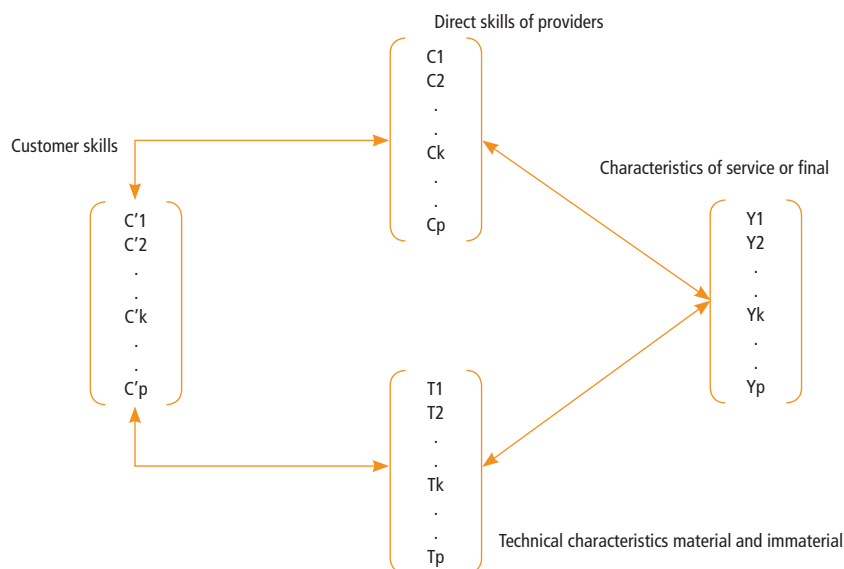
The literature on innovation in services may be reclassified in four approaches: assimilation, demarcation, investment and integration (Gallouj & Savona, 2009; Gallouj, 2010; Djellal, Gallouj, & Miles, 2013). The approach of assimilation or technical approach limits the innovation in services to the adoption or use of technology. The approach of differentiation, distinction or service-oriented approach, seeks to identify possible points of interest in the nature and organization of the innovation in services, and seeks to develop a specific structure for this form of innovation. The investment perspective considers some service industries, such as the knowledge-intensive services as sources of innovation for the entire economy, since they play an active role in the development of innovation. The integrative approach or synthesis, seeks to develop a conceptual framework that approaches and offers a possibility of convergence between goods and services. According to Gallouj and Savona (2009), this is a promising approach in terms of theoretical advance, since it overcomes the distinction between goods and services.

In the perspective of integrative approach, the concept of innovation in services, by its magnitude, is based on Schumpeter (1985), in which, innovation is: 1. the introduction of a new service; 2. the introduction of a new method for providing a service; 3. the opening of a new market; 4. the obtaining of a new source of raw materials or intermediate inputs; 5. the establishment of a new organizational form in an industry in which the company operates in analysis. Situations 1 and 2, in particular, are aligned into the perspective of services and involve changes in the competences of who produces and who uses the service.

The approach based on features developed by Gallouj and Weinstein (1997) is of an integrative nature. In services, the technical characteristics are understood as front office technologies, i.e., those that have a direct relation with the product/service. Procedural characteristics, routines, are back-office technologies (Gallouj & Weinstein, 1997; Sundbo & Gallouj, 1998). Figure 1 demonstrates the representation of Product Service in terms of these characteristics. By examining this model, it is reasonable to assume the occurrence of innovation in the interaction between the vectors, i.e., interaction between the direct skills of providers (C), customer skills (C'), and material and immaterial technical features (T). The characteristics of service or final (Y) are derived from this interaction.

FIGURE 1

REPRESENTATION OF PRODUCT SERVICE
IN TERMS OF CHARACTERISTICS



Source: Adapted from Gallouj and Weinstein (1997).

According to Gallouj and Weinstein (1997), innovation can be defined as changes that affect one or more vectors of characteristics, being expressed in various ways. These forms of innovation can be better understood from the classification given by these authors: Radical innovation; Innovation of improvement; Incremental innovation; *Ad hoc* innovation; Recombinative innovation; and Formalized innovation.

In a Schumpeterian sense, innovation is defined by Sundbo and Gallouj (1998) as the change in business by adding a new element or by a combination of old elements. Sundbo and Gallouj (1998) define four types of innovation: product, process, organizational and market. They also suggest the *ad hoc* innovation, defined as the interactive construction for a problem proposed by the client. This type is not directly reproducible, i.e., its reproduction is indirect by coding and formalizing experience and competence, also being considered incremental.

Djellal and Gallouj (2005; 2007) examined innovation in hospitals. In their work, these authors conceive the hospital as a complex supplier of services and a hub – main center of activity – of the health system. The authors claim that innovation in hospitals is not a black box, i.e., hospitals are seen in terms of its production function and must be understood in its entirety, by analyzing the operation of other elements of the organization. Djellal and Gallouj (2007) claim that this logic refers to a change of approach, i.e., the technical perspective in search another approach stressed on services and services relationship.

Gopalakrishnan and Damanpour (1997) discuss three dimensions of innovation: the stage of the innovation process, analysis levels and the types of innovation. The stages of the innovation process are the generation and adoption of innovation. The levels of analysis are industry and the organization and organizational subunit. The types of innovation are product or process innovation, radical or incremental, technical or administrative.

Windrum and Garcia-Goñi (2008) present a neo-Schumpeterian synthesis approach, since it is a proposal that considers all five types of innovation defined by Schumpeter (1985), being a generic model that can be applied to studies both in the public and in the private sector, both in services and manufacturing. According to these authors, as regards to the existing models, Barras (1986) and Gallouj and Weinstein (1997) do not explain the innovation in the health sector, although the model of Windrum and Garcia-Goñi (2008) was developed based on the model of Barras (1986), under the claim that its contribution is important for providing a theory about the nature and the direction of innovation in services. The approach also differs from Gallouj and Weinstein (1997), which was applied to the private services sector and in business-to-business context-relationship between companies - and also includes the variables of preferences and skills of users, service providers and decision-makers.

The elements that Gallouj and Weinstein (1997) present in its integrative approach are also evidenced in the *Economia do Aprendizado* (Lundvall, 1988), which brings innovation as an interactive process between producers, users, universities, and the Government. Learning by interaction is measured by the cooperation between user and provider, being a part of one way of learning defined

by Jensen, Johnson, Lorenz and Lundvall (2007). These forms of learning are STI-mode (Science, Technology and Innovation) and DUI-mode (Learning-by-doing, Learning-by-using and Learning-by-interacting). According to Jensen *et al.* (2007), learning by interaction is related to the tacit knowledge (Lundvall & Johnson, 1994). On the other hand, these authors recognize that the explicit knowledge, encoded or written, which can be transmitted and absorbed by others, such as routines, scripts, protocols, as common codes, provides the basis for efficient communication between users and producers in the context of product innovation. The combination between the ways of learning causes more innovative companies (Jensen *et al.*, 2007).

As regards to innovation in hospitals, Kimberly and Evanisko (1981) advocated that the organizational innovation, understood as technological innovations and administrative, suffers the influence of individual factors, organizational and contextual. On an individual approach, the authors claim that technological innovation is positively affected when the hospital administrator is highly qualified, is involved in medical activities and is in his role for a long period of time. On the organizational factors, the conclusion is that the adoption of technological innovation tends to be more common in large, specialized, functionally differentiated and decentralized organizations. Larger hospitals have greater bias to innovate. With respect to contextual factors, the authors claim that the presence of competition in the local environment is a significant predictor of adoption of technological innovation.

Chesbrough (2003) spoke about the innovation in services. For the author, the process of open innovation is a strategy to advance the capabilities of innovation. The open innovation considers the client as an important actor in the process of innovation. Innovation helps in improving performance, and a high level of performance requires interaction with the client.

The process of innovation adoption was studied by Rogers (1995), presenting five levels of the decision-making process of adoption: knowledge, when the potential adopter uncovers the existence of innovation and understands its operation; persuasion, when the potential adopter if positioning favorable or not to innovation; decision, when the potential adopter chooses or rejects the innovation; implementation, when the adopter uses the innovation; confirmation, when the adopter reinforces a decision of innovation already carried out and in situations of conflict.

To better understand the process of innovation in hospitals, Koch, Cunningham, Schwabsky and Hauknes (2006) spoke about the factors that are facilitators, barriers and effects or results generated by innovation. The facilitators are individual and organizational variables that affect positively the adoption of innovation by fostering the successful deployment and use. The hinder factors

or barriers are individual and organizational variables that affect negatively the adoption of innovation. The effects or outcomes are the impacts on flows of organizational processes, such as management, support and diagnosis, nature of work and employment, and productivity of hospital organizations.

Fleuren, Wieffrink and Paulussen (2004) developed a study to identify the determining factors that simplify or prevent the introduction of innovation in healthcare organizations. The authors have developed a framework of analysis that shows the main stages of the innovative process and categories of causes of innovation. The innovative process stages are dissemination, adoption, implementation and continuation. The categories determinants of innovation are: 1. characteristics of the socio-political context, as the rules, laws and characteristics of patients; 2. characteristics of the organization, such as the staff turnover and the decision-making process in the organization; 3. characteristics of adopters of the innovation, or users of innovation, as the knowledge, skills and support received from colleagues; and 4. characteristics of innovation, such as the complexity and relative advantage. Fleuren *et al.* (2004) yet claim that the jobs surveyed did not show a systematic strategy design, as well as the existence of just a few standardized procedures to measure determinants of innovation, which could lead in their view to failure in the implementation process (Katterhagen, 2013).

Caccia-Bava, Guimaraes and Harrington (2006) developed a study to examine the type of organizational culture that influences the efficiency of hospitals to innovate by absorbing new technologies and the importance of this capacity in the implementation of information technology. The results showed that the organizational culture is an important factor in the development of absorptive capacity and influences the implementation of new technologies.

Cohn, Berman, Chaiken, Green, Green, Morrison and Scherger (2009) report adoption and implementation IT in health services on organizations of the United States. These authors discuss the clinical and economic benefits of IT and the factors that prevent doctors to adopt it, as well as the means for implementation. As advantages, they point out, among others, opportunity for a partnership between doctors and patients, access and storage of medical and patient information, reduction in archive, transcription and staff costs, improvement of coding and billing. They also report that doctors are reluctant to adopt the electronic health record for lack of participation in the initial project design process. Finally, the successful adoption and implementation are both a matter of organizational culture as design engineering.

From the theoretical analysis developed until this moment, it is important to note that one most important aspect for understanding innovation in services is the interaction between producer and user. On this analysis, it is important to understand the phenomenon of co-production as dynamic interaction of skills

or abilities, as well as its relationship with innovation in services, in particular, health services.

The initial concept of co-production was produced in the 1970s by an academic team led by Elianor Ostrom of the Indiana University, whose work described the services user recognition gap in service delivery (Realpe & Wallace, 2010). The concept of co-production means the exchange of information and knowledge for the execution or performance of a work or activity (Gallouj & Weinstein, 1997; Gallouj, 2002). According to Gadrey (2000), the co-production means cooperation or interaction between producer and consumer to the achievement of desired results. These authors point out that the participation of clients, in one way or another, is one of the most important characteristics of production and supply of services, as well as certain products. In the model proposed by Gallouj and Weinstein (1997), the co-production relationship is identified by the interaction of two vectors: the competence of customer and the competence of supplier (C and C').

According to Etgar (2008), the co-production is a dynamic process and it develops in five stages: 1. Development of background conditions; 2. Development of dominant logic and motivational drivers; 3. Cost assessment and cost/benefit analysis; 4. Activation; and 5. Assessment.

The author deploys the first stage in four conditions: environmental macro conditions, consumer related to factors, product related to factors, situational factors. Among these, conditions related to consumers and situational factors are highlighted. Regarding consumers, Etgar (2008) defines as background of co-production the factors: capacity, time, involvement, coordination ability and dialogical capacity. Situational factors refer to the interaction and are managers' beliefs, truth, confidence, opportunistic behavior, cultural compatibility and empathy.

A gap of research pointed by Etgar (2008) is the knowledge of how consumers choose to engage in co-production and the corresponding decision-making process, suggesting still that co-production is a strategy used to improve the customization. Chesbrough (2003) says that there is a conflict between customization and standardization. In the view of the author, internal processes must be standardized and customer relationship customized. According to Fitzsimmons and Fitzsimmons (2014), the involvement of the client in the process of service maintains a competitive strategy of cost leadership with some customization, when focused on customers interested in self-care, i.e., the higher the involvement of the customer, less the relation with leadership in cost, because a smaller involvement implies less customization. Examples: banks (less involvement, greater standardization, lower costs) and hospitals (greater involvement, less standardization, higher costs).

Chen, Tsou and Ching (2011) maintain that the co-production between producers and users is fundamental to the process of innovation in services. Greater customer involvement in innovation process results in better quality products. The model proposed by the authors is applied in the business-to-business context, besides being developed based on service dominant logic and the theory of vision based on resources.

Bitner, Faranda and Hubbert (1997) list the levels of participation of clients in the service experience: low participation (customer presence required in the service delivery), average (customer inputs required for the creation of the service) and high (customer co-creates the service). It is also highlighted the role of the customer in the service experience: the customer as a productive resource; the client as a contributor to the quality, satisfaction and value; the client as a competitor to the organization of services.

The marketing area also developed the concept of co-production, mainly from the approach to the service-dominant logic (SDL) under this logic; the term co-creation is used more frequently. The notion of dominant logic appears in marketing literature as one effort in search of a more inclusive understanding, seeking to integrate goods and services and providing richer reasons to develop thinking and marketing practices (Vargo & Lusch, 2004), consistent with the integrative approach (Gallouj & Weinstein, 1997; Gallouj & Savona, 2009), although the marketing literature has not explored this approach.

The service dominant logic is not a theory, but a lens through which a phenomenon can be observed (Vargo & Lusch, 2004; Vargo, 2007; Vargo & Lusch, 2008a; Maglio, Vargo, Caswell, & Spohrer, 2009; Vargo, 2011), being considered, including how an open-source approach, i.e., open to criticism, debates and empirical validation (Vargo & Lusch, 2008b).

The co-creation is wider than the co-production in the context of marketing, as it relates to a product that is not necessarily a service. On the other hand, it can be ended that, in services, from the integrative approach, which does not distinguish between goods and services, value co-created and value co-produced. The co-production and co-creation constructs should be seen more as a continuum than as dichotomous categories or mutually exclusive.

Dadfar and Brege (2013) had the purpose to explore the role of customer involvement in the production of the service and the possible effect on the quality of service delivery, as well as customer satisfaction. Being an exploratory study, case study approach was used. For the authors, the customer involvement ranges from silent participation to a high degree of user involvement as part of the production process.

In synthesis, from the theoretical analysis developed until now, it was possible to extract that client participation in the production of a service is one of

most important characteristics of the provision of services, as well as certain products (Gallouj & Weinstein, 1997; Gallouj, 2002), being this participation characterized as a relationship and interaction of skills, i.e., co-production. The process of innovation in services is dependent on co-production between users and producers. Greater involvement results in better quality products or services (Chen *et al.*, 2011).

3 METHOD

To achieve the purpose of this study, a descriptive research was carried out using qualitative approach and case study strategy. The survey was developed in a public hospital – Centro de Reabilitação e Readaptação Dr. Henrique Santillo (CRER) – a large-scale reference hospital in rehabilitation located in Goiânia, in the period from March to April 2015. The selection criteria of this hospital was the adoption of the Electronic Patient Record (EPR), an innovation that pervades the entire hospital structure, that is, a tool that provides information to all involved in hospital services (Angst, Agarwal, Sambamurthy, & Kelley, 2010; Jha, Roches, Campbell, Donelan, Rao, Ferris, Shields, Rosenbaum, & Blumenthal, 2009): the user, the service provider and the decision-maker.

The CRER was founded in 2002 and is managed by a social organization. It is an ISO 9001 and ONA certified hospital (National Accreditation Organization).

For data collection, it was used documentary collection and interviews. The documentary collection was conducted by consultation in the webpage of the hospital. The interview is described by Bardin (2011) as not-directives and semi-directives or semi-structured. The use in this work was the semi-directive, with the support of a semi-structured script built based on the analytical categories provided by the theory: motivators of innovation; facilitators and difficult factors; effects/results; co-production. Ten interviews were made: 3 representatives of senior management (hospital decision-makers); 3 managers of healthcare services – doctors and other health professionals (users); 1 technology internal area manager (user); 2 billing area representatives (users); 1 representative of the foreign supplier of technology (service provider). The interviews were single, recorded and then transcribed.

The analysis of the data was developed from the technique of content analysis, developed by Bardin (2011). Content analysis is divided into phases: 1. prior analysis; 2. exploitation of material; and 3. treatment of results, inference and interpretation. For the operationalization of these phases, a fluctuating reading was initially made. The text generated by the interviews was the corpus, which

was subjected to analytical procedures. After reading the interviews transcribed, the highlight of keywords and phrases that contain descriptions of the analytical categories was made. The reports were classified according to such categories. As the nature of this study is exploratory, the qualitative approach was used and considered that the presence of words in the report, quoted at least by one participant, would be enough for the description of the variable researched and, therefore, there were not registered frequencies. Then, the data was analyzed according to the literature addressed.

4 RESULTS AND DISCUSSION

The adoption of the EPR was regarded in CRER as a process of administrative innovation. It was an innovation characterized as a new method (Schumpeter, 1985) and incremental (Gallouj & Weinstein, 1997; Gopalakrishnan & Damanpour, 1997). Decision makers, i.e., the senior management of the hospital, have a long journey in administration of hospitals, which, in the view of Kimberly and Evanisko (1981), simplify the process of innovation. The decision-making process for the adoption of technology was of the senior management, but all respondents made reference to the reason for the adoption, i.e., make the hospital 100% paperless, differentiated from other hospitals. The size of the hospital with a specialized structure and functionally differentiated was also an important factor for the implementation of innovation (Kimberly & Evanisko, 1981).

The decision was based on what Koch *et al.* (2006) called motivation, in the individual and organizational levels. At the individual level, the motivations verified were prestige and idealism. The prestige can be observed when noted, in the report, the fact that it is the only institution in the State of Goiás, and the second in Brazil, having a 100%-paperless hospital, i.e., with an EPR deployed in its entirety with digital certification, being also recognized throughout the community of health as a distinguished hospital. Idealism is noticeable at the talks of senior management, also present at the talks from all other respondents, without exception, the idea of a paperless hospital.

At the organizational level, the motivations were troubleshooting. The goal was the paperless hospital. Although the respondents did not have emphasized cost savings, the reduction of paper and greater control of information are elements related to cost reduction, which had been advocated by Windrum and Garcia-Goñi (2008).

In the interviews, the existence of two types of users was identified: the end user, patient, and the middle user, healthcare professionals. The end user has

not been involved in the process. According to the speech of E3: “the institution did still not perceive the need to involve end users, perhaps for reasons of time and understanding”, as well as the speech of E8: “the patient is a passive subject. The ERP is private for the hospital, although it concerns the patient; I think the patient is layperson. Who knows the system is who works with it”. These arguments suggest that the involvement of the patient, end user, is not important. If the records concerns the patient, not hearing the patient would ignore the importance of his/her opinions for the development of a tool that aims his/her welfare. This finding reveals a strategic dissonance with respect to the innovation adopted. The concept of strategic dissonance is understood as the divergence between strategy and action (Burgelman, Christensen, & Wheelwright, 2013). If the creation of value in services passes through co-production, the user involvement is a key condition.

As regards to the middle user, the involvement was planned. The actions for the implementation of the ERP were: awareness, training, meetings, informative manuals provided by intranet. According to Fleuren *et al.* (2004), systematization is important for the prevention of failures in the implementation, the authors call this systematization of systematic design of the strategy. The mechanisms of involvement of the assistance team in the development of the technology have not been verified. The action of hearing was performed in the implementation, by the record of improvement contributions.

Service providers have been characterized in two ways: the technology supplier and internal team of information technology. The supplier company developed training with the IT staff, with the aim of forming multipliers. This, in turn, was responsible for training the assistance team. The supplier company was also responsible for the technical support. Aspects related to system settings, when needed, are made by the internal team, because there were difficulties of the supplier to make these adjustments, since they were expensive and were not in the scope of the tool.

According to the information provided by the respondents, the ERP implementation did not happen in a single moment. The process was developed in the following stages: 1. Deployment decision; 2. Identification supplier; 3. Diagnosis; 4. Sensitization; 5. Pilot Project; 6. Training; 7. Adaptation of technology. Note that the deployment occurred in a structured way, which makes the process less difficult (Fleuren *et al.*, 2004; Cohn *et al.*, 2009; Katterhagen, 2013).

On the other hand, it is noted that the deployment process has clearly demonstrated that the ERP was not specifically developed for the hospital. The tool was a ready-made solution that, initially, was not suitable to the specifics of a rehabilitation hospital. It is a generic software, designed for a general hospital. It was one complaint that users have pointed. The tool needed to be customi-

zed, but this customization was costly and the supplier also demonstrated not to be willing to make substantial changes; the changes were generally made by the internal IT team, corroborating with Chesbrough (2003) with respect to the conflict customization and standardization, i.e., when the solution is standardized, the cost and also involvement are lower (Fitzsimmons & Fitzsimmons, 2014). Chesbrough (2003) relates this conflict with the question of scale economy versus scope economy. The scale decreases costs and involves less customer participation. The scope increases costs involving customized solutions. Etgar (2008) points out that the co-production is a strategy to improve the customization.

In the CRER, the interaction process was more evident in the stages of diagnosis, sensitization and training. This interaction occurred in the customer adaptation to the software, being the tool a ready-product, and the logic of development was based on the development of product, and not the service. This conclusion is important, because those were some of the problems informed by users as barriers.

The main barriers quoted were that the system doesn't have a level of customization, and that is a linear standardized software, and the supplier offers resistance to customization. This can be noticed, in the words of one respondent, (E4) "The supplier needs to listen more the people, get feedback, evaluation; they reveal the bottlenecks of the tool, for them innovate after". He and Wong (2009) claim that the interaction of the technology provider with their client is the biggest determinant of innovation. Here, if users are complaining about the technology, the perceived value may be affected (Maglio *et al.*, 2009). It is perceived that the non-involvement of the technology user can be important for the origin of these barriers. Other barriers identified were: the human, that is, the ability of people to use the system; the resistance of the staff; the cost of the tool.

The reported facilitators factors were: the involvement of senior management; the capacity of financing; the management model adopted (transparency, requirement, attitude of respect among employees, managers, users, suppliers, among others); the planning of all stages of deployment; the support of the information technology team; the training of all those involved; the involvement of key people; the experience of the people; the culture of the hospital, i.e., the trajectory on adopting news that the hospital already had; and the number of machines available. These facilitators' factors are in line with Cohn *et al.* (2009), in what they called economic advantages and clinics, in particular, about the culture of the hospital. Caccia-Bava *et al.* (2006) claim that the organizational culture is an important factor in the development of absorptive capacity, and influences the implementation of new technologies. The involvement of senior management was a key factor for innovation to happen (Kimberly & Evanisko, 1981), because it assumes the guarantee of financial resources, as well as other organizational

conditions necessary for its deployment, as the planning, training and involvement of professionals.

It is important point out that the facilitators found, keep resemblance to elements relative to the concept of innovative capacity, although this has not been the subject of previous study. The capacity for innovation is understood as a variable that affects the ability of the organization to manage its innovation (Mustafid & Anggadwita, 2013). With respect to innovation in the public sector, Hughes, Moore and Kataria (2011) claim that the ability to innovate is the main underlying organizational capabilities that can influence innovation activity in a sustainable way: innovation management, leadership and culture and facilitators of innovation, which are convergent with the items listed by Bugge, Mortensen and Bloch (2011): innovation strategy and organisation and management of innovation and staff. The work of Valladares, Vasconcelos and Serio (2014) was comprised of a study of literature review and defined the innovation capacity as a set of organizational practices for the development of new products or processes, in addition a multidimensional structure composed of seven determining factors of the innovation capacity. These factors are transformative leadership; strategic intent to innovate; people management to innovation; customer and market knowledge; strategic management of technology; organic organizational structure; and project management.

With respect to the effects/results generated by innovation, the following positive impacts were reported: easy access to information available; the controls that the tool offers; quality of the developments made by the assistance professionals; access to research; improvement of billing; improvement of management indicators; centralization and availability of the records for all at the same time; traceability; quick access to medical records with security to the professional of assistance and data reliability; guarantee of a better communication by remote access; improvement of productivity by allowing assist more patients; improved end-user satisfaction; organization, fluidity and speed; paper savings. The positive effects support the advantages pointed out by Cohn *et al.* (2009), in addition to the result in improved communication between the professionals by system availability.

Another positive effect reported, in particular, was the safety of prescription, since, according to a respondent (E4) “eliminates the need to guess doctor’s handwriting”. This effect in addition to bringing security still collaborates to improve the activity of hospital billing. That question had already been studied by Crane and Crane (2006), that pointed the medical handwriting misundertoed as one factor that caused harm to patients.

5 CONCLUSION

This study was aimed to identify how the actors, users, service provider and decision maker interact in the innovative process, as well as to identify in the process, how occurs the co-production. The decision makers, taking into account their preferences, had a key role, because, as representatives of senior management, provided the financial resources to guarantee the implementation of innovation, as well as the strategic support for the deployment successfully.

The provider, herein understood as the technology supplier, is responsible for transferring the knowledge to the client. In this study case, this transfer was marked by an offer of a ready-made product. The participation of the institution in the project design of ERP has not been verified, which, at first, had a passive role, adopting the technology. In a second moment, the participation of the institution was to get the adaptation of the system to their needs. It is perceived that it is a logical development of technological solutions, based on the practice of manufacturing or product development methodologies. This way of acting goes on the opposite direction of the service logic, which assumes the client interaction with the supplier in various stages of development of the service. The absence of a relationship of services can be responsible for the problems of lack of customization of the system claimed by users.

The user at the hospital is understood in two ways. The user of technology, i.e., doctors, nurses, physiotherapists, among others, that are directly using the electronic health record. These users have an important role in the implementation of the solution, but they were not involved in the design of the system. The supplier justified this lack of involvement by the speech of technological path, i.e., the long existence on the market. The path is important, as it shows the technical capacity of the supplier. On the other hand, in a process of developing solutions to services, the details must be respected, and the path does not determine that the provider has all the answers for all the problems of the customer. Those answers must be constructed in an interactive process, from the conception of the project.

The end user, the patient, is not involved in the process. It is interesting to note that the electronic health record does not belong to the patient. It was found that, in the perception of all other actors – decision maker, provider and supplier – the opinion of the end user in the design of the tool is unnecessary, given the experience of the supplier to provide the system. If the adoption of ERP was a strategy to get benefits as security to the patient, not listening to the patient means not a strategic resonance, but a strategic dissonance.

As a proposal for future works, to understand and investigate the mechanisms that allow the interaction of users from design innovation until its effective deployment is one suggestion. These mechanisms are directly related to the con-

cept of co-production. It is also necessary to investigate if the elements that characterize the co-production are really relevant for innovation in hospitals, given the fact that the research point to other factors that relate to the innovation capabilities. Thus, this study contributes to the advancement of knowledge in the field, since it identifies the possible existence of relationship between innovation capability and innovation occurring in hospitals. The test of this relationship constitutes an opportunity for future studies. Also, it proposes to investigate, regarding co-production of innovation, the differences between public and private hospitals.

This paper is a case study from the reality of a single hospital, which represents a limitation. During the work, it was noticed the predominance of co-production relationship between hospital and supplier of technology. The user was excluded from the process. The co-production with the user has not been verified, revealing a limitation to innovation.

A COPRODUÇÃO DA INOVAÇÃO: UM ESTUDO DE CASO EM UM HOSPITAL DE REABILITAÇÃO

RESUMO

Objetivo: Compreender como o usuário, o prestador/fornecedor e o tomador de decisão interagem no processo inovativo, bem como identificar como se dá a ocorrência da coprodução.

Originalidade/lacuna/relevância/implicações: Há indícios de que a inovação deriva, dentre outros fatores, de elementos que caracterizam a coprodução. Estudos envolvendo coprodução de inovação são escassos. O presente trabalho contribui para o aumento do conhecimento teórico no campo da inovação em hospitais, principalmente no que se refere à coprodução de inovação.

Principais aspectos metodológicos: É um estudo qualitativo com estratégia de estudo de caso. Levantamento de dados por meio de entrevistas e pesquisa documental. Análise dos dados por meio da técnica de análise de conteúdo.

Síntese dos principais resultados: A lógica de desenvolvimento de produtos ainda é aplicada no desenvolvimento de soluções tecnológicas para o hospital, na contramão da lógica de serviços que pressupõe a interação do cliente com o fornecedor. Os resultados também sugerem a possibilidade de relacionamento entre capacidade de inovação e ocorrência da inovação, apontando a necessidade de se testar esse relacionamento em trabalhos futuros.

Principais considerações/conclusões: É necessário compreender e investigar os mecanismos que propiciam a interação dos usuários, da concepção à implementação da inovação. Também é importante investigar se os elementos que caracterizam a coprodução são relevantes para explicar a inovação em hospitais,

pois foram identificados elementos relacionados ao conceito de capacidade de inovação que merecem ser mais bem compreendidos, inclusive em contextos de hospitais públicos e privados.

PALAVRAS-CHAVE

Inovação. Interação. Coprodução. Hospital. Prontuário eletrônico.

LA COPRODUCCIÓN DE LA INNOVACIÓN: UN ESTUDIO DE CASO EN UN HOSPITAL DE REHABILITACIÓN

RESUMEN

Objetivo: Entender cómo el usuario, el proveedor de servicios y responsable de la decisión, interactúan en el proceso de innovación, así como identificar cómo ocurre esa coproducción.

Originalidad/laguna/relevancia/implicaciones: Hay evidencias de que la innovación se deriva, de entre otros factores, de los elementos que caracterizan la coproducción. Son escasos los estudios sobre la coproducción de la innovación. Este trabajo contribuye al aumento de los conocimientos teóricos en el campo de la innovación en los hospitales, principalmente con respecto a la producción de la innovación.

Principales aspectos metodológicos: Es un estudio cualitativo, con estrategia de estudio de caso. Recolección de datos a través de entrevistas e investigación documental. Análisis de los datos mediante la técnica de análisis de contenido.

Síntesis de los principales resultados: La lógica de desarrollo de productos aún se aplica en el desarrollo de soluciones tecnológicas para hospitales, en contra de la lógica de servicios, que implica la interacción del cliente con el proveedor. Los resultados también sugieren la posibilidad de la relación entre la capacidad de innovación y la aparición de la innovación, señalando la necesidad de probar esta relación en futuros trabajos.

Principales consideraciones/conclusiones: Es necesario entender e investigar los mecanismos que permiten la interacción de los usuarios, desde el diseño hasta la implementación de la innovación. También es importante investigar si los elementos que caracterizan la coproducción son relevantes para explicar la innovación en los hospitales, porque se identificaron elementos relacionados con el concepto de innovación que merecen ser mejor entendidos, incluso en contextos de hospitales públicos y privados.

PALABRAS CLAVE

Innovación. Interacción. Coproducción. Hospital. Historia clínica electrónica.

REFERENCES

- Angst, C. M., Agarwal, R., Sambamurthy, V., & Kelley, K. (2010). Social contagion and information technology diffusion: the adoption of electronic medical records in U.S. hospitals. *Management Science*, 56(8), 1219-1241. DOI: 10.1287/mnsc.1100.1183.
- Bardin, L. (2011). *Análise de conteúdo*. Lisboa: Edições 70.
- Barras, R. (1986). Towards a theory of innovation in services. *Research Policy*, 15(4), 161-173.
- Barras, R. (1990). Interactive innovation in financial and business services: the vanguard of the service revolution. *Research Policy*, 19(3), 215-237.
- Bitner, M. J., Faranda, W. T., & Hubbert, A. R. (1997). Customer contributions and roles in service delivery. *International Journal of Service Industry Management*, 8(3), 193-205.
- Bugge, M. M., Mortensen, P. S., & Bloch, C. (2011). Report on the Nordic pilot studies – analyses of methodology and results. *Measuring Public Innovation in the Nordic Countries – MEPIN: Copenhagen Manual*, Rapport 20/2011, (February), 1-54.
- Burgelman, R. A., Christensen, C. M., & Wheelwright, S. C. (2013). *Gestão estratégica da tecnologia e da inovação: conceitos e soluções*. Porto Alegre: Editora AMGH.
- Caccia-Bava, M. C., Guimaraes, T., & Harrington, S. J. (2006). Hospital organization culture, capacity to innovate and success in technology adoption. *Journal of Health Organization and Management*, 20(2-3), 194-217. DOI: <http://doi.org/10.1108/14777260610662735>.
- Chen, J., Tsou, H., & Ching, R. K. H. (2011). Co-production and its effects on service innovation. *Industrial Marketing Management*, 40(8), 1331-1346. DOI: <http://doi.org/10.1016/j.indmarman.2011.03.001>.
- Chesbrough, H. (2003). *Open innovation: the new imperative for creating and profiting from technology*. Cambridge: Harvard Business School Press.
- Cohn, K. H., Berman, J., Chaiken, B., Green, D., Green, M., Morrison, D., & Scherger, J. E. (2009). Engaging physicians to adopt healthcare information technology. *Journal of Healthcare Management/American College of Healthcare Executives*, 54(5), 291-300.
- Crane, J., & Crane, F. G. (2006). Preventing medication errors in hospitals through a systems approach and technological innovation: a prescription for 2010. *Hospital Topics: Research and Perspectives on Healthcare*, 84(4), 3-8.
- Dadfar, H., & Brege, S. (2013). Customer involvement in service production, delivery and quality: the challenges and opportunities. *International Journal of Quality and Service Sciences*, 5(1), 46-65. DOI: <http://doi.org/10.1108/17566691311316248>.
- Djellal, F., & Gallouj, F. (2005). Mapping innovation dynamics in hospitals. *Research Policy*, 34(6), 817-835.
- Djellal, F., & Gallouj, F. (2007). Innovation in hospitals: a survey of the literature. *The European Journal of Health Economics. HEPAC: Health Economics in Prevention and Care*, 8(3), 181-93. DOI: 10.1007/s10198-006-0016-3.

- Djellal, F., Gallouj, F., & Miles, I. (2013). Two decades of research on innovation in services: Which place for public services? *Structural Change and Economic Dynamics*, 27, 98-117. DOI: <http://doi.org/10.1016/j.strueco.2013.06.005>.
- Dosi, G. (2006). *Mudança técnica e transformação industrial: a teoria e uma aplicação à indústria de semicondutores* (C. D. Szlak, Trad.). Campinas: Editora da Unicamp (Obra original publicada em 1953).
- Etgar, M. (2008). A descriptive model of the consumer co-production process. *Journal of the Academy of Marketing Science*, 36(1), 97-108.
- Farias, J. S., Guimarães, T. A., & Vargas, E. R. (2012). Inovação em hospitais do Brasil e da Espanha: a percepção de gestores sobre o prontuário eletrônico do paciente. *Brazilian Business Review*, 9(3), 25-46.
- Fitzsimmons, J. A., & Fitzsimmons M. J. (2014). *Administração de serviços – operações, estratégia e tecnologia da informação*. São Paulo: McGraw Hill.
- Fleuren, M., Wiefferink, K., & Paulussen, T. (2004). Determinants of innovation within health care organizations. *Literature Review and Delphi Study*, 16(2), 107-123.
- Gadrey, J. (2000). The characterization of goods and services: an alternative approach. *Review of Income and Wealth*, 46(3), 369-387.
- Gadrey, J., Gallouj, F., & Weinstein, O. (1995). New modes of innovation: how services benefit industry. *International Journal of Service Industry Management*, 6(3), 4-16.
- Gallouj, F. (1998). Innovating in reverse: services and the reverse product cycle. *European Journal of Innovation Management*. DOI: <http://doi.org/10.1108/14601069810230207>
- Gallouj, F. (2002). *Innovation in the service economy: the new wealth of nations*. Cheltenham: Edward Elgar.
- Gallouj, F. (2010). Services innovation: assimilation, differentiation, inversion and integration, chapter 75. In H. Bidgoli (Ed.), *The Handbook of Technology Management* (pp. 989-1000). Hoboken: John Wiley and Sons.
- Gallouj, F., & Savona, M. (2009). Innovation in services: a review of the debate and a research agenda. *Journal of Evolutionary Economics*, 19(2), 149-172.
- Gallouj, F., & Weinstein, O. (1997). Innovation in services. *Research Policy*, 26(4-5), 537-556.
- Gallouj, F., & Zanfei, A. (2013). Editorial: Innovation in public services: filling a gap in the literatures. *Structural Change and Economics Dynamics*, 27, 89-97.
- Gopalakrishnan, S., & Damanpour, F. (1997). A review of innovation research in economics, sociology and technology management. *Omega*, 25(1), 15-28.
- He, Z. L., & Wong, P. -K. (2009). Knowledge interaction with manufacturing clients and innovation of knowledge-intensive business services firms. *Innovation: Management, Policy, & Practice*, Dec., 11(3), 264(15).
- Hughes, A., Moore, K., & Kataria, N. (2011). Innovation in Public Sector Organisations: A pilot survey for measuring innovation across the public sector. *NESTA Index Report*, (March). Retrieved May 21, 2015, from <http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Innovation+in+Public+Sector+Organisations+A+pilot+survey+for+measuring+innovation+across+the+public+sector#1>.
- Jensen, M. B., Johnson, B., Lorenz, E., & Lundvall B.-A. (2007). Forms of knowledge and modes of innovation. *Research Policy*, 36(5), 680-693.

- Jha, A. K., Roches, C. M., Campbell, E. G., Donelan, K., Rao, S. R., Ferris, T. G., Shields, A., Rosenbaum, S., & Blumenthal, D. (2009). Use of electronic health records in U.S. hospitals. *New England J. Medicine*, 360(16), 1628-1638.
- Katterhagen, L. (2013). Creating a climate for change introduction of a new hospital. *Electronic Medical Record. Nurse Leader*, 11(3), 40-47. DOI: 10.1016/j.mnl.2013.02.002.
- Kimberly, J. R., & Evanisko, M. J. (1981). Organizational innovation: the influence of individual, organizational, and contextual factors on hospital adoption of technological and administrative innovations. *Academy of Management Journal*, 24(4), 689-713. DOI: 10.2307/256170.
- Koch, P. M., Cunningham, P., Schwabsky, N., & Hauknes, J. (2006). PUBLIN – Summary and policy recommendations. *Innovation in the Public Sector, Summary and Policy Recommendations*. Oslo: NIFU Step, 2006.
- Lundvall, B.-A. (1988). Innovation as an interactive process: from user-producer interaction to the National Innovation Systems. In G. Dosi, C. Freeman, R. R. Nelson, G. Silverberg & L. Soete (Eds.). *Technology and Economic Theory*. London: Pinter Publishers.
- Lundvall, B.-A., & Johnson, B. (1994). The learning economy. *Journal of Industry Studies*, 1(2), 23-42.
- Maglio, P. P., Vargo, S. L., Caswell, N., & Spohrer, J. (2009). The service system is the basic abstraction of service science. *Information Systems and e-Business Management*, 7(4), 395-406.
- Mustafid, Q. Y., & Anggadwita, G. (2013). Determining innovation aspect in the performance of public service sector. *Journal of Social and Development Sciences*, 4(8), 361-368.
- Realpe, B. A., & Wallace, L. M. (2010). *What is coproduction?* London: The Health Foundation.
- Rogers, E. M. (1995). *Diffusion of innovations* (4th ed.). New York: Free Press.
- Schumpeter, J. A. (1985). *A teoria do desenvolvimento econômico: uma investigação sobre lucros, capital, crédito, juro e o ciclo econômico*. São Paulo: Nova Cultural.
- Sundbo, J. (1997). Management of innovation in services. *The Service Industries Journal*, 17(3), 432-455. DOI: <http://doi.org/10.1080/02642069700000028>.
- Sundbo, J., & Gallouj, F. (1998). Innovation in services. *Services in European Innovation Systems – SI4S (Synthesis Paper)*.
- Valladares, P. S. D. A., Vasconcellos, M. A., & Serio, L. C. (2014). Capacidade de inovação: revisão sistemática da literatura. *RAC*, 18(5), 598-626.
- Vargo, S. L. (2007). Paradigms, pluralisms, and peripheries: on the assessment of the S-D logic. *Australasian Marketing Journal*, 15(1), 105-108.
- Vargo, S. L. (2011). It's all B2B... and beyond: toward a systems perspective of the market. *Industrial marketing management*, 40(2), 181-187.
- Vargo, S. L., & Lusch, R. F. (2004). Evolving to a new dominant logic for marketing. *Journal of Marketing*, 68(1), 1-17.
- Vargo, S. L., & Lusch, R. F. (2008a). Why “service”? *Journal of the Academy of Marketing Science*, 36(1), 25-38.
- Vargo, S. L., & Lusch, R. F. (2008b). Service-dominant logic: continuing the evolution. *Journal of the Academy of Marketing Science*, 36(1), 1-10.
- Windrum, P., & García-Goñi, M. (2008). A neo-Schumpeterian model of health services innovation. *Research Policy*, 37(4), 649-672.