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Service Innovations in the Healthcare Service Ecosystem: A Case Study

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Abstract: In the service economy, scholars and practitioners are even more focused on the development and appliance of innovative services. The importance of service innovation is rising in many sectors and among different organizations. Several disciplines (e.g., marketing, management, operations research, etc.) deal with this innovation, a concept widely used, but with different definitions. In this paper, service innovation has been analyzed according to the Service Dominant Logic (S-D Logic) and a service ecosystem perspective. The literature still calls for a greater understanding of how a new or renewed combination of resources affects the shaping of service ecosystems. To contribute to filling this gap, this study explores the practices that different actors, enact to co-create value in novel ways; i.e., service innovation. The paper is structured as follows. In the first section, the main academic contributions on service research have been reviewed, focusing on healthcare service innovation. This is followed by the research method and discussion of the research findings. Finally, the theoretical and managerial implications have been detailed and an agenda for future research suggested. The paper offers interesting insights to develop new or renewed practices that foster the reshaping and maintaining of a healthcare service ecosystem. Some recommendations are included to support managers in the development of service innovation strategies.

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1. Introduction

Over the last decades, healthcare has experienced important challenges in changing its policies and practices to face the pressure of rising costs, changing regulations and innovation [1]. In this sector, innovation is one of the liveliest issues. A large amount of the research budget is allocated to innovation, in particular for new or innovative pharmaceutical, biotechnological, medical and health products or services [2]. A new cultural milieu is arising, focused on requirements, which have to be merged with innovations and technologies so as to achieve successful outcomes [3,4]. Consequently, the healthcare community is increasingly aware of the importance of transforming its traditional orientation [5] to promote new and advanced services, capable of responding to the needs of a global society and experienced patients [6]. Moreover, healthcare professionals have been asked to cooperate with several actors in order to make medicine a collaborative science [5] and offer innovative services aimed at social wellbeing [7]. To this end, various and emergent technologies can support healthcare evolution, making services as open, enjoyable and patient-oriented as possible. However, to achieve this goal the involvement and direct participation of several different actors (e.g., institutions, healthcare providers, Non-Governmental Organizations—ONGs—physicians, citizens, etc.) in innovative processes can make healthcare services as respondent as possible to social needs and expectations. This is particularly evident when related to chronic or acute diseases (e.g., cardiovascular disease, hypertension, diabetes, dyslipidemia), which treatment can benefit from the emergence and appliance of innovative services.

In fact, these diseases request specific treatments that are often based on advanced protocols, techniques or technological tools that offer an even more effective treatment program, capable of positively affecting the patients' social and physical life.

In current literature, there is an evident need for a more detailed investigation of service innovations in healthcare. However, in broader terms, the study of innovation is often mainly related to the notion of service [8–10], which is considered the key element of the modern service economy and the so-called service innovation [11–13]. Service has been analyzed according to different theoretical perspectives, moving from the traditional view that looks at service or service products as the companies' offering to clients or to a generic market, to the SD Logic view [14–16], according to which service is a "value co-creation in exchanges between resource integrating actors" [12]. It is worth underlining that SD Logic represents the theoretical foundation of service science and the investigation of value creation processes in service systems [17,18]. In particular, it counteracts the traditional Good Dominant (GD) Logic, representing the foundational framework to better define and understand service and its role in competitive exchanges [19].

In this research line, SD Logic offers a new approach to service innovation, emerging from the contribution of different disciplines (e.g., marketing, management, information systems etc.) highlighting the fundamental role of ICTs in fostering the transformation and development of the markets [13]. However, as previously mentioned, the application of SD Logic to healthcare is new; consequently, there is very little literature that deals with it [19]. In this direction, starting from the seminal works of McColl-Kennedy et al. [20,21], this study is aimed at contributing to fill this gap investigating not only the interaction occurring between the ecosystem actors at a micro level, but also those typical of the other ecosystem levels. This paper also discusses the influence that the interactions occurring among and between the actors belonging to the different ecosystem levels have on the emergence of brand new services in line with the changing patients' expectations and demands for a safe, comfortable, friendly, informative and actionable approach to health care, which represent an important emergent service setting. To achieve this goal, the study briefly reviews the most important theoretical approaches to service innovation, starting from the traditional ones up to the most recent ones, which highlight the importance of integrating the resources of various actors to co-create value. Following this research line and with the aim of filling the above-mentioned gap in current academic literature, the study aims to discuss the emergence and influence of service innovation in shaping a healthcare service ecosystem. In this direction, practices are intended as a set of routinized actions, consisting of tools, know-how, images and physical space that one or more actors can use to create value [22,23].

In particular, this paper also focuses on the analysis of an innovative service ecosystem that is a private Italian clinic offering services for renal diseases. Understanding healthcare as a service ecosystem arising from an innovative approach to resource integration or from service innovation requires focusing not only on a focal firm approach to innovation, but also on the contribution of several internal and external actors in the rethinking of medical services that is the way to co-create value [24]. The analysis of a case study supports the theoretical discussion of the role and characteristics of service innovation in healthcare. According to a service ecosystem perspective, this study addresses the main research questions:

- RQ1: *Which practices are implemented to foster service innovation?*
- RQ2: *How do actors co-create value in a novel and useful way?*

The paper has been structured as follows. In the next section, the main academic contributions on the advancement of service research have been reviewed, with a specific focus on the evolution of innovation and in particular of service innovation in healthcare. In the next section, the research method has been detailed; this is followed by the discussion of the findings obtained from the analysis of the case study. Finally, the theoretical and managerial implications have been discussed and an agenda for future research suggested.

2. Insights on Service Research

2.1. Framing Service Innovation: A General Overview

The lively debate on the significance and importance of innovation has lasted to this day since it started during the first decades of the XX century, when Schumpeter [18] defined what innovation was. Following a traditional approach to innovation, scholars have investigated this topic according to either a firm or output-centric view [25,26], while an emerging approach mainly focuses on an emerging service-based view of innovation [27,28]. Different research fields, such as marketing [29,30], economics [29,30], information systems [31,32], operations [33,34] and strategy [35] have all investigated innovation in service. Among the studies on this topic, it is worth mentioning two research paths; the first based on the enlightenment of differences between "product innovation" and "service innovation" [36,37]. The second focused on the analysis of a possible adaptation of the existing theories and models on innovation to a concrete service context [38]. Following Ostrom et al. [39] "Service innovation creates value for customers, employees, business owners, alliance partners, and communities through new and/or improved service offerings, service processes, and service business models." (p. 5).

In this direction, a new conceptualization of innovation is emerging, placing greater emphasis on its inner relational and collaborative nature [40–42]. In fact, scholars are even more frequently looking at innovation as a process involving different actors capable of sharing and combining resources in new or innovative ways [43,44]. Moreover, there are relatively few studies aimed at defining the categories and models of service innovation [13,30,45,46]; they mainly define the sources of this innovation and, at the same time, the way different actors cooperate to innovate [42,43]. These two research lines have been criticized; current literature [13,30,44] calls for a third and synthetic approach to innovation capable of embracing every kind of innovation across all sectors and industries, in which the focus is shifted onto the analysis of the real contribution of multiple actors in changing value co-creation processes, the related practices and the actors that enact them [45].

In service management, value co-creation is considered the primary basis of innovation. In this research line, SD Logic has overcome the traditional partition not only between "product" and "service", but also value "producer" and "consumer", focusing on the actors' ability in resource integration, along with assuming the role of both service provider and beneficiary in a context of service-for-service exchange [46]. In greater detail, SD Logic considers service innovation as the ability of actors to co-create value through an original, different and often better integration of resources [13,47]. In fact, according to this perspective, co-creation "depicts a new and promising vision of innovation" [48] and can be considered as an innovation factor capable of fostering the change and adapting better to the context in which it arises. Therefore, SD Logic [12,13,48] looks at service innovation as directly related to value co-creation processes, involving in a systemic way different entities or actors [49]. Consistent with this perspective, service innovation is "inherently network-centric, value and experience focused, and span[s] the tangible–intangible divide" [15]. In fact, it roots on the reassembling of different resources, pointing to create new ones, which should be able to benefit different interacting actors. It has to be noted that this is in accordance with a system thinking logic [50,51] or a service ecosystems perspective [52]. These interactions commonly occur in a specific context. Both economic and social actors contribute to the building of service ecosystems [53,54]. Thus, these actors are "spontaneously sensing and responding to the spatial and temporal structure of largely loosely coupled, value-proposing social and economic actors interacting through institutions, technology and language to (1) co-produce service offering; (2) engage in service provision, and (3) co-create value" [53]. Being nested and loosely coupled by nature, service ecosystems are characterized by several different and interacting levels [55,56], a micro (e.g., households, organizations, etc.), meso (e.g., industries, communities, etc.), and macro (e.g., nations, global markets, etc.) level. At all these levels, the ecosystem actors share their resources and integrate them to create new ones (resources integration) and exchange services in order to contribute to co-create value [57,58]. Moreover, institutions (enduring rules, norms, values and beliefs) and institutional arrangements (sets of interrelated institutions) are at the core of service

ecosystems [59], being multifaceted institutions and long-lasting social structures [60] built on symbolic and material elements. Thus, institutions and institutional arrangements drive the way actors integrate their resources in service ecosystems [56] to create mutual value.

According to an ecosystem perspective, service innovation concerns the reconfiguration of institutional structures, a process aimed at changing rules, norms and values at the roots of resources integration [59,61]. Consequently, organizations no longer look at innovation as a proprietary and internal process, but they consider it as a social process involving several different actors or entities within and across organizations [62]. In this context, institutions play an essential role in defining the way resources can be integrated and in underlining those rules, norms, values and beliefs at the core of their integration. Therefore, innovation can be considered as a process pointing to change value co-creation practices and the related institutionalized rules [52]. A systemic, dynamic, and multi-actors or multi-entities approach to value creation is able to affect the inner nature of innovation, which is seen as a process of deinstitutionalization and/or re-institutionalization of the practices at the core of value co-creation [52]. However, service research still calls for a better understanding of the way actors change the institutionalized rules needed for the integration of several and different resources at multiple levels of a service ecosystem that in sum foster service innovations or value co-creation processes.

2.2. Service Innovation in Healthcare

In healthcare, innovation plays an even more important role, being mainly oriented to offering new approaches, practices, and tools aimed at reducing costs and improving the quality of life. In this domain, organizations act in an unpredictable and dynamic context, where decision-makers have to manage complex interactions between several different actors or entities (e.g., patients, health providers and suppliers, etc.).

Innovation can support these organizations in facing and overcoming several challenges and concerns emerging from a complex and ever-changing context. In fact, scholars underlining that numerous and blazing innovations have interested medicine, have pointed out that they were able not only to enhance their ability to respond to patients' expectations in terms of life expectancy, quality of life, diagnosis and treatments procedures, but also to make organizations more efficient and effective [63]. Nevertheless, several inefficiencies still affect healthcare. Even if scholars are trying to overcome these inefficiencies, current literature still suffers from a fragmented approach to healthcare innovation and, in particular, to healthcare service innovation [64].

A brief literature review highlights how most of the innovations in healthcare system generally assume an output-centric focus, being oriented to the development of new or renewed medical products and/or tools designed to offer new medical treatments. The output-centric logic that drives most medical innovations make it mainly oriented to developing new devices and tools (e.g., electronic recordkeeping, electronic medical record, computerized tomography scanning, etc.) aimed at supporting physicians and practitioners in offering patients smarter, faster, better and cost effective services [64]. Drawing on the previous considerations, it is evident that innovation in healthcare still follows a GD Logic approach [17], being focused on the development of new or renewed products and/or tools. It follows that healthcare providers are still considered experienced, knowledgeable, innovative, and creative as well as creator/source of value, while patients are inexperienced, unknowledgeable, passive or even value destroyers [65]. This opposition still characterizes healthcare, even if it has evolved towards a patient-centric and/or a wellness care, a personalized and consumer-driven approach, a patient engagement and other emergent features [66–68]. This consumer-driven approach has also led to the emergence of a renewed approach to healthcare services, based on shifting from the traditional technology push approach to healthcare innovation towards a collaborative and service-centered one. Being this renewed and service-centered approach to innovation in healthcare still under investigation, this work aims to fill this gap, offering an overview on the way different actors are engaged in the co-creation of innovative services following the

cooperative and collaborative logic at the roots of the service ecosystem logic. Drawing on the previous considerations, healthcare innovation has been loosely defined as the "introduction of a new concept, idea, service, process, or product aimed at improving treatment, diagnosis, education, outreach, prevention and research, and with the long term goals of improving quality, safety, outcomes, efficiency and costs" [69]. This statement underlines that healthcare innovation still lacks of a service perspective; thus, this domain is oriented towards "innovation in service" which is mainly focused on technological dimension of innovation, concerning the changes occurring within an activity or a sector [70]. However, the conceptualization of "innovation in service" counters with the more recent notion of "service innovation", referred to the change that look at organizations as capable of stimulating new, renewed or novel services [71,72] in terms of an innovative approach to knowledge application and management, with the ultimate goal of increasing their viability in their own context [73]. The lack of a service approach to health innovation is mainly due to the enduring separation between health providers and patients, which can be reduced through a patient-centered approach to care, based on patient involvement in medical paths and treatments. To counteract this situation, SD Logic makes it finally possible to overcome a liner and technologic approach to innovation. In this respect, both health providers and consumers are sensing, experiencing, creating, integrating resources and learning [15], in other words, they are able to co-create value using their applied knowledge and skills to benefit each other. Therefore, service innovation is inherently interactional and based on the ongoing adjustment of each involved actor capable of learning the way to exchange service-for-service according to a win-win logic in a value network, enabling a healthcare service ecosystem. Entities or actors belonging to a service ecosystem contribute to the emergence of interconnected networks capable of creating over the time not only new entities/actors, but also new interactions that ensure the long term viability of the nested service systems, offering social and economic wellbeing.

In healthcare, sharing resources, goals and pathways, the different actors can contribute to the co-creation of public health [74]; consequently, a new or renewed approach to the integration of resources can led to innovating the way actors co-create the above-mentioned wellbeing. In this domain, the emergence of a patient-centered approach has led to the development of several new interactions among and between the different actors directly or indirectly involved in the healthcare system.

Current literature highlights how the continuous participation of actors in the value co-creation process is significantly influenced by both their past and present knowledge and experience [75,76]. In this respect, some studies have investigated the value co-creation process within the focal dyad doctors and outpatients (micro level), finding out that it is influenced by the following critical issues: social context, actors' believes and perceptions, and partnerships among actors [77]. The emergence of a system-thinking enables a multi-actors perspective that looks at healthcare as a service ecosystem in which numerous actors interact within and across different levels, sharing their resources to create new ones [78,79]. Following a healthcare service ecosystem perspective, some researchers have developed practices that contributes to shaping a dynamic service ecosystem, defining the role that they have on the ecosystem wellbeing [20]. All the actors that interact in a health service ecosystem contribute to the improvement of its services [80] through emergent coordination mechanisms, active at operational, political, social, economic, legal or ethical levels [74]. Consequently, co-creation seems to be a research priority even when related to a better understanding of the ways health providers achieve service innovation through combining/recombining novel or renewed resources.

In fact, service innovation research emphasizes the primary role of resources integration in an ecosystem perspective, according to which this integration can led to the ongoing emergence of new or renewed resources [56]. An emerging research path focuses on the ability of innovation to change the way different actors' current or new medical resources are integrated or shared to deinstitutionalize and re-institutionalize value co-creation practices [52]. This body of literature points to a detailed investigation of the emergence of service innovation in a networked and information-centric world [13], where the actors share resources in order to achieve novel value co-creation practices [81]. Consequently,

the resources do not have value *per se* [14]; value is co-created when actors (e.g., firms, customers, etc.) integrate their resources that is when value is realized in use [14,82].

Recent theoretical advancement highlights the need for a service ecosystem perspective, according to which, in a many-to-many environment, all actors should collaborate and integrate resources to co-create value for themselves and several others. In this respect, scholars have investigated how co-creation practices can shape a healthcare service ecosystem [21]. In particular, adopting a patient-centered model of healthcare, scholars depict some practices that according to a structural approach affect value co-creation at micro, meso and macro levels. Consequently, according to a dynamic approach, those practices can have either a positive or disruptive impact on value co-creation in the healthcare service ecosystem. Following a dynamic and active approach to resource sharing, the interactions among all the ecosystem actors (e.g., patients, health providers, firms, institutions, etc.), that is the way they creatively combine or recombine their resources, represents a primary source of innovation and, consequently, of value creation also in healthcare [83,84].

3. Research Methodology

3.1. Research Approach

To investigate the healthcare innovations according to a service ecosystem perspective and depict the achieved theoretical findings, the case study method was implemented [85,86]; this method is particularly suitable for practice-oriented fields and answers the "how" research question [87]. The case study methodology supports the achieving of a better understanding of complex social phenomena [88] such as the multi-actor contribution to service innovation in a critical domain such as healthcare. In this way, it was possible to collect data from several sources and answer the questions at the roots of this research [88]. Following Gummesson, to deal with the complex reality of management studies, qualitative methodologies, empowered by modern natural science, are "[. . .] superior to quantitative methodology emanating from traditional natural science" [89]. In this direction, other scholars [89,90] have considered qualitative methods more fitting with the in-depth investigation of a new phenomenon, such as the emerging of healthcare service innovations.

The analysis focused on a single case study in the Italian healthcare system (*Nephrocare*) and on its approach to service innovation, based on multiple actors' interactions occurring at different ecosystem levels and inspiring new or innovative value propositions capable of co-creating mutual value. The case study analysis followed the following five steps: (1) definition of the object of study; (2) case selection; (3) building of initial theory through a literature review; (4) data gathering collection and organising; (5) analysis of data and research conclusions.

The analysis started with the investigation of how the interaction between the different ecosystem actors could foster the emergence of service innovation in the healthcare domain. In this direction, the case study offered insights into the means/practices through which the different (internal and external) actors contribute to the emergence of healthcare service innovation, considering them according to the SD Logic perspective. To this end, several data collection methods were used. Following the traditional approach to the case study, the analysis of business documents, reports and notes as well as some interviews and on-site observation were conducted. In particular, being one of the widely used techniques to collect data in interpretative case studies, interviews try to combine the findings and converge on the tentative illustration [87,91].

3.2. Sample, Data Collection and Analysis

Following the theoretical sampling approach, an extreme case was selected [85,89]. In fact, the case company, belonging to a network of medical clinics for renal diseases, represents an innovative ecosystem in which multiple actors are engaged to co-create value. Moreover, in this dynamic ecosystem relationships between the different interacting actors are fundamental, enabling an ongoing resources sharing. Information was collected to define how service innovation unfolds on different

levels of a service ecosystem. In order to get the information on the value co-creation practices that foster service innovation, a desk-top study was performed, analysing corporate reports and handbooks, brochures, scientific papers provided by the company or accessed by surfing its corporate web sites and social networks. Before starting the collecting of the most relevant data, a research protocol was outlined to organize the data into digital worksheets and allow the authors to analyse them individually. Then, the data were classified according to the different resources integrations that foster the reconfiguration of the value co-creation process that is service innovation. At first, the authors individually analysed each practice and then all of them were critically revised. To support the results obtained, 20 unstructured interviews were conducted.

The interviews were administered through a set of open-ended questions and conducted on the interviewees' company premises. At first, the company executives (Service Innovation manager, Human Resources manager, Quality manager, Local General manager) were interviewed so as to have a general perspective on the company's strategic orientation towards innovation. Then, following a top-down approach, the service managers (Research and Development manager, Marketing manager, Public Hospital General manager) were interviewed. Finally, in order to obtain information about the way innovative actions/practices were implemented, some physicians (doctors and nurses) and representative employees were interviewed.

Open-ended questions were used to encourage the interviewee to actively participate in an open dialogue with the interviewers. The interviews lasted, on average, 45 min; they were recorded and then verbatim transcribed. The collected data were classified in homogeneous categories according to the topic and source in order to improve their comparability. The recognition of relevant themes provided the material with the narrative presented in the following sections. All collected data and information were critically examined and a research report was written. In particular, the categories used to classify the data gathered through the interviews are the following: (1) Institutionalization of renewed business models; (2) Rethinking the approach to services; (3) Development and sharing of new and advanced competences; and (4) New Market Development. The above-mentioned categories include the practices that the company and the other ecosystem actors implemented to renew the care of renal diseases and the related services, paving the way for a better understanding of how these actor contribute to constantly innovating the way they co-create health value.

4. Findings

4.1. The Case Company

Nephrocare is a private healthcare provider, belonging to the holding Fresenius Medical Care, the world's leading provider of products and services for people with chronic kidney failure, which offers through its specialized clinics and centers medical services for patients affected by renal diseases. In particular, Nehprocare, thanks to its departments active all over the world, today is an international network of dialysis centers capable of offering specialized and customized care all across the Europe, Middle East, Africa, and Latin America. Since the first center was opened in 1994, the current 880 Nephrocare clinics treat about 91,000 patients per year. Currently, Nephrocare centers count over 21,000 employees, who offer a complete and high quality service to renal patients.

Nephrocare mission states, "We want to help and alleviate the suffering of people affected by kidney diseases". To achieve this goal, the company has developed a business model aimed at including not only the active participation of patients, but also of other healthcare service organizations, such as government agencies, public authorities and public/private providers. The company is also deeply committed to the empowerment of its globalized medical and not medical staff, offering them not only different online and offline learning opportunities, but also the possibility to be part of a modern cooperative working environment. Continuous investments support the development and the viability of this dialysis centers' international network.

To this end, the focus on innovation has led the company to enact some specific and shared practices aimed at institutionalizing new and innovative services, according to different resources integration. In other words, innovation emerging from collaborative and cooperative efforts, made with patients and others actors, towards the definition of new ways to create value.

4.2. Path of Healthcare Service Innovation

Each practice/path described and analyzed below presented different features in terms of interacting actors, role, ecosystem level and the innovation that they contribute to shaping. The practices that contribute to the emergence of the service ecosystem shaped around the focal company (Nephrocare) depicted some common traits (the rethinking, the reshaping, the rebuilding and the maintaining) of the way actors share, combine and recombine their resources. According to an ecosystem view, Nephrocare was conceptualized as the focal actor, being able to foster the interactions between and among the actors belonging to different systems or in the same ecosystem at different levels, making them able to participate in the development of health service innovation.

4.2.1. Institutionalization of Renewed Business Models

Until a few years ago, Nephrocare conceived innovation as merely technology based, aimed at improving medical performance in terms of quality and costs. More recently, the traditional output-centric approach to innovation has shifted toward a service-centered approach, aimed at rethinking the way medical services are conceived and provisioned. This has led to replacing traditional practices, building up new ones that involve actors such as public healthcare providers in order to create new rules capable of making the treatment of renal diseases not only as effective as possible, but also in line with the real and ever-changing needs of the patients and their families. In particular, this renewed approach had a direct influence especially on the Italian National Healthcare System, fostering its opening towards a service logic supported and somewhat inspired by the patient centric approach to kidney diseases developed and sustained by Nephrocare.

The emergence of an effective and patient-centered approach to the care of renal disease has led to the development of an innovative business model, based on the collaboration, cooperation, knowledge and skills sharing between Nephrocare and the physicians of Bolognini public Hospital, in the Lombardia region. The spread of public-private partnerships has led to the emergence of a new model of medical assistance that is a hybrid model, capable of sharing competences and generating service innovations aimed at customizing every care path. This kind of partnership has also led to the building of a new public outpatient clinic, directly managed by a Nephrocare medical manager, capable of offering locally advanced services according to a public service logic. The emergence of this new business model (public/private healthcare services) is based on the detailed understanding of some critical elements of the Italian National Healthcare System (NHS). These elements are the needs, the lack of a dense network of specialized clinics able to effectively and efficiently serve citizens, public hospital needed for an update and, consequently, for new practices and services in line with the current health demand. This brand new scenario arose not only from the interaction with patients, but also from the collaboration, cooperation and experience sharing with the other actors belonging at different levels to the healthcare service ecosystem (i.e., nurses, medical manager, managers and physicians of public hospitals, institutions, universities, etc.). In this direction, Nephrocare reshaped the Department of Nephrology of Bolognini Hospital, so as to share and apply the most advanced medical and learning technologies, in order to offer to the Department as well as the public local care centers a more effective organization. The strong and ongoing orientation to quality has led these structures to a more sustainable resources management, offering them a straight orientation to the future and viability.

The Bolognini Hospital's General Manager summarized "In 2010, we launched a public-private partnership, being supported by and collaborating with Nephrocare. To this end, we signed a 9-year cooperation agreement, which allowed us to define and implement a new management model based on the investment and dissemination of the best educational technology and an efficient organization

of the medical staff and dialysis centers. In this light, Nephrocare's skills supported our ability to serve a wide basin of patients in order to make our public hospital able to improve the quality of care, for example managing the department of nephrology and dialysis of our hospital and six decentralized dialysis units (1 CAD and 5 CAL) that assist about 200 patients".

Cooperating with other public and private ecosystem actors, Nephrocare defined new medical standards, whose implementation contributed to the reshaping and maintaining of the healthcare service ecosystem, orienting it to patient-centered, efficient and effective medical practices. The Director of Nephrology, Dialysis, and Transplantation of University of Pavia reported "*In 2009, we established a co-operation with Nephrocare to carry out several clinical audits aimed at a better management of blood pressure and bone metabolism, based on the most recent studies and scientific data. This led to the appliance of theoretical scientific skills to a real medical environment. This collaboration led us and our partners to increasing and hybridizing internal expertise*".

Nephrocare identified new practices aimed at improving the patient/physicians interactions and to create a novel *corpus* of knowledge and skills based on the mutual contribution of different ecosystem actors.

4.2.2. Rethinking the Approach to Services

Nephrocare adopted a new approach to services development and provisioning based on strategic goals aimed at a continuous improvement of both the medical treatment and the related services. This has been possible thanks to a significant resource reconfiguration aimed at responding in a novel way to an enduring need. In this direction, the renewed approach to services is based on a growing attention to the patients' needs and requirements aimed at offering shared and novel solutions. Moreover, the atient is directly involved in the care path going beyond his/her emotional, psychosocial and situational participation. Therefore, a big change was made, implementing innovative technologies (ICTs), characterized by a new and high processing, communicative and informative potential capable of making technologies the basis of new advanced medical services comprehensible, familiar and somewhat human both for physicians and patients. This platform represents a concrete and technological value proposition, which became an actual service innovation thanks to the willingness of all availability ecosystem actors to share their resources in order to achieve a brand new combination. The Nephrocare Quality Manager reported, "*The Interactive Management System Data 'EuCliD5' is one of the largest database dedicated to the practice of dialysis. It is our flagship pointing to the continuous improvement of services and care quality. Its novelty is in the monitoring of clinic issues related to patient care, possible thanks to an ongoing data collection and assessment aimed at improving the dialysis outcomes. This system is directly connected to the dialysis machines to record in real time patient data and the medical parameters of each dialysis sessions*". Ultimately, the informative system represents a new value proposition in which an ongoing resources' exchange occurs between the different actors, such as other physicians, researchers, ICTs companies, experts and patients. Fresenius R&D Manager reported, "*Collaborating with Nephrocare, we have jointly developed innovative technologies that our medical staff, interacting with the patients, has contributed to making as human and acceptable as possible. In particular, EuCliD5 is a tool aimed at the continuous improvement of the treatment provided to the patients, which benefits from practice sharing, data sharing and transparency*".

In this way, the managerial board gain information about the patients' everyday medical situations, problems, and ideas about the care path and their health status. The introduction of this informative system radically changed the way physicians and patients interact. To create new services, Nephrocare established a direct relationship with their patients thanks to a continuous assessment of their satisfaction, possible thanks to the specific program "Patient Satisfaction". The human resources manager explained, "*The program named 'Patient Satisfaction' aims to highlight possible patients and families discontent and at the same time to fuel our ability to solve them. For example, some improvement measures affected fire emergency procedures, the better understanding of clinical problems such as the differences between hemodialysis and hemodiafiltration, the electronic data collection, the overall quality of services improvement*".

As a long-term effect, the implementation of the informative system EuCliD5 fosters the development and adoption of new practices in all Nephrocare's clinics, contributing to institutionalizing the renewed approach to medical services and defining some good practices capable of ensuring care and the related service quality. A Nephrocare partner also supported this approach, the TUV (Technischer Überwachungsverein), whose Marketing Manager stated, "*Good practice or Good Dialysis Practice led to the definition and the implementation of ongoing new service standards. These aim to make, unlike other centers, clinics and hospitals, the service experience not only as pleasant and friendly as possible, but also healthy and safe both for the patients and for staff*". Moreover, the database embedded in the informative system allowed for the creation of a synergistic circle in different moments and among different actors. In fact, data collected through the informative system can be processed and compared with those of other clinics belonging to the Nephrocare network in order to define the best practices that should inspire all the networked organizational units.

4.2.3. Development and Sharing of New and Advanced Competences

Nephrocare considers doctors, nurses, and all its employees' fundamental for its network success; thus, a new online e-learning platform was developed, in order to allow them to gain updated skills and competences. This novel tool radically changed the corporate approach to professional learning, breaking with the traditional and offline training programs mainly based on face-to-face learning, team lessons, meetings and symposiums. In fact, when the managerial board decided to implement this platform, a brand new approach to leaning in healthcare was founded; thus, this advanced tool allowed Nephrocare employees to share information, define, validate and adopt new medical procedures, institutionalize new standards and rules fundamental for the development of new or renewed services, i.e., new value co-creation processes. In this direction, the Human Resources Manager explained, "*Doctors, nurses and, all the employees are at the core of Nephrocare. In fact, the company offers them updated training courses, based on an innovative online platform, which make them keep up to date and respond to different patient needs. We have tied the professional training courses to the results of the patients' audit that is performed annually since 2008. In other words, the 'Patient Satisfaction Program' recording patients' needs, demands, complaints and suggestions allows us to customize our collaborators' training and consequently the services and assistance they lend*". The e-learning platform represents a new and joint value proposition, based on a more convenient resources sharing and integration for all the participant actors: the employees of Nephrocare International network (physicians, nurses, researchers, pharmacists, managers, etc.). Consequently, service innovation arises from the recombination or new combination of resources, aimed at offering new responses to patients' needs.

Being a new joint value proposition, the e-learning platform allowed for value creation, with the actors gaining value from using it and integrating their own knowledge and skills with several others, such as personal (e.g., learning and medical skills), public (e.g., job position) and market (e.g., online service, medical textbooks, experience sharing) competences. The different interacting actors were conscious not only about the importance and potential of this platform, but also about its ability to change the "rules of the game" at the roots of knowledge and experiences sharing in healthcare. An physician stated, "*In Nephrocare, we can count on a continuing training system, which allows us to always regularly use technologies, tools and innovative protocols that the company implements. This allows us to do our job as best as we can, using all the available facilities that contribute to improving the medical services and organizational procedures. We can also communicate and share information and experiences with our colleagues in Italy and abroad thanks to a series of technological tools, such as our online TV 'Infovision' and informative programs, based on newsletter and chats such as 'Medical Flashlight' and 'Nursing Now'*". This platform led to the definition of brand new learning services, based on an ongoing training as well as the ability to share and access the experiences of other actors belonging to the Nephrocare network. These services are fueled constantly by employee and manager participation, aimed at offering increased and updated knowledge to every actor.

4.2.4. New Market Development

Nephrocare engaged several different actors in co-creating a new approach to the care of kidney diseases based not only on effective and customized services emerging from the patients and physicians experience sharing, but also on the ability to develop, implement and make as human as possible the most recent medical technologies. Consequently, much more than traditional clinics, Nephrocare networked clinics offered several advanced medical tools and protocols (value proposition). In fact, it completely rethought the traditional approach to emo-filtration, making their patients able to experience a new approach to emo-filtration, merging innovative technologies, chemical and physical solutions in order to remove from the blood a higher quantity of liquids and toxins than traditional hemodialysis. In fact, a Fresenius Service Innovation Manager reported, "*The cooperation with Nephrocare was aimed at developing advanced tools and services thanks to the implementation of the most recent technologies, in order to significantly reduce the rate of hospitalization and mortality among dialysis patients. To this end, a new procedure was developed and implemented, online Hemofiltration, which offers better outcomes and a longer life expectancy. Online Hemofiltration is based on new technological equipment that removes from the blood, a larger amount of liquid together with the metabolic toxins if compared to 'normal' hemodialysis. This technology helps in reducing inflammation, as it significantly lowers the level of reactive protein if compared to what happens in traditional treatment*".

This advanced tool designed for the hemodialysis opened new interesting commercial opportunities for Fresenius and Nephrocare; thus, a growing number of clinics and hospitals in Europe, as well as in several foreign countries purchased, and adopted the innovative technology designed for the online hemofiltration. The development and widespread adoption of this technology contributed to responding to the need for a renewed, effective and as safe as possible approach to dialysis. Moreover, the focus on its continuous improvement contributed to the technological, medical and commercial stabilization of online hemofiltration, establishing new rules and standards in the current treatments of kidney diseases and offering better outcomes to the patients. These new rules and standards were supported by several studies, conducted by different ecosystem actors, such as biologists, medical researchers, data companies and others.

Much more than a traditional approach to medical care and in particular of chronic diseases such are the renal affections, Nephrocare included in its international network a variety of interacting actors, who not only share resources and recombine them to offer novel service, but also sometimes belong to other ecosystems. In particular, the service ecosystem built around the company is grounded in the integration of several actors belonging not only to medical or scientific fields, but also to other specific fields such as education, entertainment and tourism. The establishment of specific partnerships with actors operating in other sectors such as entertainment and tourism led Nephrocare to completely rethinking the traditional approach to the treatment of kidney diseases and to patient lifestyles. Consequently, the company reshaped the approach to the provision of medical services, contributing to offering them a human and patient-centered nature, aimed at making kidney patients able to live a life as normal and safe as possible in every situation, even when they decide to go on holiday. To this end, Nephrocare established specific and close partnership with some international tourist operators and other companies active in accommodation and entertainment. In particular, they contributed to allowing patients to experience a high quality and safe holiday, characterized by high competences in tourism management and in particular in medical tourism. In fact, these actors are able to support people affected by kidney diseases offering advanced solutions and services in order to merge their need to have a as normal as possible life, but also for rapid and professional medical support. Therefore, the partnership with several actors active in tourism and accommodation led the Nephrocare network to support their patients in travelling all over the most important and attractive destinations. A new market has been built, the so-called "dialysis holiday", capable of responding to the medical needs and aspirations of a normal life of kidney patients. A Nephrocare Marketing Manager explained, "*Dialyze three times a week does not mean stop travelling abroad and going on vacation. Our new service called 'Dialysis holiday' gives the opportunity to visit other dialysis centers around the world*

and at the same time allows you to enjoy holidays. Therefore, whether you want to travel, you can continue to enjoy an active life, visiting new places or simply relaxing by the sea. In fact, we have established some important partnerships with international operators, in order to offer to our patients the best holidays we can, choosing for them hotels, restaurants and other high quality structures, equipped to respond to their leisure and prime medical needs. This is possible thanks to a direct connection with the local network of Nephrocare dialysis centers, which are equipped to offer the service patients are used to all over the world".

The ability of the company to share the same rules and values in a large number of countries all over the world contributed to the definition and enhancement of some innovative services, covering both medical and leisure needs (e.g., hotel and restaurant selection, booking, medical and commercial communication etc.). In this way, novel services have been created, organized around what is important to a specific cluster of tourists such as kidney patients and aligns them to their medical and leisure needs.

5. Discussions

The research findings highlighted some interesting insights on the influence that different actors (e.g., medical staff, administrative staff, other medical or not medical organizations, institutions, patients, etc.) and their personal resources (e.g., knowledge, dynamic interactions, etc.) have on the emergence of service innovations. In particular, the paths of service innovation are fuelled by a circular and synergistic logic described in the following table (see Table 1). In fact, the actions at the basis of the above-mentioned practices, which occur at different ecosystem levels, promote the viability of the investigated service ecosystem. In other words, actions like the rethinking, the re-shaping, the rebuilding and, of course, the maintaining of the institutional arrangements at the core of those practices that lead to service innovation contribute to the emergence and the ongoing renovation of the health care service ecosystem [92]. Consequently, this ecosystem is not only adaptive, but also able to reconfigure their resource integration to respond better to the patients' demands.

Table 1. Patterns of medical service innovation.

Service Innovation	Ecosystem Level	Rethinking (Co-Decision Making)	Reshaping	Rebuilding	Maintaining
Business models	Micro, Meso, Macro	Redefining the relationship with public healthcare providers (to better manage the treatment of kidney diseases).	Establishing public/private partnerships.	Creating new local medical centres and novel medical standards.	Adhering to a strong patient-centred orientation and defining specific programs of patient/physician interaction.
Approaches to services	Meso	Developing a novel approach to service design and provisioning based on a synergistic logic and multi actor contribution.	Creating new technological value propositions.	Converting new technological value propositions into service innovation thanks to several actors' resources sharing.	Institutionalizing the renewed approach to service. Establishing direct relationship with patient in order to ensure updated services and in line with their needs.
Competences	Micro, Meso	Changing the traditional development and sharing of competences and skills.	Defining new ways to interact, learn and communicate.	Developing and implementing an e-learning platform.	Sharing core competences from both internal and external actors.
Market	Meso, Macro Micro, Meso	Rethinking of traditional medical procedures. Opening the number and the ecosystem origin of interacting actors.	Defining a renewed approach to resource integration across traditional services. Opening healthcare service ecosystem to the interaction with other service ecosystems.	Implementing an informative system able to record and process in real time care data. Establishing partnerships with actors external to healthcare service ecosystem to create innovative services merging leisure and medical needs.	Defining and following best practices. Institutionalizing practices able to create new, advanced, cross-sectorial and standardized services.

Source: our elaboration.

In fact, the findings of this paper underlined the dynamic nature of service innovation as based on specific institutional changes, emerging from some interdependent processes and the influence they have on service ecosystem configuration. In this direction, service innovation can be considered a dynamic process aimed at changing the current configuration of a specific service ecosystem based on the conjoint action of multiple actors [93]. Following a circular logic, the actors' interactions, within and across the service ecosystems, foster the rethinking, the reshaping, the rebuilding and the maintaining of resource integration at the core of value creation.

The case study showed not only how these steps contribute to changing and reshaping a service ecosystem through the emergence and institutionalization of new or renewed practices (RQ1: *Which practices are implemented to foster service innovation?),* but also the way the ecosystem actors change the co-creation processes (RQ2: *How actors co-create value in novel and useful way?).*

xThe findings underlines that the ability of the focal company to establish inter-organizational relationships that led it to go beyond its sectorial boundaries, involving other institutional actors (e.g., other public and/or private medical providers) in forging practices capable of changing the rules of healthcare service provisioning, fostering the emergence of a new business model [94]. In particular, the company studied contributed to the emergence of a novel and hybrid healthcare business model, establishing a long-lasting partnership with the Bolognini public Hospital and the department of Nephrology, Dialysis, and Transplantation of the University of Pavia that led to the definition of innovative medical standards as well as the creation of new local public medical centres. The ability to detect new opportunities for co-creation has made the company able to institutionalize a new business model that enables higher resource density for value creation [95] shifting from a traditional business model based on a hierarchical system and competition towards a new one oriented to collaboration and social networking.

The company also developed and institutionalized a renewed approach to medical service, converting a new value proposition that is the innovative informative system (EuCliD5) into a concrete service innovation [52] thanks to the conjoint action of several different actors open to sharing and combining their resources to create new ones. This made it possible to change the way things were done, for example choosing to digitally record, compute and share data about current medical treatments and change the actors' access to these data. This new informative system has led to the development of new and productive collaborations [96] that led healthcare providers to deal with several external conditions, such as networking, the cooperation and the cross-fertilization with third parties often belonging to different sectors, market evolution and the existing regulations [41]. To enforce its renewed approach to service, Nephrocare also developed an innovative e-learning platform, aimed at offering new or renewed resources (e.g., knowledge) and practices in order to allow the actors to create new value propositions that is service innovation [52,97]. In fact, new value propositions arose from the actors' ability to interact and change together, sharing processes, roles and skills. To this end, this is even more important in a service system, emphasizing that a re-assembling or re-evaluation of the whole actors' network is sometimes necessary so as to make it possible for them to take part in the value creation processes. In this direction, the case company interacted with external actors (e.g., ICTs service providers, other physicians, patients, etc.) whose resources contributed to the renovation of its medical services.

Nephrocare was also able to develop new rules/standards for the whole healthcare industry through the institutionalization of a new value proposition that is online hemofiltration, a new technology that was first implemented, with other public and private providers then purchasing and implementing it. This led to a general improvement of kidney care thanks to the institutionalization of those practices aimed at quality assurance, using innovative medical practices drawing on critical social outcomes, such as the reduction of hospitalization and mortality among dialysis patients, the reduction of the rate of physicians' errors, and longer life-expectancy. According to a dynamic and social-oriented perspective, technology is not only an essential tool for finding out new ways to join

different actors in service innovation processes, but also as an element able to foster the emergence of new and ongoing innovations.

The findings also showed that a renewed approach to the market as well as the emergence of new markets could be fostered also including new and sometimes external actors in a service ecosystem, such as tourist operators or companies active in specific sectors such as accommodation or leisure. This happened when Nephrocare decided to integrate new actors into its network, establishing some partnerships with brand owners of tourism, accommodation and leisure sectors, in order to offer to its patients a high quality medical assistance even when on holiday. Therefore, the case company assigned to these actors different roles and responsibilities and guided them towards new practices aimed at resource integration through which healthcare service ecosystem was deeply reconfigured [96]. In this case, service innovation fostered the shaping of a new market, such as medical tourism, providing ecosystem actors with alternative frames of sense-making, enabling the emergence of a new occurrence of "resourceness" [59].

6. Implications and Further Research

This paper explores the most recent developments in the service domain; thus, following a service ecosystem perspective [13,52] it focused on service innovation and its influence on service ecosystem reshaping. This renovation, based on a circular logic, involves several actors interacting within and across service ecosystems to foster the rethinking, reshaping, rebuilding and maintaining of resource integration at the core of value creation. To better understand the influence of service innovation on a specific and complex service ecosystem, it has been investigated in a specific and critical domain such as healthcare.

The theoretical implication of this study underlined how actors internal and, in some occasions, external to a healthcare service ecosystem are involved in those ongoing value co-creation processes able to foster the emergence of innovation from new value propositions that they institutionalize by participating in service exchange and value co-creation [52]. In this direction, the paper tries to contribute to the recent call of current literature for a better conceptualization of service innovation and its influence on service ecosystems ongoing reconfigurations.

Following a service ecosystem approach to healthcare innovation led to embracing an actor-to-actor logic, according to which the traditional division between "producers" (healthcare providers) and "consumers" (patients) [45] and even "innovators" and "adopters" is blurred. In this direction, the research findings underlined the new or renewed practices capable of fostering and maintaining the reconfiguration of a healthcare service ecosystem, involving several different internal and external ecosystem actors, redefining their roles and reframing the resources they share. However, to better understand the potential of innovation in reframing a service ecosystem, further research is needed, in order to emphasize the systemic nature of service innovation and overcome the traditional out-centric approach that still seems to be preeminent also service innovation research [41,42,98]. Moreover, the investigation of service innovation in different contexts apart from the healthcare should contribute to a more detailed conceptualization of innovation as an institutional change process [59].

In terms of managerial implications, the findings underlined that in a service ecosystem a concrete and useful innovation requires a balanced resource combination, based on institutionalized and shared rules that the actors can easily adopt. In this direction, the managers should facilitate the inclusion of new and somewhat external actors, capable of sharing new and different resources to change, reshape and maintain the new configuration of a specific service ecosystem.

In other words, decision-makers should govern and manage service ecosystems through ongoing learning process that led them to adapt/model constantly themselves to the changing requirements of a context characterized by a growing complexity. This strategic conduct might contribute to the improvement of the physical and psychological conditions not only of the patients directly involved in the service process, but also of the social context, not forgetting to foster public awareness about how healthcare advancement benefits social wellness [99,100]. Even if a service ecosystem approach to

innovation offers interesting insights for marketing and management to rethink, redesign, rebuild and maintain the practices at the core of value co-creation, much research is still needed to improve the potential of innovation on the reconfiguration of different service ecosystems. In this direction, this study opens to interesting and further research paths that, according to the adaptation theory, aim to underline the systemic and relational nature of service innovation in a service ecosystem perspective.

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