Driving organisational change in SMEs using service design

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Abstract

Purpose – The purpose of the paper is to present a service design (SD)-based methodology developed to help small and medium enterprises (SMEs) undertake organisational change.

Design/methodology/approach – This research used the design science research methodology, which enabled the creation of the Service Design for Organisational Change (SD4OCh) methodology. A real case study of a small service company specialised in neuropsychological disorders was used for the definition and validation of SD4OCh.

Findings – The main outcome of this study is the SD4OCh methodology, which is based on three key stages: diagnosis (knowing where to begin by detecting the organisation's strengths and weaknesses), innovation (improving the structure/processes and designing/redesigning services by employing a customer-centric approach), and implementation (enabling the definition of the route towards organisational change). There is also a transversal evaluation stage, which quantifies the organisational changes.

Research limitations/implications – This study adds valuable knowledge to the service science research field and contributes to the awareness of the usefulness of SD theory within companies, especially those which are small and medium-sized, since those companies lack the tools and methods required to tackle organisational change, signifying that the challenges the companies confront are different to those of larger companies.

Originality/value – Although this is a SD-based research, the SD4OCh methodology was developed in order to enable companies to make holistic changes, namely, to innovate their services, structure, and processes, thus supporting and guiding organisational change.

Keywords Service design, Methodology, Organisational change, Innovation, SMEs

Paper type Research paper

1. Introduction

To survive in an increasingly competitive society, many professionals who have traditionally carried out their work independently (psychologists, lawyers, etc.) have started to create their own businesses or to adapt their small businesses to the new market. This poses various challenges, such as digitalisation of services and efficient service management (Dredge *et al.*, 2018). Thus, professionals who are excellent in their fields have, therefore, had to become business owners, which eventually entails performing business-related tasks (e.g. human resources management; operations management) in which they are not trained/experienced (Beresford and Saunders, 2005). The consequence is the emergence of SMEs with specialised

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know-how, experience, and high-quality services, but that are overwhelmed by the management of these services (Bobillo *et al.*, 2010; Gupta *et al.*, 2013). Many of these SMEs rely on business processes that, in many cases, "simply work", although their owners are not aware of their inner working/internal business processes and how it may affect their customers' service experience.

To overcome these kinds of issues requires a holistic and innovating thinking which will allow SMEs to grow in a sustainable manner, to create new or better services and processes, and adding value to the traditional business (Reason *et al.*, 2015, p. 6). It is required, therefore, to drive changes in the organisation. But it is necessary to ask: do SMEs have valid tools with which to confront these changes? SD seems to be a highly powerful tool with which to bring about organisational change.

Service design (SD) is a new multidisciplinary approach to conceive/improve an organisation's services and acquire a holistic view of them (Ostrom *et al.*, 2010; Rosenzweig, 2015). Since an SD process allows services/processes to be improved, it can assist companies in achieving proximity with their customers and adjusting their services to meet customers' requirements. One of the most frequently employed SD methodologies is design thinking (DT) (Stickdorn *et al.*, 2018), as its characteristics (e.g. creativity or a customer-centric approach) make it particularly suitable for SD and innovation.

However, SD is not limited to improving services from the customer's point of view; it can also help to improve service creation and provision, which can often lead to organisational change (Kurtmollaiev *et al.*, 2018). For example, such improvements can foster the identification of new business opportunities (Reason *et al.*, 2015) and the review of all processes; then, this review can help to identify customers' concerns when contacting the organisation, or even bottlenecks that generate delays/discontent (both within the organisation and among customers), giving rise to changes in the business model.

In addition to all these benefits, current research highlights the need to carry out further studies that may prove the transforming potential of SD processes in organisations (Iriarte *et al.*, 2017). There is consequently a need for methodologies that will enable the systematisation of organisational change and the measuring of the impact of SD on the organisation. Further, there is a research gap regarding how SD affects organisational logic (Kurtmollaiev *et al.*, 2018). Moreover, there have been studies which applied SD to develop new services, provide innovative value, create a value network, or improve the customer's experience (Banica and Patricio, 2020; Patrício *et al.*, 2011). Although these applications can lead to organisational improvement, to the best of our knowledge, there are not documented or validated methodologies with which to carry out organisational change that are based on SD.

According to Balogun and Hope Hailey (2004), all change programmes that are initiated have a failure rate of approximately 70%. This poor success rate may indicate the lack of a valid framework for the implementation/management of organisational change, as research shows that the currently available theories and methods for organisational change are widely contradictory and often confusing (Burnes, 2004). In order to attempt to cover this gap and deal with the generalised problem in SMEs as regards the lack of systemisation during the development of their activities, this study aims to provide steps that will help SMEs to undertake organisational change in a holistic manner.

We specifically propose "Service Design for Organisational Change" (SD4OCh) as a methodology by which to drive organisational change in SMEs. In this methodology, an in-depth analysis (diagnosis) of the organisation's structure, processes, and services is carried out, thus enabling the identification of its strengths and the points that can be improved. After identifying these points, an innovation process through the use of SD techniques is implemented in order to find solutions that will provide both the customer and the organisation with value. The proposed solutions are then implemented by the organisation, which is constantly accompanied by a team of service engineer/s (usually external to the company, and hereafter denominated as the design team), who acts as advisor and offers,

motivation, assistance and tools provision, to implement and trigger organisational change. In order to guarantee the positive effect of implemented solutions, evaluations are carried out before and after the implementation of the innovation process. It is supposed that the differences between these two evaluations represent changes in the organisation.

The methodology proposes the use of a pool of techniques that will enable SMEs and their employees to visualise the possibilities of organisational change; this is done by focussing on customer service and plotting a route to be followed in order to promote organisational change.

The proposed methodology was developed by following the Design Science Research (DSR) method (Hevner *et al.*, 2004; Peffers *et al.*, 2007). In order to illustrate the feasibility of SD4OCh, this paper presents a real-world example of a small company, named NEURO, which comprises a team of excellent workers (e.g. neuropsychologists) specialised in treating people with neuropsychological disorders. In the last few years, their business has grown because of the excellent quality of the treatments/therapies provided. However, the company was also experiencing certain organisational deficiencies that limited its continued growth and were a potential threat to business viability. We accordingly applied SD4OCh in NEURO, and the outcome was a significant improvement as regards the internal aspects of the company, including the reliability of the personnel and the capacity to respond (Papa *et al.*, 2020).

It is important to highlight that the SD4OCh methodology has arisen as a real need for SMEs such as NEURO, namely, those that start out by offering good services but eventually reach a point at which they need to innovate/redesign their structure, processes, and services in order to grow or be sustainable. The proposal presented may be of use in this situation since it makes it possible to undertake changes throughout the organisation. SD4OCh was shown to be effective in the specific case of NEURO, and this may be owing to the small size of this company. Moreover, as mentioned above, the methodology proposes that SMEs be accompanied by a design team, and the method is intended to be implemented together with the organisation's staff. We consider that, in the future, SD4OCh may be applicable and provide value to larger companies, although we are aware that changes in large organisations can be much more complex and may require other well-established techniques/processes for organisational change.

The contributions of this paper are both theoretical and practical, since it provides knowledge regarding the SD theory and organisational change by means of a method designed and put into practice in a real case.

The remainder of this paper is structured as follows: section 2 provides a brief overview of, SD, organisational change and SME works related to this research; section 3 describes the research design method; section 4 presents the proposed methodology, a detailed description of which is provided in section 5 by means of its application to the NEURO case study; finally, section 6 presents the discussion and the conclusions.

2. Conceptual background

SD allows organisations to improve their services through the use of techniques and/or tools (Stickdorn *et al.*, 2018), thus enabling the addition of value for both customers and companies. The importance and contribution of SD to the service field is recognised in literature (Spohrer *et al.*, 2007). With regard to scope, SD is a multidisciplinary field of science covering several areas, including design, management, and engineering (Maglio and Spohrer, 2008), and implementing an SD process consequently entails taking into account knowledge from different disciplines, thus enabling a holistic view of organisations and their services.

This view will facilitate organisational change in companies, since it will enable links to be established between both research domains. The focus on SMEs, which has been detected as a gap in literature and in practice, will allow the two to be connected. The main contributions found in the literature in this area are analysed below.

2.1 SD methodologies

A systematic literature review (Kitchenham *et al.*, 2009) made it possible to identify and analyse the various methodologies related to SD, and to detect their strong and weak points as regards their possible application to organisational change, these methodologies are presented in Table 1. Only were taken into account fully-fledged methodologies, with several steps/stages and different analytical tools/techniques employed, including customer journey map (Rosenbaum *et al.*, 2017) and service blueprint (SBP) techniques (Bitner *et al.*, 2008), among others.

New Service Development or NSD (Yu and Sangiorgi, 2018): this method comprises the four stages of design, analysis, development and launch. In the design stage, research into concepts regarding the new service, idea generation activities, and the projection and testing of the new service are conducted; these processes require the prior definition of objectives and

Methodology	Stages[1]	Organisation diagnosis[2]	Measurement of results[3]	Holistic organisational change[4]
New Service Development (NSD) (Yu and Sangiorgi, 2018)	Design; Analysis; Development; Launch	Partially–Services	N	Partially–Services
Multilevel Service Design (MSD) (Patrício *et al.*, 2011)	Designing the service concepts; Designing the service system; Designing the service encounter	Partially–Services	N	Partially–Services
Management and Interactions Design for Service (MINDS) (Grenha Teixeira *et al.*, 2017)	Management; Interaction Design	Partially–Services	N	Partially–Services
Service Design for Value Networks (SD4VN) (Patrício *et al.*, 2018a, b)	Mapping the Value Network; Understanding the experience, network goals, activities, and interactions of multiple actors; Designing the value network service concept and architecture	Partially–Services	N	Partially–Services
Service Design Method for Companies Undergoing a Servitisation process (SDCS) (Lima and Teixeira, 2020)	Exploration; Development; Pilot; Implementation; Service management	Partially–Services	N	Partially–Services
Service Design for Business Process Reengineering (SD4BPR) (Banica and Patricio, 2020)	Mapping the AS-IS process; Modelling the TO BE process; Exploring implementation possibilities	Partially–Process	N	Partially–Processes

Note(s): [1]This column summarises the steps of the methodology; [2]This column describes whether the method allows for understanding the organisation' structure, processes, or services prior to intervention (Yes, Y; No, N; Partially); [3]This column describes whether the method allows to quantify the results obtained after the intervention (Yes, Y; No, N; Partially); [4]This column describes whether the method causes organisational change in structure, processes, or services (Yes, Y; No, N; Partially)

Table 1.
Methodology for service design

strategies that must be followed. In the analysis phase, business analysis is performed to determine the feasibility of the project and attain authorisation for its implementation. In the development stage, the services are designed, tested, marketed, the *staff* are trained, and a pilot test is conducted to acquire information on the type of service that can satisfy customer needs. Finally, the service is launched, and the launch is reviewed.

Multi-level Service Design (MSD) (Patrício *et al.*, 2011): this interdisciplinary method serves to design complex service systems and has three hierarchical levels: the design of the service concept level; the service system level; and the service encounter level. First, the design of the service concept level serves to improve the company's proposed value by considering how to position the company within the scope of customer value (including the service provided), and the already established links with other organisations in the network. Second, the design of the service system level tackles the configuration among people, technologies and other resources; it considers that service experience is created by all the interactions between a customer and the service systems, which involve different interfaces of the company's service. Namely, service experience is the result of a customer's journey. Third, when designing the service encounter level, the encounters with the service are defined as the moment at which customers interact with the company, which may occur through multiple interfaces.

Management and Interactions Design for Service (MINDS) (Grenha Teixeira *et al.*, 2017): MINDS is based on the MSD structure and was developed by integrating the two perspectives of management and interaction design. From a management perspective, MINDS aims to contribute with the service management, commercialisation and operation of the company on the basis of creating innovative value offers. From an interaction design perspective, MINDS aims to significantly contribute to the design of services by focussing on understanding human commitment to digital technology and designing useful/enjoyable technologies for customers.

Service Design for Value Networks or SD4VN (Patrício *et al.*, 2018b): this method was designed in order to understand the activities, interactions, and objectives of actors in the network. It is divided into three stages: (1) mapping the value network, which provides a broad view of the value network; (2) understanding the interactions among multiple actors, which provides a map of the activities in the network, and (3) designing the value network service concept and architecture, namely, providing services that are integrated into the value network by following an iterative design process and involving network actors through participative design sessions.

Service Design Method for Companies Undergoing a Servitisation process or SDCS (Lima and Teixeira, 2020): this method serves to support organisations that wish to undergo a servitisation process. It comprises 5 stages: exploration, development, pilot, implementation, and service management; the first four are focussed on SD, and the fifth on identifying improvements and proposing changes.

Service Design for Business Process Reengineering, or SD4BPR (Banica and Patricio, 2020): this method is based on the DSR, and is, therefore focussed on SD and based on DT. It provides a holistic view of the company's processes whilst seeking to create value with regard to customer experience. It has three stages. The mapping stage, or the AS-IS stage, entails conducting an exploratory study based on interviews and a review of documents (termed as exploration in DT), and this process is treated as customer-centric; this stage leads to the identification of the main components of the process and a series of suggestions as to how the participants can make improvements. The modelling stage, or the TO-BE stage (i.e. ideation and prototyping in DT), ensures consistency between the business and its technology; it is a design stage comprising various levels, and follows the MSD method and the interaction models in the MINDS method. Finally, the exploration implementation possibilities stage (i.e. implementation in DT) explores technological alternatives that can be adjusted to the requirements/restrictions of the business environment. Table 1 compares the methods mentioned above.

Almost all of the aforementioned methods allow a partial diagnosis of the organisation and focus on the service level (Table 1, column 3). The exception is SD4BPR (Banica and Patricio, 2020), whose authors propose an analysis of business processes (mapping stage) in order to understand the organisation's processes. Furthermore, the methodologies do not describe a quantitative measurement tool with which to assess the improvements made (Table 1, column 4). Finally, we observed that although some methodologies evoke service and process change, none focus on inducing a holistic organisational change (Table 1, column 5). Most of the aforementioned methods use SD to: develop new services or complex services; provide innovative value; create a value network, or improve the customer's experience. But none use SD techniques to go beyond service change. In other words, they do not focus on changing/improving the organisation holistically. This is a relevant gap, and it is particularly important that it be covered in the case of SMEs, which require techniques and tools that will not only help them to improve their services, but will also allow them to improve the organisation as a whole, guiding and accompanying it throughout the process.

The theoretical foundations of organisational change, along with their conceptualisation as regards structure, processes and services, are shown in the following section.

2.2 Organisational change through SD

Change management is defined as "the process of continually renewing an organisation's direction, structure, and capabilities to serve the ever-changing needs of external and internal customers" (Moran and Brightman, 2001). Knowing what changes need to be made and how to make them would appear to be key aspects for organisational change, in addition to knowing that it requires certain routines (Luecke, 2003). This balance between the changes to be made and the need for stable routines can be facilitated by methodologies aimed at supporting organisational change.

A comprehensive review of the literature on "organisational change" was undertaken by Nasim and Sushil (2011). These authors identified dominant dilemmas in organisational change literature (planned vs emergent organisational change; static vs dynamic; incremental vs revolutionary; piecemeal vs holistic; macro vs micro). The different contributions can be classified on the basis of these dilemmas. Recently, a comprehensive review was realised by Stouten *et al.* (2018), they facilitate scientific evidence of widely used practitioner-oriented change models and findings from scholarly research on organisational change processes to develop an integrative summary of the available evidence of what is known, contested, untested, and underused in change management.

One of the first authors to be recognised as a leader in this field was Lewin (1947, 1951), whose planned change approach comprises four main elements: field theory, group dynamics, action research and the three-step model for change. Lewin's three-step model has formed the basis of most of the organisational change models and is still influential today. One of the first consolidations of existing change models was carried out by Bullock and Batten (1985), who analysed the literature on organisational development regarding the stages of change. This analysis was used as the basis on which to propose a model comprising four stages: exploration, planning, action and integration. Various processes that change the organisational system from one state to another occur in each stage. The majority of the models later developed were based on these four stages.

Organisational change has, therefore, become a complex matter that has been tackled by many authors who have attempted to synthesise this domain (Al-Haddad and Kotnour, 2015; Demers, 2007; Graetz and Smith, 2010) and have found several theoretical approximations. A systems model for organisational change was formulated by Maes and Van Hootegem (2019). This model considers different concepts of organisational change, as follows:

(1) Content concepts
   - Object of change: strategy, structure, people and culture;
   - Level: individual, group, organisation, industry and society and
   - Dimension: from small to large.

(2) Process concepts
   - Elements of planned change

(3) Result concepts – change effects on different levels
   - Individual and group effects;
   - Organisational effects and
   - Social effects (industry and societal level).

These concepts make it possible to tackle various organisational change strategies by focussing on one or several of them, such as structure, processes and services.

According to the approach described in this work, organisational change can, therefore, be compared to product/service changes, as both encompass a design process. Furthermore, how a change is introduced to users (e.g. customers or employees) is as important as the change (e.g. in product/service, process, organisation) itself (Hussain *et al.*, 2018). That it is crucial for a method for organisational change to enable not only the proper designs/implementation of change/innovation but also the management of the experience surrounding changes. This paper develops the idea that SD can provide the foundations required for this process.

Moreover, the use of SD should enable both service improvement and organisational change by redirecting change management. For example, Kurtmollaiev *et al.* (2018) carried out an in-depth examination of the SD adoption process in large organisations, showing that SD not only influenced service innovation but was also fundamental to its creation; this is because SD led to changes in both organisation routines and employee mentality. Meanwhile, Junginger and Sangiorgi (2009) argued that SD may produce internal changes in the organisation, affecting its resources, regulations, beliefs, and values; namely, it can lead to holistic changes, which is also why service designers are beginning to play a fundamental role in companies.

The aim of the approach presented herein is, therefore, to build a bridge between the organisational change and SD theories and practices, and to provide successful services by helping the organisation to undergo a process of reflection, structuring and action in order to attain the desired objective, such that SD as a methodology can tackle this process.

2.3 SD in SMEs

SD implementation in organisations can help to redesign the "customer journey" (Hamilton and Price, 2019) and, consequently, improve the customer experience (Lemon and Verhoef, 2016; Meroni and Sangiorgi, 2011). This is intrinsically related to one of the main characteristics of SD, the "user-centred" design Stickdorn *et al.* (2018), which allows us to understand not only the client's needs but also the different points of contact between client and company (De Keyser *et al.*, 2020). The analysis of these contact points constitutes valuable information that provides the foundation for transforming and improving the organisation holistically.

In section 2.1, we showed several pieces of research that support the application of SD in order to design/improve services in organisations. However, to the best of our knowledge, there

are currently no SD-based methodologies focussed on improvement and organisational change at a holistic level. Moreover, and as proposed in section 2.2, whilst there is extensive literature on the topic area of organisational change, the majority of published work focusses on organisational change in large organisations (Bloodgood, 2006; Karasvirta and Teerikangas, 2022; Khaw *et al.*, 2022; Wiesner *et al.*, 2004). SMEs have, owing to their very nature, more limited human, material and financial resources. With more limited resources, it is more difficult to direct efforts towards organisational change initiatives. SMEs focus on the allocation of resources in order to achieve their maximum short-term advantage, which frequently leaves them responding to external influences as they occur rather than taking a proactive approach (Mcadam, 2002). SMEs also have less market power than large organisations and are consequently more subject to market changes (Tödtling and Kaufmann, 2001).

In the case of SMEs, which are the focus of this research, few studies have examined the implementation of SD in this environment. However, there are two studies on the topic that we can highlight: one on the preparation of manufacturing SMEs in order to implement SD (Teso and Walters, 2016) and the other on the application of service experience and SD concepts in tourism SMEs (Zehrer, 2009); although both research works theoretically analyse the use of SD in SMEs, neither propose a specific methodology. This signifies that, despite the relevance of this topic, we have observed a lack of both theoretical and practical proposals. In fact, Zehrer (2009, p. 344) states the following: "stimulate other researchers to study the issue of SD among SMEs and the role that this can play in securing competitive advantages for such service providers. More extensive research is certainly needed in this important area".

The aforementioned factors concerning the lack of links between organisational change and SMEs are also valid as regards the small extent to which SD is applied in SMEs. Moreover, their "non-formal business or marketing background" (Mc Kercher and Robbins, 1998) often leads SMEs to be organised on the basis of stakeholders' empirical knowledge, without proper planning or design.

Prior research has also highlighted another relevant factor that is a weakness of SMEs: their "little capital and inadequate management" (Shaw and Williams, 1990). It is evident that SMEs have fewer resources with which to design services than do large companies, and even fewer to undertake organisational improvement/change strategies. SMEs, by definition, lack specific departments that deal with customers more efficiently, particularly as regards the provision of services and their quality; their limited size and resources signify that they function on a day-to-day basis, which supposes not applying techniques that could resolve the problems that arise during the development of their activities. Many of them could, therefore, improve by making a change to their structure, processes and services, which together sustain organisational change. It is in this change that an SD-based methodology could assist.

SD examines all the business activities, organisational foundations, infrastructures, people interactions, and material elements involved in the service in order to develop both its quality and the relationship between the provider of the service and its customers, thus making the service more beneficial, useable, acceptable for customers and efficient, and useful for organisations (Stickdorn and Schneider, 2011, p. 23).

Applying SD thinking can transform the way in which small enterprises build their products, services, processes, and strategies, because it provides successful tips for start-ups so as to design and plan innovatively, whilst the existing business can improve its service or products creatively by adopting SD tools (Kurokawa, 2015, p. 10).

The methodology presented in this work, therefore, aims to help SMEs to make organisational change; its diagnostic activities and those of innovation and implementation are performed jointly by the design team, the staff, and the organisation's customers. It is hoped that this can expand SMEs' possibilities of innovating/improving their services, satisfy customer needs, and reduce the possibility of failure.

In our case study with the NEURO company, we noticed that simple measures can lead to improvements and changes in SMEs. These measures include the following: accompanying, analysing, and diagnosing the company; providing guidelines to ensure greater efficiency and sustainability; ensuring that the company offers higher quality services, and that services are more in line with customer needs.

3. Research method

The proposed methodology was developed by following the DSR method (Hevner *et al.*, 2004; Peffers *et al.*, 2007), which is a framework developed to serve as a research guide and that was initially related to IT (Beloglazov *et al.*, 2015; Hevner, 2007; Hevner *et al.*, 2004). Nonetheless, its applicability was eventually extended to research services, operations management, and design: "DSR can support service design research efforts by providing a robust and well-documented methodology that aims to rigorously develop and evaluate service design research contributions and address real-world problems" (Teixeira *et al.*, 2019, p. 579).

DSR focusses on understanding the organisation's context in order to create/evaluate artefacts that can resolve its problems. These artefacts can be constructions, methods, or innovative/valuable implementations that lead to progress in the field in question (March and Smith, 1995). Indeed, our application of DSR enabled us to identify and tackle the problem, and to evaluate and document the artefact; this process resulted in the SD4OCh methodology. The principal phases of the DSR process are summarised in Figure 1, and they are also described below:

Identify problem and motivation: some of the activities developed in this research, which has lasted three years to date, have been a *systematic literature review* and a *bibliometric study* in the field of SD. These reviews made it possible to identify and analyse the various proposals related to SD, and to discover possible areas for improvement. The analysis of the proposals shown in section 2.1 showed that although methodologies for SD already exist, there is no methodology based on SD that would allow an SME to make a greater (holistic) change to the organisation. Once this gap had been identified, we selected a company (NEURO) whose structure, processes, and services were deficient and which was, therefore, appropriate as regards undertaking an improvement process. The study of previous work concerning both SD methodologies and organisational change helped us to define a first version of the stages in the process. This process was subsequently refined through its application to a case study.

Define the objectives of the solution: using prior research describing the application of SD concepts and tools and the involvement of company clients and employees as key pieces of the process of change as a basis (Prahalad and Ramaswamy, 2004; Sanders and Stappers, 2008), we defined the aim of the SD4OCh methodology as follows: to drive SMEs towards organisational change in order to improve their structure, processes, and services and measure the related improvements.

Design and development and Demonstration: NEURO has served as a case study for the development and application of the SD4OCh methodology, which was developed with the aim of addressing the aforementioned gaps in research. This was done by following an Action-Research approach (Avison *et al.*, 1999; Wieringa and Moralı, 2012), in which the case itself was valid as the motivation to carry out research and design the methodology, and to demonstrate the feasibility of the stages and steps proposed.

The desired artefact, SD4OCh, was designed and developed in order to address the lack of methods on organisational change in SMEs using an SD approach. As already stated,

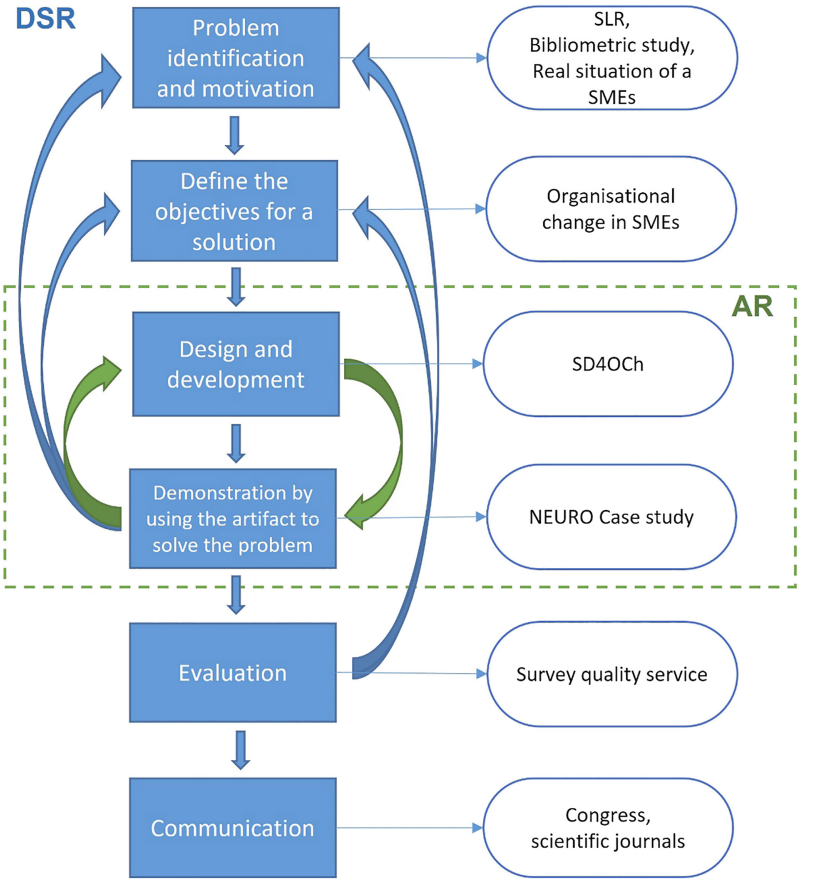

Figure 1.
Design science research model applied to develop the SD4OCh method proposed in this study

the SD4OCh comprises four stages (i.e. three main stages and a transversal evaluation stage) that serve to efficiently promote the holistic transformation of the organisation.

We demonstrated the effectiveness of SD4OCh by applying it in the NEURO case study. We specifically implemented the artefact in three iterative cycles. First, a *diagnosis* process, which allowed us to identify the organisation's needs, internal and external processes, principal strengths and weaknesses, and possible areas for improvement. Second, an *innovation* process: once the problematic situation was understood, we started to set up workshops, meetings, and activities that allowed the organisation and its customers to co-create solutions. Third and finally, an *implementation* process, which allowed us to implement the chosen solutions whilst constantly considering the potential for resistance to change (change management).

Evaluation: we evaluated the SD4OCh using DSR criteria (Hevner *et al.*, 2004; Peffers *et al.*, 2007). We evaluated the situation before the methodology was applied and the results obtained after its application, which enabled us to affirm that the SD4OCh yielded positive results. A more detailed explanation is provided in the Evaluation section (5.4).

We verified the DSR criteria: the criteria are process, invention, relevance, and extensibility (Forlizzi *et al.*, 2008). We deemed that the process was described and supported because of the lack of relevant research on this topic, something that also validates the relevance and innovative nature of the current research. Furthermore, although we did not conduct processes to ensure the extensibility of SD4OCh, it can be verified by applying the method in other SMEs. We plan to conduct more related case studies in the near future.

Communication: we began to communicate, at a scientific level, the results of the methodology to academics and professionals from various areas, thus allowing us to obtain different points of view regarding the research. Moreover, we intend to eventually divulge the results obtained in conferences and scientific publications.

During the application of the methodology to the case study, we presented the progress made at each stage to the organisation, which then provided the researchers with constant feedback.

4. SD4OCh in a nutshell

4.1 The process

As mentioned previously, SMEs often comprise professionals who are excellent in their own fields but have little experience of organisational management (Ropega, 2011). This led us to propose the SD4OCh methodology, which is based on SD, and which in turn allows these SMEs (and other companies, whenever applicable) to undertake organisational change.

Since it is based on SD, the SD4OCh is also a human-centred methodology (Brown, 2008; Karpen *et al.*, 2017; Ojasalo *et al.*, 2015) that allows SMEs to create innovative solutions based on the knowledge provided by both customers and employees.

The application of this methodology requires expertise in both SD and organisational management, since a design team that is external to the company is generally necessary in order to guide its application. However, those SMEs that already have this expertise would be capable of applying the methodology themselves.

An in-depth description of each of the four stages of SD4OCh is shown below (see Figure 2).

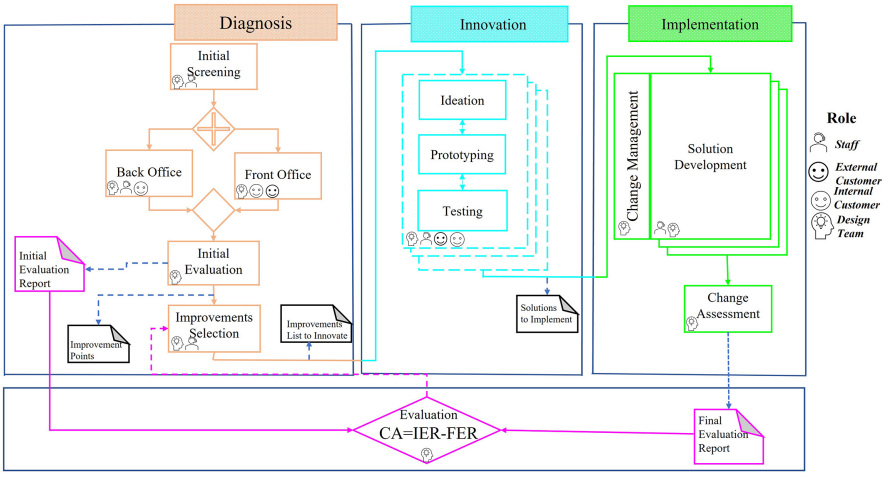

Figure 2.
The processes in the SD4OCh method proposed in this study

4.2 Stages and techniques

4.2.1 Stage I. Diagnosis. The objective of this stage is to obtain in-depth knowledge of the organisation by analysing its structure, processes, and services. To achieve this, it is necessary to acquire a general vision, which then enables the problem and the importance of the solution to be understood (Peffers *et al.*, 2007). An initial screening is, therefore, conducted in order to discern the operation. This requires stakeholder participation (e.g. the staff and the design team, namely, service engineers) and the use of a set of techniques (e.g. an initial interview and job screening). The steps in this stage are described below.

Back Office Analysis. This should be performed in order to understand the organisation's functioning, and various techniques can be used, such as the business model canvas (Osterwalder and Pigneur, 2010, p. 42), SBP (Bitner *et al.*, 2008), and value models (Kimbell, 2011).

Front Office Analysis. This should also be performed in order to understand customers' opinions and the services provided by the organisation; here, techniques such as surveys (Groves *et al.*, 2011) or a customer journey map (Rosenbaum *et al.*, 2017) can be used. The participants in this stage are the internal and external customers and the design team.

After acquiring data on the back office and front office, the use of SBP techniques can be useful to connect the back office processes identified and the opinions gathered from the front office (e.g. from the customers), which may help to detect points that can be improved and that will be worked on in the following stages.

Initial Evaluation. The design team employs the information obtained using these different tools to perform an initial evaluation of the organisation, assessing the quality of the processes and services (internal and external) so as to obtain a list of points that can be improved. These points should be established according to the organisation's objectives as regards the intervention, and this process should allow the design team to understand the organisation's status (starting point). This will all serve as input for the next step.

Improvements Selection. This step entails using the aforementioned input (i.e. points that can be improved) to produce a document denominated as "Improvements List to Innovate". The selection of the points that will be on this list should be based on decision-making mechanisms used in systems (Kautz and Larsen, 1997, p. 293), in which "a decision-making unit passes from its first knowledge of an innovation through a persuasion stage at which an attitude towards the innovation is formed to the actual decision to adopt or reject it."

In SD4OCh, this process is developed by carrying out meetings in which the design team presents each point that can be improved to the staff (decision unit), and this will help the organisation to innovate (persuade). These stakeholders should then discuss their impressions of the point presented until the staff decides to adopt/reject it. The potential improvements selected are then classified according to the three aspects of SD (i.e. human, business, and technology). After this classification, the points of each aspect that could be improved are classified numerically (from 1 to 3) by their level of importance, with priority being given to level 1 points. The decisions regarding priority are made by means of discussions between the staff and the design team, and the points chosen are placed on the "Improvements List to Innovate". This list will serve as the input for stage 2, which entails innovation processes and understanding innovation from a process approach (Quintane *et al.*, 2011).

Various tools can be used to achieve the "Improvements List to Innovate", such as the customer journey map (Rosenbaum *et al.*, 2017), SBP (Bitner *et al.*, 2008), value models (Kimbell, 2011), the business model canvas (Osterwalder and Pigneur, 2010, p. 42), surveys (Groves *et al.*, 2011), and interviews (DiCicco-Bloom and Crabtree, 2006). These tools should be used on the basis of the problem to be solved. More suggestions regarding tools for stage I are shown in Table A1 (Appendix).

4.2.2 Stage II. Innovation. The objective of this stage is to find/provide solutions to the points identified as needing improvement in stage I. This entails the onset of an innovation process based on the concept of DT; according to Oxman (2017), "[. . .] Design thinking's process and methods facilitate rapid learning and understanding of the situation and people involved, while allowing for iterative generation and testing of possible solutions". The steps for this stage are described below.

Ideation. In this step, a set of improvements is proposed in order to provide responses for each element in the "Improvements List to Innovate". It is particularly necessary to include as many solutions as possible (divergence) and then select those that are most relevant (convergence). As described in prior research, "The goal is to go beyond the obvious to brainstorm, incubate and generate far-ranging ideas, solutions, and approaches connected to the problem" (Henriksen *et al.*, 2017).

Prototyping. Once all possible solutions have converged, it is necessary to bring them to fruition. The goal of prototyping is not finishing, but rather learning about the strengths and weaknesses of the idea and identifying new directions for other potential prototypes (Brown, 2008). This allows the stakeholders to design/refine the solutions proposed.

Testing. After prototyping, it is necessary to obtain feedback from all possible users (internal and/or external customers) in order to discover whether the proposed solutions fulfil user expectations. If unfulfilled, stakeholders should return to the ideation step, and this should be done as many times as necessary. The aim here is to find a solution that satisfies user expectations.

It is important to highlight that these three steps should be repeated for all points in the "Improvements List to Innovate", which then will provide the solutions to be implemented. Stage II requires the participation of the staff, external and internal customers, and the design team, but the members of the design team are those responsible for it.

The following tools can be used at this stage: brainstorming (Kaner and Karni, 2007), empathy maps (Rosenbaum *et al.*, 2017), sketching (Berengueres, 2017), paper prototypes (Mehtälä and Nieminen, 2019), feedback grid (Stickdorn *et al.*, 2018), constructive interaction (Kahler *et al.*, 2000), among others. More suggestions regarding tools for stage II are shown in Table A2 (Appendix).

4.2.3 Stage III. Implementation. This stage has the objective of promoting/assisting organisations to implement the solutions. Research shows that many attempts at organisational improvement tend to fail owing to inadequate change management (e.g. the staff do not understand the change, resist the change, etc.) (Jones *et al.*, 2019; Kotter, 1995). This stage, therefore, requires the involvement of the whole staff at the organisation. The steps of this stage are described below. More suggestions regarding tools for stage III are shown in Table A3 (Appendix).

Solution Development. In this step, the solutions developed are set in motion, and the solutions are likely to vary according to the organisation's needs. For example, they could be a training or a marketing plan, a minimum viable product, among others. The staff and design teams participate in this step, but the staff is directly responsible for it.

Change Management. When making organisational changes, both employees and management need to understand them and receive support on how to correctly manage them. Furthermore, these actors should bear all the objectives of the intervention in mind and focus on conducting a human-centred change. This is can be operationalised using tools such as workshop sessions (Stickdorn *et al.*, 2018). The design team is responsible for this step.

4.2.4 Evaluation. At this transversal stage, the organisational change is quantitatively and/or qualitatively measured/evaluated in order to attain the difference between the initial and the final evaluation reports. The participants in this stage are the staff, the external and internal customers, and the design team, and the following attributes should be measured/evaluated: customer satisfaction, internal service quality, and income statement

(see section (5.4) Evaluation, Table 4). Please note that the attributes to be evaluated should be directly related to the objectives of the intervention. These attributes are defined below:

(1) *Customer satisfaction*: the fulfilment of consumers' needs and expectations (Cronin and Taylor, 1992).

(2) *Internal Service Quality:* the objective measurement of properties that make service provision possible (Jun and Cai, 2010).

(3) *Income statement*: the results obtained by the company in a predetermined period; research shows the need to quantify the increase in the income statement produced by the intervention (Acounting Santards Board, 1992; Sawyer, 2009).

Once the organisation/staff have obtained the results of these evaluations, they should compare these results with the objective of the intervention. If the results are concordant with or better than the original objective, the intervention is considered to be complete. Otherwise, processes should be repeated as many times as necessary until the objectives are attained.

5. The NEURO case study

The NEURO company specialises in caring for people with neuropsychological disorders and has an excellent multidisciplinary team comprising neuropsychologists and clinical psychologists, among others. However, all lack experience in or knowledge of the fields involved in running a business (e.g. human resources). NEURO has grown in recent years owing to the excellent quality of its treatments, customer satisfaction, and word-of-mouth marketing. However, the aforementioned shortcomings have limited its growth and viability.

We initially came into contact with NEURO as customers of its services. This was when we discovered its real problems and limitations, which motivated our research. We proposed collaborating with them in order to provide a solution, and we thus began to work together to promote organisational change. The work was, therefore, carried out in a framework of collaboration (they provided us with a case – NEURO – and we helped them to improve their processes). We played the role of researcher and consultant when applying the various techniques and stages defined. In some stages, we also acted as coach, accompanying them in the identification of the differential aspects that provide value. The company participated in a direct manner, since it attempted to solve several of the problems encountered. NEURO had several characteristics that we deemed important as regards applying SD4OCh. These were the following:

(1) a service company with stability in the market (more than 20 years of experience);

(2) highly qualified staff with an opportunity for growth;

(3) small company size, ensuring the feasibility of the evaluations;

(4) the owner/manager is a professional with a lot of experience in his own field, who fulfils many functions (e.g. manager, human resources, etc.) in which he has little or no experience.

In the NEURO case study, the term "staff" refers to the directors, internal customers (e.g. the administrative and medical workers), and external customers (e.g. patients and/or their tutors). The "design team" are the authors of this paper.

5.1 Diagnosis

The design team first analysed NEURO's back office and then its front office.

5.1.1 Initial screening. This step was accomplished when the NEURO staff and the design team first made contact. This step allowed the latter to obtain a general overview of NEURO's structure, processes and services.

5.1.2 Back office analysis. This step had the objective of understanding the internal operations of NEURO. We collected data on various parameters (e.g. technological support, activities that generate value, etc.) by conducting three focus group sessions (Table A4, Appendix) and interviews (Table A5, Appendix) (Stickdorn *et al.*, 2018); the participants were internal customers, the staff, and the design team. These meetings allowed us to attain a clear idea of the internal functioning of the organisation. The main findings were the following:

(1) The application of the business model canvas allowed us to collect data on the company's business strategy, value propositions, key activities, partners, resources; customer relationships and segments; and the main revenue streams and cost structure (see Figure 3). NEURO's main value proposition was focussed on personalised patient care together with a close personal interaction with customers (human-centred care).

(2) After analysing NEURO's e^3value model, we observed that the organisation adds value to most of the actors with which it interacts, but receives it only from its customers; in other words, the give-take relationship was unbalanced, and this was clearly a point to be improved.

(3) Upon applying the business process model and notation, we identified NEURO's internal activities (back office) and its interactions with customers when providing services (front office).

(4) The interviews showed that the internal service quality required improvements regarding tangibility, reliability, and responsiveness (see subsection 5.4, Evaluation).

(5) One of the principal problems we detected was the waiting period between different follow-up sessions; this was based on the therapy procedures and was three months in length. During this waiting period, parents performed their children's therapy exercises at home without any support from NEURO and had no knowledge of, for example, whether they were doing them properly.

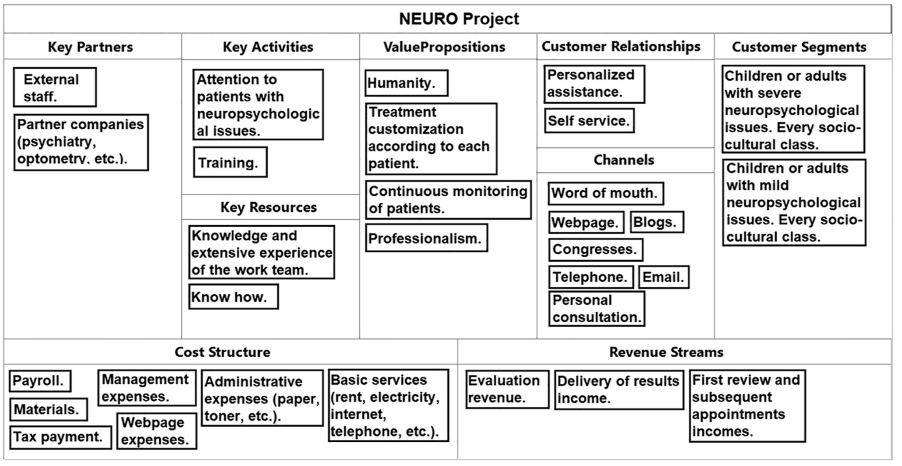

Figure 3.
The results of the application of the canvas business model technique in the NEURO case study

(6) Another major problem was the lack of organisation regarding managing appointments; this problem had to be resolved immediately owing to the direct relationship between customers and NEURO's income.

5.1.3 Front office analysis. The objective of this step was to analyse the customers' opinions of and emotions related to the service provided by NEURO. We collected data on various parameters (e.g. general customer satisfaction, difficulties in performing the treatment, etc.) by conducting DT workshops (Table A6, Appendix) using diverse techniques, such as empathy maps and surveys (Table A7, Appendix); the participants were external and internal customers, the staff, and the design team. The main findings were the following:

(1) The results of the customer satisfaction survey were interesting because, although the field work indicated a certain amount of deficiency in the services, the results of the surveys were positive (details of this are provided in subsection 5.4, Evaluation).

(2) The creation of the empathy map during one of the work sessions (see Figure 4) made it possible to observe that the customers had some doubts about the treatments provided by the organisation, although they believed that the treatment could have positive effects on the patients.

5.1.4 Initial evaluation. After carrying out the back office and front office analyses of NEURO, the information attained was processed by the design team in order to measure/evaluate the initial state of the organisation and the process and service quality. This yielded the "Improvement Points" shown below:

(1) Back office:

- There was no clear organisational structure for either role definition or standard/automated processes. This often made the services that they provided feel very amateurish, leading to a loss of time, information, and, in some cases, potential customers.

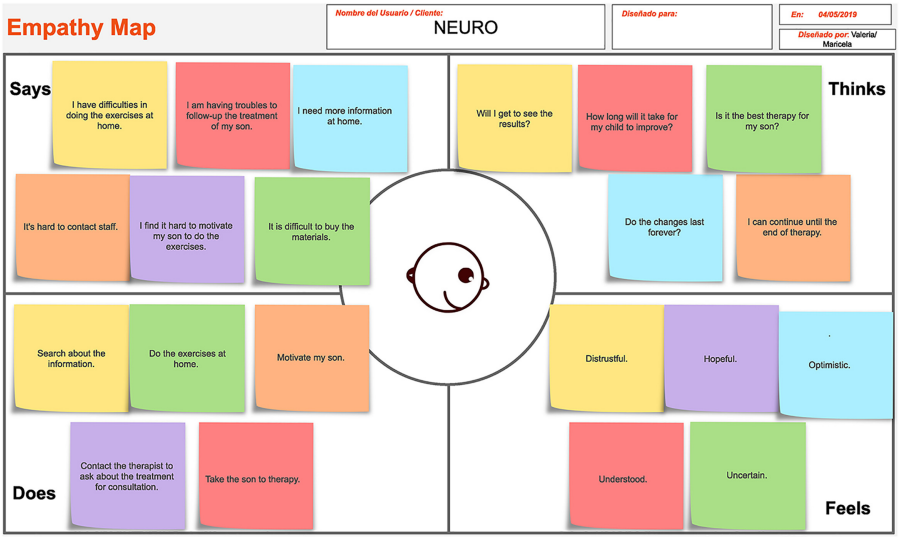

Figure 4.
The results of the empathy map technique in the NEURO case study

- Although NEURO collaborated with different external entities, this did not bring it any direct benefits. These lines of business could be improved by establishing win-win collaborations.
- Some of the staff had more qualifications than those required to perform their duties. We, therefore, observed that NEURO could use these additional qualifications for outsourced services and even train the staff to tackle other services, thus expanding its lines of business.
- After conversing with the NEURO staff and some of its customers, we conducted a slightly more qualitative analysis. This showed that the organisation's communication policy was regarded as poor; specifically, most customers sought NEURO services thanks to word-of-mouth recommendations, implying that NEURO did not seem to benefit from the possibilities of gaining customers through the internet, social networks, or other marketing activities.

(2) Front office:

- Assessments showed that the customers regarded the company very highly from both the administrative and the clinical points of view. The customers were very satisfied with the services, from the diagnosis (first interview and assessment) to the follow-up sessions. According to the customers, the worst-valued aspect of NEURO was its physical facilities.
- However, some customers experienced difficulties in continuing with the treatment. For example, some patients were unwilling to perform exercises at home; some parents, tutors, and/or patients lacked the time and/or patience required to continue the treatment; and some customers found it hard to gain access to the materials required to perform the exercises at home. The services could, therefore, be improved if NEURO gave its patients more support to continue the treatment at home.

5.1.5 Improvements selection. Having defined the improvement points, we conducted a meeting in which the design team provided NEURO with explanations concerning all the points that could be improved. NEURO then decided which aspects they wished to improve by the interventions, which led to the attainment of the "Improvements List to Innovate" (see Table 2).

The points on the list to be improved were then classified according to the three aspects of SD and by their level of importance (level 1 was "high priority" and level 2 was "medium priority". There was no level 3 "low priority" in the case study). In this paper, we shall address only level 1 points because they were highly prioritised, namely, those that the organisation considered relevant for its organisational change.

5.2 Innovation

Once the "Improvements List to Innovate" had been obtained, DT meetings (Table A8, Appendix) were held in which the staff, customers and design team ideated, prototyped, and tested the solutions. Only the solutions related to *improving assistance with exercises at home*, from a human-centred perspective, will be presented for reasons of space.

5.2.1 Ideation. The DT workshop with the customers led to ideas that were divided into the following topics: parent training, internet-based assistance, home assistance, and accompaniment by phone (see Figure 5). Of these, the most viable, and that chosen, was *internet-based assistance*, since it implied a small amount of effort on the part of the organisation and a significant amount of value for the customer.

Perspective[1]	Aim[2]	Action[3]	Priority[4]
Human	To improve empathy treatment with parents	Provide better explanations of the exercises to be done at home	Level 1
		Improve access to materials required for the exercises	Level 1
		Improve assistance with exercises at home	Level 1
	To increase customer trust	Videos of successful cases	Level 2
		Website that publishes results/information about the process	Level 2
		Self-help meetings between parents	Level 2
		Promote proper employee performance	Level 2
		Define a mechanism with which to establish the report delivery date	Level 1
		Assign a specific time to answer emails	Level 1
Business	To improve the organisation	Define incentive policies for employees	Level 2
		Rethink the aims and views	Level 1
		Define the organisational chart, roles, and functions associated with roles	Level 1
	To improve the follow-up	Clearly define the follow-up process for each specific customer	Level 2
		Assign a specific employee to each customer (personalise)	Level 2
		Deliver answers more quickly	Level 2
		Define a mechanism to control/monitor tasks assigned to employees	Level 2
		Define a mechanism to track information exchanged with customers	Level 2
		Improve the follow-up process from the initial contact	Level 1
	Marketing strategies	Establish a marketing plan, increase trust, and attract more clients	Level 2
Technology	To improve the technological area	Improvement plan for all available technologies	Level 2
		Improve the appointment management mechanism	Level 2
		Improve software (website, apps, etc.) using agile methodologies	Level 1

Table 2.
Improvements list to innovate

Note(s): [1]This column shows the SD perspective to which each improvement belongs; [2]This column shows what is intended to be achieved by implementing the improvement; [3]This column shows the actions to be implemented; [4]This column shows the actions priority order to be implemented, with level 1 being priority

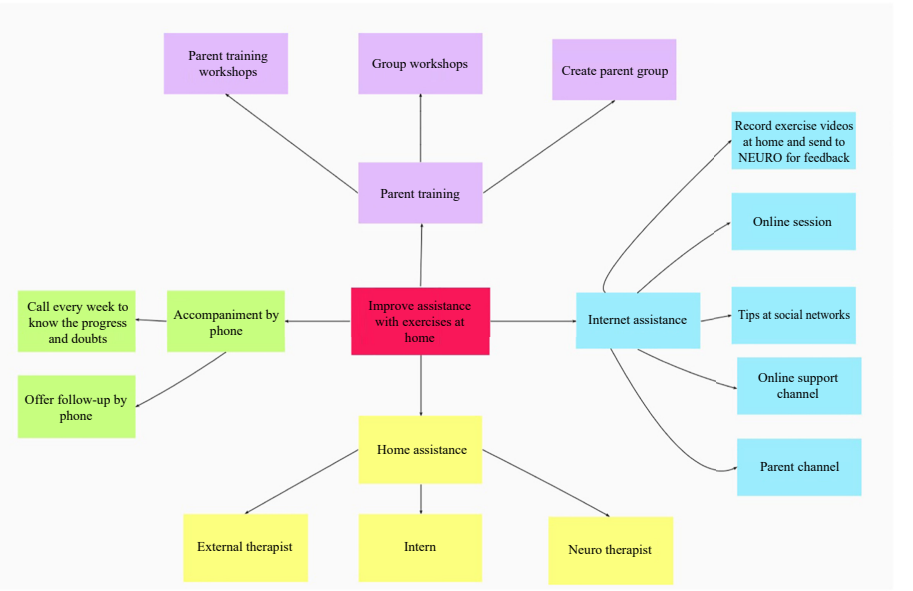

Figure 5.
The mind map of the NEURO case study acquired through DT workshops

5.2.2 Prototype. The aforementioned *Internet-based assistance* for exercises at home included the following: parents taking videos of their children doing the exercises at home and uploading them onto the NEURO platform, thus enabling the medical staff to provide feedback; online sessions for the medical staff to explain/supervise the exercises; the publication of tips in social networks (e.g. Twitter) to help customers to perform the therapy at home; an Internet channel containing videos of the exercises related to the therapy; and a discussion forum to allow parents to share their experiences regarding the exercises, tips, and other information concerning the therapies.

Moreover, these solutions were easily implemented using management software, which was appropriate for all related solutions. A screen designed to test the proposed solution is shown in Figure 6.

5.2.3 Testing. After testing the prototype software screens, the customers and staff were asked their opinions on what was good, what they liked, anything that they did not understand, and new ideas to consider. These opinions were collected in a *feedback grid* (see Figure 7), thus enabling the prototype to be improved and new ideas to arise, which might be the starting point for future solutions.

5.3 Implementation

5.3.1 Solution development. After prototype testing, the solutions were presented to NEURO's management. Since they had been active in the design process, they did not hesitate to support the implementation. During this stage, the design team oriented NEURO in order to ensure that the solutions proposed did not lose the human-centred approach, which is an integral part of SD. Table 3 summarises the before and after level I actions implemented.

5.3.2 Change management. Although the customers and staff were involved in the entire process, thus helping to ensure that the solutions would provide positive results, the process of change was not simple for NEURO; some members of staff were unable to understand the changes implemented and showed resistance to them. The design team, therefore, set up

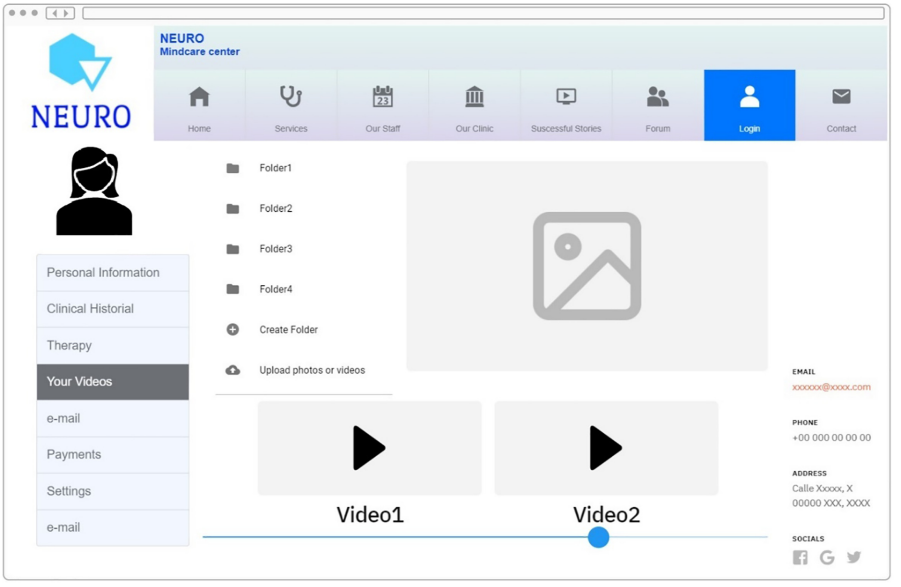

Figure 6.
Prototype of the contact screen proposed as a form of Internet-based assistance for customers in the NEURO case study

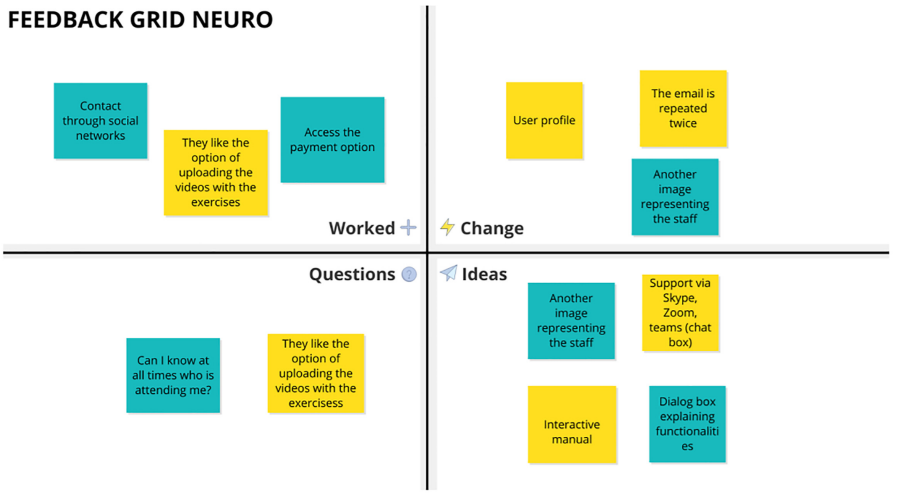

Figure 7.
Results of the feedback grid technique in the NEURO case study

presence-based online workshops to deal with these insecurities. The objective of this step was twofold: to ensure that the staff understood the reasons for solution implementation, and remind them that the solutions were focussed on the customer and that this acquired commitment should be reflected in each of the changes made.

5.4 Evaluation

Two questionnaires were used, one to evaluate the internal service quality and another to assess customer satisfaction. The questionnaires used in the survey and interviews are available in the following repository (supplementary material).

5.4.1 The survey. The survey was performed as follows:

(1) Participants: 65 clients;

(2) Medium: Google Forms and

(3) Measurement method: 5-point Likert scale.

All data were analysed with IBM SPSS Statistics for Windows, version 23.0 (Armonk, New York: IBM Corp). In order to analyse the main subjects: general customer satisfaction and difficulties in performing the treatment; we utilised descriptive statistics (i.e. frequencies, percentages, means, and standard deviations).

After processing the data from the questions regarding customer satisfaction, we observed that the customers valued the service provided by NEURO positively (see Figure 8a), with a mean of 4.30 and a standard deviation of 0.72. Although the deviation is not too low, the curve is skewed to the right, near the score limit of 5, indicating an accumulation of ratings higher than the mean, i.e. customer satisfaction was high.

This signifies that, although the field work indicated service deficiencies, the survey results were positive. The design team then endeavoured to identify the internal functioning of the organisation in order to determine whether it directly affected customer satisfaction or the organisation.

We performed calculations to assess the difficulties involved in performing the treatment/therapy: the mean was 1.70, and the standard deviation was 1.170 (Figure 8b), indicating that

Table 3.
Before and after level 1 action implementation

Perspective[1]	Aim[2]	Before[3]	Action[4]	After[5]
Human	To improve empathy treatment with parents	The medical staff explained the exercises once and a follow-up session was held every three months	Provide better explanations of the exercises to be done at home	The explanation of the exercises is now done in several ways: the medical staff conducts online sessions to explain/supervise the exercises through the web portal; videos are posted on the Neuro channel to explain the steps to perform the exercises; constant activity is maintained on social networks posting content; and a discussion forum is used to solve doubts. In addition, face-to-face follow-up sessions continue every three months
		It was suggested to the client what material would be necessary to acquire in order to carry out the therapy	Improve access to materials required for the exercises	Neuro has begun to offer the rental and sale of the necessary material to carry out the therapy
		No home assistance was offered	Improve assistance with exercises at home	The home assistance service has been implemented, either with external services or Neuro's medical staff
	To increase customer trust	Report delivery dates were not established. Neuro contacted the client until the report is prepared	Define a mechanism with which to establish the report delivery date	With the new software, each report is now tracked, and the client has access to the status of his registration. Also, it has been established that every report has to be delivered within two weeks
		Emails were answered approximately every 3 weeks and even, some clients claimed that they were not answered (got lost)	Assign a specific time to answer emails	Every email is answered within 48 h using the new software
Business	To improve the organisation	Although Neuro's aim was not formally written, employees assumed it was, *to provide personalised care for children and adults with neuropsychological conditions*	Rethink the aims and views	The objectives and mission of the organisation were redefined
		There was no organisational chart, roles or defined functions	Define the organisational chart, roles, and functions associated with roles	Now, Neuro has an organisation chart, has defined, and documented the different roles and functions of the staff
	To improve the follow-up	There was no established follow-up process	Improve the follow-up process from the initial contact	Now, every interaction between the client and Neuro is registered in the management system, allowing each case to be followed up
Technology	To improve the technological area	Although it had online presence, it was completely out of date and provided very basic information	Improve software (website, apps, etc.) using agile methodologies	At this time, they have a system to correctly manage their customers' information. Through this system, clients have organisation information, pieces of advice, and supervision. The new website is connected to the management system and is also kept up to date with useful information relevant to therapies

Note(s): [1]This column shows the SD perspective to which each improvement belongs; [2]This column shows what is intended to be achieved by implementing the improvement; [3]This column shows the situation of the company before the intervention; [4]This column shows the actions to be implemented; [5]This column shows the situation of the company after the intervention

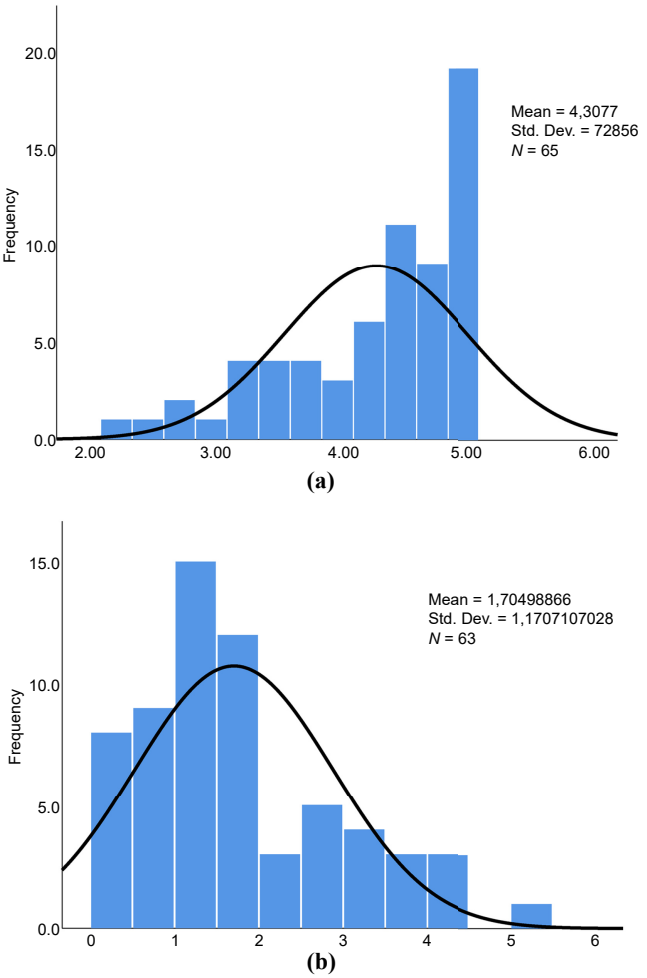

Figure 8.
Results for analyses on customer satisfaction and customer perceptions of treatment performance difficulties in the NEURO case study. (a) Customer satisfaction for NEURO (b) Customer perceptions of treatment performance difficulties regarding NEURO services

patients perceived few difficulties in performing the treatment. Nonetheless, the results also showed the need to have access to more information about performing the treatment.

5.4.2 The interview. Customer satisfaction, therefore, seemed to be positive; however, as stated by the staff, the organisation had certain internal deficiencies that hindered its proper functioning. The design team consequently conducted interviews in order to better understand the organisation. The characteristics of the interviews were the following:

(1) Participants: 11 employees (7 from the service area, 2 administrative staff and 2 managers)

(2) Medium: Google forms

(3) Measurement methods: dichotomous, discrete, and forced choice scales

This interview was structured by following the framework established in SERVQUAL (Parasuraman *et al.*, 1985, 1988), which is characterised by five dimensions: tangibility,

reliability, responsiveness, empathy, and security. All the quotations regarding these five dimensions shown below originated from the studies by Parasuraman *et al.* (1985, 1988).

(1) *Tangibility:* the degree to which the facilities, equipment, personnel and corporate identity provide properties that satisfy explicit and implicit needs with the purpose of providing the service. Its sub-characteristics are facilities, equipment, staff, and comparative identity.

(2) *Reliability:* the degree to which a service satisfies the requirement for good performance, which SERVQUAL described as the ability to perform the promised service reliably/accurately. Its sub-characteristics are business processes and organigrams.

(3) *Responsiveness:* the degree to which response times are minimised for the activities involved in the service. Its sub-characteristics are tracking mechanism, response time by email, and beginning of treatment.

(4) *Empathy:* the degree to which the personnel providing the service is involved with the reality and feelings of the users. According to SERVQUAL, NEURO provides its customers with individualised care and attention. The empathy sub-characteristics are patient care, appointment management, problem resolution, and access to superiors.

(5) *Security:* the degree to which the personnel who provide the service adequately perform their tasks. SERVQUAL defines this as the trust and credibility that employees inspire on the basis of their knowledge and attention to customers. The security sub-characteristics are roll performance, attention time availability, and availability of incentive policies for employees.

In order to measure the effectiveness of the changes implemented in NEURO, we decided to use the GOCAME strategy (Olsina *et al.*, 2013), which was defined by its authors as an integrated, goal-oriented, context-sensitive strategy focussed on the need for information. In NEURO, we applied this strategy through the MCI-SERVQUAL model (Papa *et al.*, 2020), which was conducted around the interview process.

The measurement and evaluation of the internal quality of service was carried out on two occasions: before (initial) and after (final) applying the organisational change, which made it possible to discover the impact on the internal quality of the service (see Table 4 and Figure 9).

We observed an impact of 50.46%, indicating a significant improvement in service quality after applying SD4OCh. In this case study, we did not assess customer satisfaction twice because the results were already positive from the outset, and the organisation did not consider the second measurement necessary. Although SD4OCh recommends assessing fluctuations in the income statement, NEURO showed no interest in evaluating this indicator because they prioritised aspects related to internal service quality.

	Evaluation		
	Initial	Final	Impact
Internal Service Quality	*14.13%*	*64.59%*	*50.46%*
Tangibility	5.25%	54.79%	49.59%
Reliability	1.21%	93.58%	92.37%
Responsiveness	0.00%	56.97%	56.97%
Empathy	28.18%	69.67%	41.49%
Security	35.99%	47.94%	11.94%

Table 4. Results for the analysis on internal service quality

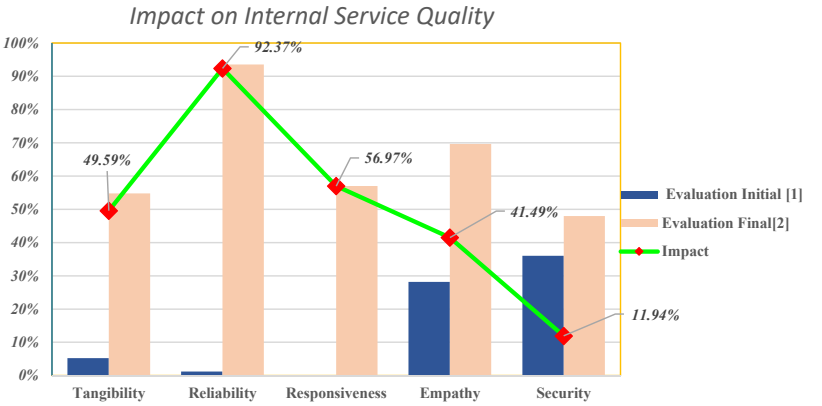

Figure 9.
Impact of organisational change on internal service quality in the NEURO case study

6. Discussion and conclusion

Practicing managers appear to make little use of available scientific evidence in making decisions or changing their organisational practices (Barends *et al.*, 2017). SD40Ch brings this gap, being grounded in SD and organisational theories, and serving in turn as a guide to practitioners.

This paper shows the development of a methodology based on SD with the intention of bringing about organisational change in SMEs. The feasibility of the proposal is demonstrated by means of its application to the real case of NEURO. Although its results cannot be generalised, the paper makes relevant contributions to theory and practice, and provides the basis on which to continue researching how to build bridges between SD theory and organisational change theory.

This focus on SMEs may provide a solution for many companies that have emerged thanks to individual enterprising professionals who confront the lack of a global view of the organisation and the tools required in order to design and manage their processes and systematically provide their consumers with a satisfactory experience.

6.1 Theoretical contributions

This paper has explored the links between SD and organisational change and proposes a methodology as a basis for this. The SD4OCh methodology proposed is based on the premise that end services and their interactions are the result of a global process of change in the organisation. It is, therefore, necessary to make explicit how those services should achieve the organisational system; the methodology consequently deals with the structure, processes and services in order to culminate in organisational change. This covers a gap in SD literature regarding complex systems and transformative interventions and their relationship with organisational change. It is facilitated a roadmap to the change management literature. It responds to the approach of Maes and Van Hootegem (2019), that consider a systems model for organisational change that includes content concepts, process concepts, and result concepts. Thus, SD40Ch facilitates a strategy for organisational change, considering structure, organisation, and SMEs for content concepts, a complete analysis of processes for process concepts, and services and organisational effects for result concepts.

The proposed methodology overcomes the limitations found as regards SD attaining organisational change (Sangiorgi *et al.*, 2019):

(1) SD often begins at the organisational periphery. SD4OCh broadens the focus by considering both the periphery and the heart of the organisation, providing a whole view.

(2) Building trust relationships for change. SD4OCh facilitates collaboration among the members of an organisation and other stakeholders, thus generating confidence.

(3) Develop transformative insights. SD4OCh builds trust in the process, generates interest and co-creates a new vision based on internal positive traits and external potential rewards. That is, it facilitates a joint-reflective process that enables learning as the main output.

SD, therefore, focusses on a transformational approach in the organisation and facilitates a guiding framework for organisational change, as has also been done by authors such as (Patrício *et al.*, 2018a; Sangiorgi *et al.*, 2019). For all of the aforementioned reasons this study has, at a theoretical level, sought to advance the understanding of the effectiveness of the adoption of SD tools by small enterprises in order to provide a picture of the current business (processes and practices) so as to facilitate the realisation of organisational change strategies in the future. Applying SD thinking may, therefore, change the means employed to develop business in order to add new value. This thinking is very useful for the organisational change in practice.

From a service research perspective, SD4OCh integrates the multidisciplinary contributions of SD and provides a framework with which to drive organisational change. Our results showed that it is possible for SD to not only relate to service innovation but also be a fundamental part of its creation, and help change organisational routines and mentality. The benefits of SD4OCh were first visible at both the service and process levels, and then rapidly scaled to internal service quality and the company's bottom line, thus significantly changing the organisation. This methodology can, therefore, support the creation of new value propositions in creative/structured environments and contribute to service innovation. This was observed in the case of NEURO.

By exploring how SD can manage organisational change, this research opens many possible pathways as regards purposefully fostering SD methodologies in a more nuanced manner in order to provide solutions in a highly changing and uncertain economic environment. In summary, it contributes to SD research because it is an innovative methodology, demonstrating that SD-based approaches can produce holistic organisational changes, affecting its internal functioning. This study, therefore, shows that service engineers can play a fundamental role in companies (Marcos *et al.*, 2020).

6.2 Managerial implications

From a practical point of view, the objective of this paper was to examine the usability of SD theories and the possibility of organisational change in SMEs. The study provides managers with support and useful and applicable tools and models through the use of a SD thinking process; it also concentrates on how it is possible to reshape and develop existing small businesses.

The study consequently provides the following knowledge for SMEs: (1) many SMEs provide excellent services, but lack the capacity to manage their organisation efficiently (Deimel *et al.*, 2009); (2) a simple analysis of the organisation can generate new business opportunities and improve processes/services; (3) SD techniques can lead to significant organisational changes focussed on customer satisfaction and internal service quality (Kurtmollaiev *et al.*, 2018), and (4) in today's market, organisations should have methodologies available to them that enable the adaptation of processes/services to current trends, in addition to improving each cycle of change. This research is, therefore, useful for SME managers/owners/decision makers, who are integral parts of organisational change (Livne-Tarandach and Bartunek, 2009), because SD4OCh can facilitate an in-depth understanding of the organisation processes and services.

Considering the changing dynamics of the current market, organisations should concentrate on constantly evolving (Pieters and Young, 2017) and endeavouring to understand their customers' experience of their services. Knowledge on this can change managers' perspectives because it entails the need for the organisation's decision-making process to be focussed on customer experience (AlHarbi *et al.*, 2016), constant innovation, and cooperation; together, these focusses can enable companies to have a customer-centric organisational structure. The SD-based SD4OCh methodology may, therefore, help managers to get closer to customer's feelings/experiences and make more customer-centric decisions.

The holistic view provided by the proposed methodology will allow SME managers to use SD to remodel the entire business, to communicate as regards the customers' wishes and expectations and to achieve the company's objectives. The SD4OCh methodology enables a good understanding of the company's current situation, the nature of the challenges it confronts and the possible impacts of those challenges. This enables it to reorient the approach of doing business in order to survive and redirect it towards attaining a good position in a highly competitive market by making changes as regards both thinking and action. This way, SD4OCh methodology facilitates the organisational change.

In SD4OCh, although services should be improved during the process, SD techniques should be used to improve the organisation as a whole. In order to ensure that this holistic perspective permeates SD4OCh, we believed that it was important to include: a stage in which to diagnose the organisation's structure, processes and services; another for innovation and change implementation, and a final one in which to measure and assess the change. We also deemed it important for a design team to guide organisations throughout the entire process.

As mentioned above, the resources of an SME are limited, and although initially the application of the proposed methodology requires an investment cost (to hire the design team or to train their own staff), this will result in greater knowledge and overall improvement of the organisation that will bring out economic benefits for SME.

In summary, SD4OCh could have a significant impact on organisations, and especially SMEs, and be considered an innovative performance tool with which to enhance customer satisfaction and organisational efficiency. These characteristics may help differentiate those companies that adopt this method from others that do not. We also had the objective of exploring the main obstacles to business progress, and of discussing all available alternatives and opportunities for those enterprises. For managers, the multidimensional and connected nature of SD approaches can be highly influential insights into the process of making sense and addressing the complex context in which they operate (Koskela-Huotari *et al.*, 2021). In fact, small business leaders should take the time to gain a thorough understanding of the processes regarding organisational change, its importance, and how it is essential for SMEs to succeed (Wang *et al.*, 2014).

6.3 Limitations and future research

The first obvious limitation of our work is the fact that we conducted only one case study to analyse SD4OCh. Since many SMEs may have difficulties similar to those found in NEURO (e.g. few resources and little formal knowledge of management) (Zehrer, 2009), it may be fruitful to conduct analyses in other settings.

Second, since the objective of SD4OCh is to impact on the entire organisation, we cannot specify only one or two tools for each stage; we have consequently provided a pool of tools for each stage. This means that the decision regarding which tool to use at each stage is left to the design team because the usability of a tool may vary according to the problem detected in the organisation.

Third, we did not conduct two measures of customer satisfaction, signifying that although the results of our case study showed the organisation had improved internally and customer

satisfaction was positive at the baseline, we did not measure the effect of SD4OCh on customer satisfaction.

Fourth, we were unable to assess income statements because the organisation's main interest was to improve internal service quality.

Finally, since the SD research field is relatively young, we see that there is a need to carry out further research in order to apply SD4OCh in other case studies in different settings, to design new quantitative tools with which to continuously measure/evaluate the changes produced by SD processes in organisations, and to measure/evaluate service quality.

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Appendix

Steps	Techniques	Objective
Initial screening	Observation	To attain a general overview of the organisation's processes and services
	Interview	To define intervention objectives
Back-office analysis	Systematic diagram	To understand how the organisation interacts with other organisations
	Organisational structure	To understand the hierarchical model chosen in order to organise the staff
	CANVAS business model	To understand the business model
	Business process model and notation	To understand the business process
	E3Value	To understand the exchange of value among actors involved in service delivery
	SBP	To visualise the relationships between different service components
Front office analysis	Interview	To analyse the organisation's internal functioning/ service quality
	Survey	To measure customer satisfaction
	Customer journey map	To understand customer experiences toward a service
Initial evaluation		To measure and evaluate the initial state of the organisation processes and services
Improvements selection	Focus group/meeting	Get the improvements list to innovate

Table A1.
Diagnosis steps and techniques

Steps	Techniques	Objective
Ideation	Using cards and check lists	To promote new lines of exploration, structure thoughts, and generate ideas. Cards may be particularly useful when the group gets stuck on a particular point or is unable to detach itself from familiar ideas
	Empathy map	To synthesise the team's collective knowledge of its users in order to come closer to a common understanding. Say, do, feel, think
	Brainstorming	To discover a large number of options regarding a particular idea/subject
Prototyping	Wireframes	To design the software/application interface To design the navigation structure To specify the requirements
	Paper prototypes	To create a prototype and test the software/interfaces using interactive models
	Theatrical methods	To model/create prototypes and play with human-human or human-digital interactions by means of theatre. This may be useful for analysis, design, prototyping, etc.
Testing	Feedback grid	To organise the comments made by users, group members, or interested parties. For example, on what is good, points to improve, and doubts
	Constructive interaction	To obtain information about user experience
	Evaluation of value	To confirm that the solutions being developed are providing the users with value

Table A2.
Innovation steps and techniques

Steps	Techniques	Objective
Solution development	Training plan	To propose formative actions aimed at improving the staff's skills/knowledge and productivity in order for the organisation to stand out in a changing and highly competitive market
	Communication plan/strategy	To define when and how the company will communicate with the target public
	Marketing plan	To plan marketing actions
	MVP	To evaluate the service, reduce losses, and accelerate its appearance on the market
Change management	Change management workshop	To help the staff/management to understand/manage changes that are occurring in the organisation. The design team helps the organisation to be continually aware of both the objectives and the approach, focussing on the consumer

Table A3.
Implementation steps and techniques

Session	Num. Participants	Time	Resources
1	3 Service engineers 2 Staff 2 Internal customers (administrative) 7 Internal customers (physicians)	3 h	- Materials pencil, paper and post-it - Places 1 meeting room - Equipment 3 laptops and 1 projector
2	3 Service engineers 2 Staff 2 Internal customers (administrative) 8 Internal customers (physicians)	3 h	- Materials pencil, paper and post-it - Places 1 meeting room - Equipment 3 laptops and 1 projector
3	3 Service engineers 2 Staff 2 Internal customers (administrative)	2 h	- Materials pencil, paper and post-it - Places 1 meeting room - Equipment 3 laptops and 1 projector

Table A4.
Back-office analysis – focus groups

Technique	Num. Participants	Time	Resources
Interview	11 staff (7 from the service area, 2 administrative staff, and 2 managers)	30/60 min	-Equipment to prepare the interview 2 laptops - Software to prepare the interview Google Forms Excel Email

Table A5.
Back-office analysis– interview

Session	Num. Participants	Time	Resources
1	1 Service engineers 2 Staff 2 Internal customers (administrative) 7 Internal customers (physicians)	5 h	- Materials pencil, paper and post-it - Places 1 meeting room - Equipment 3 laptops and 1 projector
2	3 Service engineers 2 Staff 2 Internal customers (administrative) 7 Internal customers (physicians)	5 h	- Materials pencil, paper and post-it - Places 1 meeting room - Equipment 3 laptops and 1 projector
3	3 Service engineers 10 External customers	3 h	- Places 1 meeting room - Equipment 3 laptops and 1 projector
4	3 Service engineers 10 External customer s	3 h	- Materials pencil, paper and post-it - Places 1 meeting room - Equipment 3 laptops and 1 projector

Table A6.
Front office analysis – DT workshops

Technique	Num. Participants	Time	Resources
Survey	65 clients	15 min	-Equipment to prepare the survey 2 laptops -Software to prepare the survey Excel Google Forms Email

Table A7.
Front office analysis–survey

Session	Num. Participants	Time	Resources
1	1 service engineer 2 staff 2 internal customers (administrative) 7 internal customers (physicians)	5 h	- Materials pencil, paper and post-it - Places 1 meeting room - Equipment 3 laptops and 1 projector
2	3 service engineers 10 external customers	5 h	- Materials pencil, paper and post-it - Places 1 meeting room - Equipment 3 laptops and 1 projector

Table A8.
Innovation – DT workshop

Supplementary material

The supplementary material for this article can be found online.

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