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The impact of technologies on society through NPO-social enterprise value co-creation

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The aim of this paper is to study the impact of technologies on the welfare of society through the value co-creation processes that Non-Profit Organizations (NPOs) carry out with social enterprises. Based on the literature on Cross-Sector Social Interactions, the research was aimed at evaluating to what extent certain technological variables (innovation orientation, omnichannel, and ICTs) condition the fact that an NPO, a key agent of social innovation, cocreates (programmes, projects, activities or services) with a social enterprise to improve the social impact and the achievement of the organizational mission of both entities in favour of society. To this end, a research model was developed and its main hypotheses tested with data collected from a sample of Spanish 104 NPOs that collaborate, to a greater or lesser extent, with social enterprises. The study employs partial least squares structural equation modelling in SmartPLS. The article is framed within the most current lines of research on the identification of resources, in this case technological, conditioning the impact of NPOs on the welfare of society. In this sense, this research concludes that the development of a real innovative culture by NPOs and the general use of ICTs are key factors, through the full implementation of an omnichannel strategy, in driving the development of co-creation processes that have a strong transformative impact on the well-being of society.

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Introduction

on-Profit Organization (NPO)-business collaboration, a type of cross-sector social interaction (Seitanidi and Crane, 2009; Seitanidi, 2010), has increased enormously in recent years (Murphy et al., 2015; Clarke and Crane, 2018) as an appropriate mechanism for addressing complex social challenges (Barroso-Méndez et al., 2020) by taking advantage of the joint resources of both partners and trying to make use of the particular strengths of each of them (McDonald and Young, 2012).

The types of collaboration between NPOs and business can evolve along what Austin and Seitanidi (2012a) call "the collaboration continuum". From eminently philanthropic collaborations, characterized by the unilateral directionality of the flow of resources (basically cash) from the business to the NPO, to transformational collaborations, in which a real process of value co-creation is carried out in order to generate transformational changes at the social level, being able to significantly improve the impact of such collaborations on society (Van Tulder et al., 2016). This improvement of social impact can be even more considerable in the case of partnerships between NPOs and social enterprises, to the extent that the organizational mission of the latter already includes the duality of simultaneously achieving a social purpose or cause in addition to an economic purpose (Saebi et al., 2019).

However, despite the importance of this value co-creation process, different studies have highlighted the difficulties inherent in the development of transformational collaborations (Austin and Seitanidi, 2012b, Clarke and Crane, 2018), it being necessary to improve the existing understanding of the main determinants of the co-creation process in this type of collaboration as well as the inter-relationships among those factors. However, the study of cause-effect relationships in the context of collaboration agreements between NPOs and companies has been, so far, little developed (Van Tulder et al., 2016; Barroso-Méndez et al., 2020). This may be due to the methods employed thus far by researchers, with numerous qualitative studies based on case studies (Barroso-Méndez et al., 2016).

In fact, it is necessary to turn to specialized literature on social innovation to identify the antecedent factors of this management strategy (Cajalba-Santana, 2014; Krlev et al., 2014). The first type of such factor is linked to the structural perspective and implies that the environment or institutional context could be the main conditioning element of value co-creation (Vargo and Lusch, 2016). The second type reflects an individualistic perspective linked to the school of social entrepreneurship according to which the values and characteristics of the agents involved in the collaboration would be the real drivers of the co-creation; among others organizational factors linked to NPOs' adoption of management principles and practices typical of the business environment (Maier et al., 2016). In this latter type of drivers, it can be established as a research question the impact of technologies on [...] society, the first topic of the special issue in which this paper is framed, through the value co-creation.

In this sense, the aim of this article has been to analyse the impact of different technological factors on the welfare of society through the value co-creation processes that NPOs carry out with social enterprises. Thus, its objective is to go one step further than previous related research that has assessed the impact of technological factors (Sanzo et al., 2015a) or the innovative orientation of NPOs (Valero-Amaro et al., 2021) on organisational outputs (funding and activities) and outcomes (mission accomplishment and NPO visibility) of any type of collaboration between nonprofits and businesses. Specifically, the focus of the article is to examine how technology influences the welfare of society through co-production, a key dimension of value co-

creation between partners (Bharti et al., 2015; Ranjan and Read, 2016), particularly, between NPOs and social enterprises, whose alignment of objectives and interests can enhance the transformative capacity of their collaborations.

Therefore, with this study, we hope to contribute to the literature about Cross-Sector Social Interactions in two ways. First, our research attempts to respond to calls for the development of new knowledge about collaborative agreements between NPOs and enterprises (Austin and Seitanidi, 2012a; Barroso-Méndez et al., 2016; Díaz-Perdomo et al., 2021) by constructing a model of value co-creation that identifies different technological tools of this value co-creation process as well as their different interrelationships, and analyses the role of the value co-creation on the impact of such collaborations on society (measured in terms of relevance, feasibility, effectiveness, and sustainability in society). Second, the study tries to address the need to obtain generalizable results in the field of NPO-social enterprise collaborations by applying quantitative data to validate empirically the proposed structural model. Probably, this is one of the few empirical studies that demonstrate the role of technological factors in improving the process of value co-creation of NPO-social enterprise partnerships.

The following section develops the conceptual framework and research hypotheses.

Conceptual framework and hypotheses

Relationships between business and non-profit sectors have been a constant subject of study for the last two decades (Austin and Seitanidi, 2012a; Clarke and Crane, 2018). Multiple ways of developing them are identified depending of the resources involved in the "collaborative continuum" (Austin and Seitanidi, 2012a). From purely "philanthropic" collaborations, materialised mainly by a monetary donation from a business to a NPO, to truly "transformative" collaborations in which both sides of the relationship exchange valuable resources of different kinds based "on their intention to deliver transformation through social innovation bettering the lives of those afflicted [the beneficiaries of the collaboration]" (Austin and Seitanidi, 2012a, 743).

This second transformative approach includes more advanced forms of collaboration between an NPO and business; from the joint development and implementation of socially innovative programmes to the creation of joint ventures with a dual mission (economic and social) to achieve mutually social goals for both parties in the relationship, or even the development of hybrid value chains whereby one of the actors in the relationship ends up actively participating in the value chain of the other (Wymer and Samu, 2003; Rey-García et al., 2018). In these advanced forms of collaboration, there is a high level of participation and involvement between the NPO and the business, and the exchanged resources are multiple and distinctive, leading to strong learning processes among the partners. In this type of collaborations, a value co-creation process is achieved in the relationship. This fact, in addition to the aspects here mentioned, results from a change in the mindset of the collaboration, which evolves from an "us against them" mentality to an "us" mentality (Austin, 2010; 35-37; Austin and Seitanidi, 2012a).

There have been many definitions and studies on the concept of value co-creation put forward during the first decade of this century in the framework of *Service Dominant Logic* (SDL) theory (Vargo and Lusch, 2004). Initially, in the framework of the SDL "value' is understood as something that is co-created with customers, rather than being pre-defined by providers and incorporated in their offerings of goods and services" (Edvardsson and Enquist, 2011; 535), so that the customer is a co-creator of value (Payne et al., 2008; Vargo and Lusch, 2008), or "the co-creation experience of the consumer becomes the very basis of value" (Prahalad and Ramaswamy, 2004). However, very soon a step forward is taken to define value co-creation "as the joint actions by a customer (or another beneficiary) and a service provider during their direct interactions" (Grönroos, 2012; 1520), in such a way that "co-creation is the process by which products, services, and experiences are developed jointly by companies and their stakeholders" (Ramaswamy, 2009).

There are multiple value co-creation actions or mechanisms (Saarijärvi, 2012; 382-383); from those linked to the different stages of the production process or *co-production* to those related to the different stages of new product development from a marketing perspective (co-conception, co-design, co-pricing, codistribution, or co-promotion). Bharti et al. (2015; 589) in particular, in their literature review of the concept of value co-creation, state that "co-production is one of the most important elements of value co-creation" with four key dimensions: (1) customer participation, (2) customer involvement, (3) partnership and engagements and (4) mutuality. In fact, they state that "[t]he presence of resources such as trust, strong network, members of value constellations, relationships with customer communities and the proactive use of technology, lays the foundation for an effective co-production process. Moreover, resources such as technology, relationships and networks significantly influence certain elements of the process environment, such as interaction, exchange, information sharing, communication and dialogue, and encounter" Bharti et al. (2015; 589). With a similar systematic literature review, Ranjan and Read (2016; 290) equally point out co-production (with three key dimensions: knowledge (sharing), equity and interaction), as a one of the core conceptual dimension of value co-creation.

With this background, Díaz-Perdomo et al. (2021) identify value co-creation with co-production and posit, and empirically verify, that the specific programmes, projects, activities, services, etc. that an NPO carries out with a business for social purposes must be based on the following dimensions: (1) participation of the business (providing suggestions, sharing suggestions, and collaborating) in the NPO's decision-making processes that affect the object of co-creation; (2) reciprocity, based on mutual interest; (3) participatory and dynamic learning for both parties; and (4) long-term engagement. Thus, regardless the objective of NPObusiness collaboration ("... the diversification of income sources, enhancement of publicity, brand improvement, or absorption of business-related skills..." Sanzo et al., 2015b; 382), it takes the form of the co-production of specific social initiatives to specific public or to society as a whole. In this way, the NPO-business coproduction process must reinforce the socially innovative role of NPOs, to the extent that they contribute to strengthening their orientation towards social goals (Grimm et al., 2013), developing in an effective, efficient, and sustainable way (Phills et al., 2008) a social process of collaboration with their stakeholders (Grimm et al., 2013) that leads to improvement in social behaviours or relationships with transformative impact (Wintjes et al., 2016).

It is to be expected that the contribution to social welfare of the co-creation processes undertaken by NPOs will be greater if the counterpart is a social enterprise, defined as "organizations whose purpose is to achieve a social mission through the use of market mechanisms" (Ebrahim et al., 2014, 82). Social enterprises and "[s]ocial entrepreneurs tend to follow new tendencies to create value for target communities. In this effort, they must take into account the socio-economic environment, forecasts and the uncertain future, but also efficiently manage available resources" (do Adro and Fernandes, 2022, 718). Also, social enterprises, as social purpose organizations (SPOs), "in pursuing their dual value focus [...] need to engage with a broad and diverse set of internal

and external stakeholders" (Weerawardena et al., 2021, 763), which can contribute to obviating that "beneficiaries remain marginalized during value creation processes, and thus many of their potential contributions may fail to materialize" (Le Ber and Branzei, 2010, 603). Or, in other words, if co-creation takes place between an NPO and a social enterprise, it seems more likely that the latter will enhance the impact of cross-sector partnerships through improved efficiency and effectiveness of that co-creation dimension (Van et al., 2016) insofar as its object commits not only the entity that promotes it (NPO) but also the other party in the relationship (social enterprise) to fulfilling of its dual organisational mission. This alignment of objectives and interests between the NPO and the social enterprise moves the relationship between them to the transformative state (Austin and Seitanidi, 2012a), where partners share the objective of co-creating, as to generate social innovation that disrupts existing systems.

The literature establishes three levels of analysis of the consequences of NPO-business collaboration (Kolk, 2013): (1) micro (benefits for individuals), (2) meso (organizational benefits), and (3) macro (impact on society). Austin and Seitanidi (2012b) in particular argue conceptually that when collaboration evolves towards what has been defined as value co-creation, outcomes are to be expected at all three levels outlined above, and not just at the meso or organisational level; probably "the most common focus in the literature and in the practice" (Austin and Seitanidi 2012b, 947). Díaz-Perdomo et al. (2021) take this conceptual approach a step further, demonstrating that NPO-business value co-creation has a positive and direct impact on society at the macro level, but also indirectly through the improvement of different outcome estimators at the micro and meso levels. In short, value cocreation in the context under study contributes efficiently and effectively to solving the economic, social, and environmental problems facing society today (Zainudin et al., 2020).

Consequently, and with particular reference to NPO-social enterprise relations, the following hypotheses could be posited:

Hypothesis 1 (H1). NPO-social enterprise value co-creation positively influences macro level indicators of social impact.

Van Tulder et al. (2016, 6) point out how, in general, "[p] artnership research, despite its fragmented nature, has resulted in considerable knowledge on the drivers and motivations of cross-sector partnerships". On this basis, and in accordance with the first topic that contextualises the present special (*the impact of technologies on* [...] *society*), a specific conceptual framework can then be developed on the extent to which the innovation orientation of the NPO and its materialisation through different technological supports (Information and Communication Technology – ICT- and omnichannel practices) can stimulate NPO-social enterprise value co-creation.

Innovation orientation. Innovation orientation is conceptualized by Talke et al. (2011) as two types of orientation to strategic innovation which reach the core of that innovation: one is proactive market orientation, which represents the needs of emerging and non-articulated customers, and the other is the orientation to proactive technology, which symbolizes a search for opportunities that lead companies to act in anticipation of future demand by experimenting with change, the exploitation of emerging opportunities, and the application of the latest technologies in the development of new products (Valero-Amaro et al., 2021).

Norris and Ciesielska (2019) also understand innovation orientation as a multiple construct with a focus on driving innovation-based practices and values throughout the organization primarily through four core aspects: culture, flexibility in structures, capital and knowledge capabilities, and understanding environmental dynamics with the aim of driving positive organisational performance. The degree of innovation orientation that organizations are able to maintain, especially those organizations that carry out their activity in dynamic contexts (such as NPOs), has therefore become a matter of great importance and a key factor to their attaining their objectives (Valero-Amaro et al., 2021).

For NPOs, establishing routines and dynamics that generate a culture of innovation favours the fulfilment of their organizational mission (Valero-Amaro et al., 2021), i.e., innovation orientation in NPOs has a significant impact on their beneficiaries and on the welfare of society as a whole.

Firstly, it should be noted that some studies have shown that the greater innovation orientation of a business favours the adoption and/or use of different ICTs (Barba-Sánchez et al., 2007; Alshamaila et al., 2013; Giotopoulos et al., 2017). Thus, authors such as Giotopoulos et al. (2017) have stated that the efforts of companies to be innovative, both in processes and products, promote their desire to absorb new technologies which require a greater endowment of ICTs. Along the same lines, Barba-Sanchez et al. (2007) have argued that a firm's innovation orientation directly determines the technologies that it chooses and how those technologies are leveraged to ultimately produce quality innovations leading to the attainment of higher levels of performance. Although there has been particular research into the relationship between innovation orientation and ICT adoption in a business context, in recent years innovation orientation has begun to gain prominence in the non-profit sector (Valero-Amaro et al., 2021). We therefore consider that such increased orientation by this sector will favour NPOs' adoption of different types of technologies which are fundamental for the management of the collaborative relationships that they maintain with their different stakeholders (volunteers, governments, companies, etc.) (Fu et al., 2019).

Secondly, it should be noted that the relationship between innovation and omnichannel has been studied from different perspectives, with the diffusion of innovation theory having contributed the most studies in recent years. Thus, it has been used to underpin explanations of the underlying mechanisms of customers' use of certain omnichannel attributes (Shi et al., 2020), and has been suggested as an alternative perspective from which to study the determinants of cross-channel integration (Cao and Li, 2018). Organizations with an innovation orientation are more open to changes through the adoption of new technologies, resources, talents, and/or processes (Hügel, 2019). As discussed above, innovation culture refers not only to the organization's ability to continuously transform ideas and knowledge into new products, but also to new processes or new systems to the benefit of the organization and its stakeholders (Hamidi and Gharneh, 2017; Inemek and Matthyssens, 2013). In this sense, companies in B2C contexts have faced and responded to the changing omnichannel environment by adapting their new product development processes (Gallino and Rooderkerk, 2020).

Empirical evidence suggests that innovation facilitates the transformation of industries through omnichannel (Climent et al., 2022). These changes are driven by the need to innovate faster and to better serve omnichannel customers (Gallino and Rooderkerk, 2020).

Increasingly, the need for omnichannel management to improve the relationship with stakeholders is evident in the non-profit sector (Mato-Santiso et al., 2021). And, although it is essential to stress the great complexity involved in the effective implementation of omnichannel strategies with stakeholders (Mato-Santiso et al., 2021), their correct use can be decisive in the relationship with some stakeholders such as beneficiaries. We can deduce that NPOs with a clear innovation orientation will be better able to take on these challenges and to more easily overcome these obstacles, in short, they will be more likely to integrate their multiple channels into an omnichannel strategy.

Thirdly, innovation has also been highlighted in several studies as a key antecedent of value co-creation. On the one hand, SDL has supported the relationship between innovation and value cocreation (Vargo and Lusch, 2004; Vargo et al., 2008) by arguing that innovation, among other aspects, facilitates the flow of information and knowledge among members, thus promoting their collaboration to co-create value (Cabiddu et al., 2013; Kim et al., 2018; Kim et al., 2019). More specifically, based on this perspective, different studies conducted in the service sector have proposed, and empirically validated through quantitative data, that a customer's perception of innovation in relation to an organization influences its predisposition to participate in a value co-creation process (Clauss et al., 2015; Kim et al., 2019). In the field of marketing also, different authors have supported the relationship between innovation orientation and value cocreation. Thus, Correa et al. (2015) have proposed and empirically validated that customers who present a greater innovation orientation are individuals who tend to be more interested in the value co-creation processes, in their particular study, in the co-creation of new products.

Also in B2B contexts, innovation orientation enables the organizations to create conditions in which to be more effective, allowing them to obtain critical resources that in turn can increase success in the development of new products (Amaya et al., 2022). In line with what had been pointed out by other authors (Gundry et al., 2016; Stock and Schnarr, 2016), Valero-Amaro et al. (2021) highlight the importance of an innovation culture in a non-profit context, with innovative orientation improving the success of new projects.

If innovation orientation favours the successful introduction of new products (Narver et al., 2004, Zhang et al., 2015, Amaya et al., 2022) and marketing capabilities (Theodosiou et al., 2012), one can assume that entities more oriented towards innovating respond more quickly and effectively to changes or demands in their environment, generating competitive advantages that positively impact their performance. In this sense, innovation orientation as a measure of the innovative component that resides in a company's culture is a relevant variable with which to measure the impact that innovation can generate (acting as an antecedent) on value co-creation in the field of social alliances.

Therefore, based on the literature review, we posit the following research hypotheses:

Hypothesis 2 (*H*2). Innovation orientation directly and positively affects ICTs in NPO-social enterprise relationships.

Hypothesis 3 (H3). Innovation orientation directly and positively affects omnichannel in NPO-social enterprise relationships.

Hypothesis 4 (H4). Innovation orientation directly and positively affects value co-creation in NPO-social enterprise relationships.

Information and communication technologies. In recent decades, different researchers have conceptualized the term Information and Communication Technology (ICT). In this sense, Sarkar (2012) mentioned that ICTs are the varied collection of technological gear and resources which are made use of to communicate. Other authors (Troisi et al., 2019; Polese et al., 2022) added that ICTs are tools that increase the sharing of resources, and that they serve to facilitate and improve efficiency in daily activities (Judi et al., 2013), thus reflecting the major role they play in organizations' day-to-day functioning.

Indeed, different studies focused on the analysis of ICTs in different sectors have shown that the advances in ICTs have enabled a shift from multichannel to omnichannel (Mato-Santiso et al., 2021; Shi et al., 2020; Martins et al., 2020; Lee and Kim, 2021; Herrero-Crespo et al., 2022).

In this sense, in the business sector, authors such as Shi et al. (2020) have stated that the advances in ICTs have led to the revolution in the retail sector by integrating multiple available channels to enhance a seamless customer experience, promoting a shift towards the omnichannel business. Along the same lines, Lee and Kim (2021) state that the development of ICTs has enabled the shift towards an omnichannel management, which is taking its place as the major service used in the online shopping market.

Although omnichannel management has shown especial relevance in retailing, marketing, and information systems research, in recent years it is also being applied to other sectors. It is especially necessary to highlight the prominence that this management is taking on in the non-profit sector. Nowadays, NPOs are trying to achieve the coordination and integration of the multiple channels that they use in order to ensure that their key stakeholders (volunteers, partners, etc.) do not feel any difference between them when they use them (Weiland, 2016). The advances in ICTs are crucial for this purpose (Mato-Santiso et al., 2021).

Additionally, other work focused on the study of ICTs, mainly in business-customer contexts (Polo et al., 2014; Martinez-Cañas et al., 2016; Zhang et al., 2020; Carranza et al., 2021; Polese et al., 2022) and in business-to-business relationships (Tsou and Hsu, 2015; Breidbach and Maglio, 2016; Heim et al., 2018; Heim et al., 2019; Chen, 2020), has shown that ICTs are key elements in facilitating value co-creation through the increased collaboration and interaction that occurs between the participating members of the relationship. Thus, on the one hand, in relationships between businesses and customers, Martinez-Cañas et al. (2016) have mentioned that ICTs have facilitated both social interaction and virtual communities, aspects that significantly improve value cocreation processes. In this line, Zhang et al. (2020) have mentioned that, through ICTs, specifically through the use of social networks, companies are pursuing value co-creation strategies in virtual spaces by creating profiles on different social networks (Facebook, Instagram, etc.) that act as on-line cocreation communities, where consumers can interact with companies and express their opinions or creativity, thus improving their participation and relationship with those companies. And, on the other hand, in business-to-business relationships, different authors have argued that ICTs facilitate the process of value co-creation by improving, among other aspects, the interaction between partners (Tsou and Hsu, 2015; Chen, 2020) due to the development of new communication mechanisms (Chen, 2020), and to the characteristics of the shared information being of higher quality (Tsou and Hsu, 2015) and more transparent (Chen, 2020).

Besides these contexts, researchers such as Foroudi et al. (2019) have also shown that, in university-student relationships, the adoption of ICTs by universities has a positive impact on students' value co-creation behaviour. Likewise, in hospital-patient relationships, Lee (2019) has shown that the adoption of different types of ICTs motivates hospitalized patients to participate in the value co-creation process through the care service.

With these antecedents, we consider that, in the collaborative relationships between NPOs and social enterprises analysed in this article, these non-profit entities' adoption of ICTs will also greatly favour the enterprises' value co-creation behaviour.

Therefore, based on the literature review, we propose the following research hypotheses:

Hypothesis 5 (H5). ICTs directly and positively affect omnichannel in NPO-social enterprise relationships.

Hypothesis 6 (H6). ICTs directly and positively affect value cocreation in NPO-social enterprise relationships.

Omnichannel. As anticipated, the omnichannel concept emerged in the framework of the digital transformation of companies linked to the retail sector (Kuksov and Liao, 2018; Verhoef et al., 2015; Viejo-Fernández et al., 2020). It has been defined "as the synergetic management of the numerous available channels and customer touchpoints, in such a way that the customer experience across channels and the performance over channels is optimized" (Verhoef et al., 2015, 176).

Although this strategy is associated with the management of relationships with commercial clients, it represents a concept that can be very useful for managing the relationships that any type of organisation (for-profit or non-profit) may establish with other relevant stakeholders (Grinstein and Goldman, 2011; Payne and Frow, 2017). In the case of NPOs for example, they may seek through this strategy that their interaction with the business with which they cooperate in the fulfilment of their social mission is carried out through offline and online channels in an interchangeable and satisfactory way. This strategic collaboration could contribute to developing new NPO-specific managerial capabilities and affective links, as well as stimulating NPO social innovation in order to ensure the organization's long-term survival (Álvarez-González et al., 2017). Therefore, this approach would make it possible to go further than the present situation "of the existing studies on nonprofit stakeholder relationship marketing tend to focus on the advantages or usefulness of a specific channel/tool, rather than on how to manage multiple channels together with a common strategy to enhance the relationships with different stakeholders" (Mato-Santiso et al., 2021, 11).

Within the scope of the present study, NPO-social enterprise value co-creation, it can be understood that if both parties develop an omnichannel journey in the relationships they maintain in the design and implementation of projects, programmes, activities, or services in which the co-creation materializes, it will have a positive impact on their social impact, in line with what Van Tulder et al. (2016) have stated. With this premise, it is reasonable to think that the NPOs will be firmly committed to co-creation to the extent that the detailed sequence of interactions, both offline and online (through the different digital technologies), that take place along the co-creation process. This journey, by analogy to what has been generally observed in the "customer journey" (Anderl et al., 2016; Lemon and Verhoef, 2016; Verhoef et al., 2015), should include all the contact points and channels that precede (initial consideration and evaluation), go along with (interaction), and follow the cocreation relationship. (Mato-Santiso et al., 2021).

Accordingly, on the basis of this approach, it is possible to hypothesize:

Hypothesis 7 (H7). Omnichannel directly and positively affects value co-creation in collaboration agreements between NPOs and social enterprises.

Therefore, the conceptual model proposed for the present research is the following (Fig. 1):

Materials and methods

Data collection. In order to test the conceptual model, NPOs were used as unit of analysis for several reasons. First, NPOs usually have more knowledge than the business with which they collaborate regarding the degree to which co-creation between the two entities can contribute to social impact on the communities



Fig. 1 Conceptual model. The impact of technologies on society through NPO-social enterprise value co-creation.

in which they take place (Díaz-Perdomo et al., 2021). Second, there has been a consensus that co-creation is a form of social innovation (Ramaswamy, 2009) and that NPOs have an advantageous position as social innovators (Anheier et al., 2019). And third, in terms of co-creation specifically with social enterprises "the existence of [...] approaches that highlight a relationship between entrepreneurial behaviour and NPO performance, the creation of social value and the entrepreneurial orientation of NPO that triggered the emergence of hybrid organizations: social enterprises" (do Adro and Fernandes, 2022, 704).

A specific census was carried out for the research including Spanish NPOs that potentially collaborated, or had collaborated, with social enterprises in the joint development of programmes, projects, activities, services, etc. for social purposes. This ad hoc census was prepared for convenience in the absence of an equivalent public census, utilizing multiple secondary information sources. These sources encompass private directories of NPOs, social enterprises or social innovations, crowdfunding platforms, awards for social innovations, social entrepreneurship transformation projects, social organizations, as well as networks and forums associated with these types of organizations. In particular, around 20 data sources were used, that can be classified into the following categories: (1) directories of socially innovative organizations, (2) directories of NPO associations and social or social/solidarity-based economy enterprises, (3) crowdfunding solidarity platforms, (4) awards for innovation, entrepreneurship, or social transformation, (5) platforms or networks for entrepreneurship or social innovation, and (6) other available databases of previous studies in the field of Spanish NPOs. In total, an initial census of 497 NPOs was drawn up.

To generate the sample, we adhered to the Tailored Design Method (Dillman et al., 2014), which emphasizes the importance of establishing trust with respondents by ensuring that the expected benefits of their participation outweigh the costs. In order to encourage their involvement in the survey, we contacted them by phone and supplied them with comprehensive information about the study, including the promise of receiving an executive summary of the survey's key findings. After that, to each of these NPOs was sent, via e-mail, access to a structured online questionnaire. The recipient was the person in charge of the daily management and/or recurrent decision making of the organization. The questionnaire was structured as follows: after several questions related to the technological antecedents of the co-creation process (innovation orientation, ICTs, and omnichannel), a dichotomous question was included to identify those NPOs that collaborated, or had collaborated in the last 3 years, with a social enterprise in the joint development of programmes, projects, activities, services... for social purposes. If so, a succession of batteries of items were proposed to assess the extent to which the object of co-creation conformed to the critical dimensions underlying this concept.

222 valid surveys (sample error of $\pm 4.5\%$ at a 95% confidence level) were obtained between December 2021 and April 2022, of which 104 confirmed that they co-created, or had co-created with a social enterprise for social purposes. In order to assess the possible existence of non-response bias in the sampling, two groups of responses were compared. The first consisted of early respondents who returned their response after a single contact. The second included those respondents whose data was obtained later with an extra effort (call or online reminder). Estimation with a two-sample (independent) t-test revealed that there were no statistically significant differences between the two groups of respondents.

Measurements. All the variables of our research model were measured by adapting pre-validated scales in the existing literature, mainly in the context of collaboration agreements. The items of each variable (see Appendix) were measured on a 7-point Likert scale (from total disagreement to total agreement).

To evaluate NPO-social enterprise co-creation, the scale of Díaz-Perdomo et al. (2021) was used. This scale, structured according to the four critical dimensions of the concept (participation, reciprocity, learning, and engagement), was generated in accordance with the methodological recommendations of Churchill (1979) and Netemeyer et al. (2003), being valid and reliable for assessing the co-creation of value between an NPO and a generic business. The items for the participation and reciprocity dimensions were generated from Bharti et al. (2015), and those corresponding to the learning dimension from Sanzo et al. (2012). Finally, the engagement dimension was obtained from Vivek et al. (2014).

To assess the extent to which the NPO adopts an omnichannel strategy when collaborate with the social enterprise, the systematic literature review carried out by Mato-Santiso et al. (2021) on how NPOs manage multi-stakeholder relationships through multiple channels was used as referent. Respondents were asked to rate the extent to which the social enterprise can contact interchangeably with the NPO through traditional (offline) or online channels, as well as how such interaction occurs in terms of service delivery, channel integration and synchronization, access to information, corporate identity, communication tools, and principles that govern the NPO management. For the innovation orientation, a specific scale was used adapted to the nonprofit context and validated by Valero-Amaro et al. (2021), based on previous research by Chen et al. (2010), Gundry et al. (2016), and Hurley and Hult (1998). The degree to which the NPOs use ICTs was evaluated using as measurement scale that developed and validated by Sanzo et al. (2015a), based on Tippins and Sohi (2003).

Finally, assessment of the social impact of co-creation was based on the work of Sanzo et al. (2015a) and Diaz-Perdomo et al.

(2021) on the macro (society) consequences of NPO collaboration with a business. With that background, respondents were first asked to indicate which Sustainable Development Goal (SDG) was primarily linked to the object (programme, project, activity, service) of co-creation. Secondly, taking into account the selected SDG, they were asked with 4 items to evaluate the co-creation with regard to its relevance, feasibility, effectiveness, and sustainability in society.

In designing the model, the following decisions were made about the nature of the constructs. The co-creation of value was modelled as a second-order composite (Henseler, 2017; Bollen, 2011; Bollen and Bauldry, 2011) which can be estimated in Mode A (Sarstedt et al., 2016; Henseler et al., 2014), i.e., a composite whose indicators can be expected to present a significant intercorrelation. The co-creation of value is made up of 4 dimensions: commitment, learning, participation, and reciprocity. These dimensions were also modelled as composites in Mode A, like the rest of the variables in the model (innovation orientation, omnichannel, ICT use, and social impact).

PLS analysis. In our study, we used the Partial Least Squares (PLS) statistical technique to examine the proposed research model. The selection of PLS was based on the following reasons: (1) the presence of composite constructs in the model design (Rigdon et al., 2017; Sarsted et al., 2016), with PLS being a method specifically designed for analysing such constructs, (2) the predictive nature of the study, as recommended by Henseler (2018) and Henseler et al. (2016), supports the use of PLS instead of confirmatory analysis, which typically involves the utilization of covariance-based methods (CBSEM); and (3) PLS demonstrates greater robustness in handling multicollinearity and managing incorrect model specifications (Cassel et al., 1999). Therefore, PLS is a more suitable technique for analysing new models, whereas CBSEM is better suited for confirming existing models.

The utilization of PLS also offers several advantages, including: (1) increased statistical power due to the estimation of fewer parameters, which is advantageous when dealing with structural models with small sample sizes (Chin and Newsted, 1999; Reinartz et al., 2009); (2) it does not assume normality in the data distribution (Chin, 2010); and (3) it resolves the issue of factor indeterminacy that arises in CBSEM, as PLS extracts scores for the factors or latent variables of the model.

The software used for the analysis was SmartPLS version 4.0.9 (Ringle et al., 2022).

PLS results

Measurement model. To study the individual indicators reliability, it was considered that the requirement established by Carmines and Zeller (1979) is excessively strict given both that the present investigation was carried out in a field in which there is no previous experience and that some scales had been designed expressly for this study (Chin, 1998; Barclay et al., 1995). Other authors also disagree with the Carmines & Zeller's criterion, and propose eliminating just those items with especially low loadings since some indicators can be retained even if their λ does not reach the required value of 0.707 as long as this contributes to improving other aspects of the validity of the scales, leaving the decision on whether to eliminate an indicator to situations where its loading is very low, for example below 0.4 (Hair et al., 2011). Taking all of this into account, it was decided that those indicators whose loading is greater than or equal to 0.650 should be kept. This criterion meant the elimination of three items (OC_3, OI_1, and OI_2) in the validation process of the first-order model.

Composite reliability was analysed through the composite reliability coefficient (CR or Rho_c), the CR confidence interval, and the Rho_a coefficient. In all the cases, the CR value was greater than 0.7, so it can be affirmed that there is compound reliability in all the first-order constructs. With regard to the CR confidence interval, this non-parametric test was calculated by bootstrapping with 10,000 samples. The suitability of composite reliability will be given by determining that the CR (Rho_c) is significantly greater than 0.7 and less than 0.95 (Hair et al., 2019). This test was used for all the latent variables. Analysing the Rho_a coefficient (Dijkstra and Henseler, 2015) left no doubt about the internal consistency of any construct, since in all cases the value was above 0.7.

The convergent validity expresses to what extent the set of indicators of a scale represents a single underlying factor, showing its probable one-dimensional nature (Henseler et al., 2009). The AVE (average variance extracted) parameter is the main indicator of convergent validity and is required to be greater than or equal to 0.5 for all the constructs (Fornell and Larcker, 1981), a condition amply fulfilled in this model in all cases.

Once the first-order measurement model had been refined, the second-order model was constructed and validated from the standardized scores of the value co-creation dimensions. In this case, no item was eliminated, and the values of internal consistency and convergent validity reached were optimal for all constructs. All the data of the reliability and convergent validity analysis are given in Table 1.

The analysis of the second-order model measurement instruments finished with the evaluation of the discriminant validity. Together with the observation of possible cross-loadings, the criteria used to assess discriminant validity were that of Fornell and Larcker (1981) and the HTMT (heterotrait-monotrait) ratio together with the latter's confidence interval. Table 2 lists the data for these parameters. The HTMT analysis showed there to be no overlap or convergence in the relationships between constructs, and the Fornell & Larcker matrix revealed no problems of discriminant validity.

Structural model. Table 3 shows the results of the analysis of the structural model. This analysis involved the following steps: (1) analysis of multicollinearity, (2) analysis of the model's explanatory power, (3) study of the predictive relevance, (4) analysis of the path coefficients and their statistical significance, and (5) study of the model's goodness-of-fit.

The constructs' VIF (variance inflation factor) coefficients indicated that there was no multicollinearity between variables, which is necessary to be able to evaluate the model's goodness, with in no case the value of this multicollinearity statistic reaching 3.

The R^2 coefficient of the social impact variable was 0.617 (adjusted R^2 : 0.613). This indicates that the model manages to explain 61.7% of the variance of the dependent variable, and thus has a moderate explanatory capacity (Chin, 1998), although very close to the value that would imply high explanatory capacity. The R^2 coefficient of the rest of the endogenous variables is also given in the Table 3, as well as their decomposition.

The Q^2 coefficient, which determines the predictive relevance of the model, reaches positive values in all cases. This confirms the existence of predictive capacity, which was also of medium relevance for the co-creation of value variable and for the endogenous social impact variable (with a value very close to high relevance).

With respect to the causal relationships, involved in the model's relational hypotheses, all the path coefficients were positive in value, implying that there is a positive relationship between all the variables of the model. From analysing the significance of the path coefficients by bootstrapping with 10,000 samples, it can be stated that all except those referring to H4 and H6 were significantly different from zero

Table 1 Measurement model results.								
CONSTRUCT/Dimension/INDICATOR	Average	S.D.	Loading (λ)	CR	CR Int _{5%}	CR Int _{95%}	Rho_a	AVE
INNOVATION ORIENTATION				0.878	0.845	0.903	0.844	0.592
IO_3	6.183	1.063	0.786					
IO_4	6.365	0.844	0.832					
IO_5	6.058	1.008	0.675					
IO_6	5.962	1.009	0.787					
IO_7	5.423	1.158	0.760					
ICT				0.892	0.852	0.918	0.873	0.623
ICT_1	5.712	1.238	0.848					
ICT_2	4.923	1.714	0.732					
ICT_3	4.865	1.824	0.785					
ICT_4	5.269	1.436	0.761					
ICT_5	5.558	1.537	0.815					
OMNICHANNEL				0.928	0.901	0.948	0.911	0.648
OC_1	6.279	1.348	0.738					
OC_3	5.029	1.784	0.762					
OC_4	4.942	1.946	0.802					
OC 5	5.596	1.590	0.798					
OC_6	5.654	1.736	0.871					
OC 7	5.596	1.724	0.879					
	5.971	1.252	0.776					
VALUE CO-CREATION				0.949	0.930	0.962	0.934	0.823
Engagement			0.921	0,965	0.952	0.973	0,963	0.796
ENG 1	5.625	1.588	0.826					
ENG 2	6.096	1,156	0.911					
ENG 3	6.000	1.217	0.904					
ENG 4	5.885	1.382	0.934					
ENG 5	5.817	1.269	0.951					
ENG 6	5.788	1.356	0.950					
ENG 7	5 173	1.826	0.753					
Learnina			0.846	0.951	0.931	0.966	0.938	0.796
IFARN 1	5 635	1 4 2 1	0.889	•••••				
IFARN 2	5 327	1.596	0.911					
IFARN 3	5.510	1.387	0.903					
IFARN 4	5.038	1454	0.897					
LEARN 5	5 154	1460	0.861					
Participation	5.15 1	1.100	0.912	0.954	0.931	0.971	0.933	0.874
P 1	5 615	1,430	0.939	•••••				
P 2	5 500	1.130	0.951					
P 3	5 385	1546	0.915					
Reciprocity	3.303	1.5-+0	0.948	0 946	0 929	0 958	0 939	0 777
RF 1	5 135	1563	0.771	0.740	0.727	0.750	0.757	0.777
RE 2	5 567	1.305	0.924					
RE 3	5 375	1.440	0.924					
PE A	5 510	1.545	0.010					
DE 5	5.894	1.454	0.912					
ςοριαι ΙΜΡάρτ	5.074	1.200	0.075	0 011	0.885	0.933	0 874	0 710
	5 708	1 2 2 1	0.858	0.211	0.005	0.755	0.074	0.719
	5 856	1.201	0.000					
	5.650	1,007	0.000					
	5.310	1.3/3	0.010					
	5.700	1.222	0.000					
In "bold", the reliability and convergent validity parameter	ers of the main con	nstructs of the r	model; in "bold italic", th	ne reliability and	convergent validity	parameters of the v	alue co-creation	construct

at a confidence level of 99%. Therefore, all the research hypotheses were accepted at that level of confidence except for Hypotheses 4 and 6. The model was therefore not able to find that there was a significant relationship between either innovation orientation and co-creation of value or the use of ICTs and the co-creation of value.

Finally, the model's goodness-of-fit indicators were favourable and indicated that the model correctly fits the data of the study. The SRMR (standardized root mean square residual) was 0.075, being favourable as it was below 0.08. Not only did the goodness indicators present valid values, but the bootstrap-based nonparametric goodness-of-fit tests (d_ULS and d_G) also allowed it to be concluded that the model presents a good fit. **PLS predictive power**. The first approximation to determine the model's power to predict the behaviour of the dependent variables was extracted from the Q^2 coefficient. This parameter confirmed that there was predictive capacity since all the coefficients were greater than zero (Hair et al., 2019), with medium predictive relevance in the cases of social impact and co-creation of value.

Subsequently, the out-of-sample predictive power was measured with the PLS Predict tool (Shmueli et al., 2016), generating 3 sections. The data, which are given in Table 4, show the model to have predictive capacity for all of its items, understanding that this capacity is present when the difference between the prediction error of this model (PLS) and that of a rival model

Table 2 Measurement model: discriminant validity.								
	ІСТ	SI	10	OMNIC	vcc			
Fornell-Larcker Criterion								
Information and	0.789							
Communication								
Technology (ICT)								
Social Impact (SI)	0.468	0.848						
Innovation Orientation	0.457	0.430	0.770					
(10)								
Omnichannel (OMNIC)	0.464	0.659	0.454	0.805				
Value Co-Creation	0.400	0.785	0.425	0.670	0.907			
(VCC)								
Heterotrait-Monotrait Ratio	(HTMT) Ci	riterion						
SI ↔ ICT	Original	HTMT	Int _{5%}	HTMT Ir	It _{95%}			
IO ↔ ICT	0.524	0.366		0.673				
IO ↔ SI	0.520	0.391		0.658				
OMNIC ↔ ICT	0.496	0.314		0.691				
OMNIC ↔ SI	0.506	0.343		0.668				
OMNIC ↔ IO	0.732	0.612		0.834				
VCC ↔ ICT	0.507	0.345		0.664				
VCC ↔ SI	0.432	0.262		0.601				
VCC ↔ IO	0.866	0.805		0.922				
VCC ↔ OMNIC	0.477	0.308		0.636				

(LM) is negative. The model has high predictive capacity in all of its indicators, as well as predictive capacity of the latent variables. With this, it can be affirmed that the model is valid for prediction of the behaviour of the co-creation of value in social collaborations as well as its impact on the outcomes of the association.

Discussion

In general, the proposed model achieves a good fit based on the data obtained, and largely supports the research hypotheses that were formulated. In this section, the results will be discussed for each hypothesis and compared with those from other studies in the literature.

As already mentioned, H1 is supported by the findings, highlighting the positive impact of NPO-social enterprise value cocreation on social impact, which explains 61.7% of its variance. Therefore, this result demonstrates that when the value co-creation processes promoted by NPOs are carried out in collaboration with social enterprises, they have a very high impact on society in the terms indicated above (relevance, feasibility, effectiveness, and sustainability). It is also interesting to highlight that this impact is even greater than that found in similar processes carried out with commercial enterprises. Thus, for example, while in the same context (NPOs and Spanish enterprises) the effect of co-creation on macro outcomes (society) studied by Díaz-Perdomo et al. (2021) gave $\beta = 0.287$ for the case of commercial enterprises, in the current research this parameter was $\beta = 0.785$, with a 61.7% of variance explained with the dependent variable (social impact). This can be explained by the dual nature of social enterprises. Specifically, the prevalence of a social objective in these enterprises over a merely economic one can favour the alignment of both organizations (NPO and social enterprise), and hence a certain synergistic effect, in fulfilling their respective organizational missions through the cocreation of projects, programmes, activities, or services, and thus have a real impact on society.

Contrary to our expectations, with respect to the main antecedents of the value co-creation, H4 and H6 are not supported. Innovation orientation and ICTs only predict 5.5% and 2.9%, respectively, of the variance of value co-creation, this being the main reason why these constructs cannot be considered to be important determinants to explain this co-creation process. This contrasts with the arguments presented by Borzaga and Boldini, 2012 or Anheier et al., 2019, according to which by adopting a real innovative culture, the NPO would itself stimulate, directly or indirectly by its use of ICTs, the value co-creation. Nevertheless, there was empirical support for H7, which represents the possible influence of omnichannel on value co-creation. This is in line with other research studies (Anderl et al., 2016; Lemon and Verhoef, 2016; Verhoef et al., 2015) which have argued that this factor is a good predictor of value co-creation, in the present case explaining 38.7% of its variance. Moreover, this result seems to validate the perception of Mato-Santiso et al. (2021, 11) that "underscoring the high complexity entailed in effectively implementing omnichannel strategies with stakeholders [in the NPO] is fundamental".

In addition, in relation to the key determinants of the omnichannel, our results support H3 and H5, demonstrating the influence of innovation orientation and ICTs on this construct, respectively. These results are consistent with the suggestions made by Amaya et al. (2022), Foroudi et al. (2019), and Lee (2019), among others, according to which both factors are fundamental for improving the development of an omnichannel strategy in an NPO, explaining similar percentages of its variance, specifically 13.9 and 15% of the same, respectively. These findings also confirm the importance of innovation orientation in the nonprofit sector (Valero-Amaro et al., 2021), and the fundamental role of the ICTs in these types of organizations (Sanzo et al., 2015a, 2015b), as essential tools for the management of collaborative relationships that NPOs maintain with their different stakeholders (volunteers, governments, companies, etc.), through different communication channels (Fu et al., 2019).

Therefore, it can be noted that while innovation orientation and the adoption of ICTs do not have a direct effect on value cocreation, these variables influence the process of co-creation by acting as precursors of an omnichannel strategy. This pathway represents a potential future direction or perhaps a current area of research in the field of the NPO (Mato-Santiso et al., 2021).

Finally, our results support H2, highlighting the positive impact of innovation orientation on the adoption of ICTs, explaining 20.9% of its variance. This result confirms the key idea supported by different authors in other contexts (Barba-Sánchez et al., 2007; Alshamaila et al., 2013; Giotopoulos et al., 2017), according to which the efforts of organizations to be innovative stimulate their desire to absorb new technologies, which requires a greater endowment of ICTs. In this sense, this fact allows us to affirm that the link existing between innovation orientation and ICTs also exists in NPO-social enterprise relationships, which helps strengthen the approach of our work.

Conclusions and contributions. The aim of this study was to develop and empirically validate, through quantitative data, a research model of value co-creation within the NPO-Business literature, as to introduce new research avenues in a context where the majority of the research is qualitative, or case-study based. Specifically, the article focuses on incorporating insights derived from extensive research on Cross-Sector Interactions, with the aim of analysing the impact of different technological factors on the welfare of society, through the value co-creation processes that Non-Profit Organizations (NPOs) carry out with social enterprises.

The empirical validation of the proposed model, by employing partial least squares structural equation modelling (Ringle et al., 2022) has allowed us to complement the suggestions offered by various authors regarding the main direct factors influencing value co-creation, and consequently, of the improvement of social impact. In their study, Bharti et al. (2015) identified the management structure, the interaction with the environment through relational norms, and the organizational resources as

Table 3 Effects on endoge	nous variables and s	structural model	results.				
VIF of the structural model (Criterion: <3)						
$\begin{array}{c} ICT \leftrightarrow OMNIC \\ ICT \leftrightarrow VCC \\ IO \leftrightarrow ICT \\ IO \leftrightarrow OMNIC \\ IO \leftrightarrow VCC \\ OMNIC \leftrightarrow VCC \\ VCC \leftrightarrow SI \end{array}$							1.264 1.412 1.000 1.264 1.395 1.407 1.000
Effects on endogenous variab	les	Adjusted R ²	Q ²	Path Coeff.	Correlation	Variance	explained (%)
Information and Communication IO \rightarrow ICT Social Impact (SI) VCC \rightarrow SI Omnichannel (OMNIC) ICT \rightarrow OMNIC IO \rightarrow OMNIC Value Co-Creation (VCC) OMNIC \rightarrow VCC IO \rightarrow VCC ICT \rightarrow VCC	on Technology (ICT)	0.201 0.613 0.275 0.456	0.117 0.426 0.180 0.370	0.457 0.785 0.324 0.305 0.577 0.130 0.073	0.457 0.785 0.464 0.454 0.670 0.425 0.400	20.9 20.9 61.7 61.7 28.9 15.0 13.9 47.1 38.7 5.5 2.9	
Causal analysis	Path coefficient	P Valu	e	Path Int _{5%}	Path I	nt _{95%}	Support
H1: VCC \rightarrow SI H2: IO \rightarrow ICT H3: IO \rightarrow OMNIC H4: IO \rightarrow VCC H5: ICT \rightarrow OMNIC H6: ICT \rightarrow VCC H7: OMNIC \rightarrow VCC	0.785** 0.457** 0.305** 0.130 ns 0.324** 0.073 ns 0.577**	0.000 0.000 0.005 0.099 0.003 0.232 0.000		0.726 0.348 0.099 -0.033 0.136 -0100 0.391	0.841 0.588 0.490 0.298 0.528 0.226 0.777		YES YES NO YES NO YES
Size of effects measurement	(f ²)						
$\begin{array}{l} \mbox{ICT} \rightarrow \mbox{OMNIC} \\ \mbox{ICT} \rightarrow \mbox{VCC} \\ \mbox{IO} \rightarrow \mbox{ICT} \\ \mbox{IO} \rightarrow \mbox{OMNIC} \\ \mbox{IO} \rightarrow \mbox{VCC} \\ \mbox{OMNIC} \rightarrow \mbox{VCC} \\ \mbox{VCC} \rightarrow \mbox{SI} \end{array}$			0.117 0.007 0.264 0.104 0.023 0.448 1.609		(Small) (Small) (Moderate) (Small) (Small) (Large) (Large)		
Goodness of fit				Int _{95%}	b		Int _{99%}
SRMR d_ULS d_G Chi-square NFI	0.0 1.81 0.7 355 0.82	75 9 39 .336 29		0.080 2.064 1.077			0.089 2.557 1.240
** $p < 0.05$; ns = p value not significant.							

drivers for co-creation. In a subsequent study, Díaz-Perdomo et al. (2021) provided empirical evidence showing that institutional factors, the market orientation of NPOs, and their cooperative management structure, which can be assimilated by the enterprises, have a significant influence on NPO-business value co-creation, through the establishment of relational norms. However, there was no prior evidence regarding the role of technological factors in co-creation. Our research has shed light on this topic by empirically corroborating that the development of a real innovative culture and the general use of ICTs are key factors, through the complete development of an omnichannel strategy, in driving the development of co-creation processes, that have a strong positive impact on the well-being of society.

In this sense, the results of our study have relevance for both academics and practitioners. From a theoretical perspective, it makes several contributions to existing knowledge. First, it responds to previous calls for theory development in NPObusiness collaboration research (Austin and Seitanidi, 2012a; Barroso-Méndez et al., 2016; Díaz-Perdomo et al., 2021) by contributing a quantitative perspective associating value co-creation with social impact. Second, it also contributes to the literature by analysing the suitability of the technological factors for studying the value co-creation of NPO-social enterprises partnerships. Third, its findings contribute uncommonly generalizable results in NPObusiness research, adding new knowledge to the recently developed body of quantitative studies that empirically validate the factors influencing partnership outcomes and impact (Murphy et al., 2015; Sanzo et al., 2015a, 2015b; Barroso-Méndez et al., 2016; Barroso-Méndez et al., 2020; Díaz-Perdomo et al., 2021).

In addition to the above relevant implications, this research generates several recommendations to those NPO managers who are responsible for the development of collaborative relationships with

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Table 4 Summa	ry of prediction	parameters and	l predictive power.					
Construct prediction summary		PLS Model						
			RMSE		MAE		Q ² _predict	
ICT SI OMNIC VCC			0.946 0.970 0.956 0.962		0.730 0.739 0.754 0.708		0.180 0.151 0.166 0.153	
Indicator	PLS Model			LM		[PLS-LM]		
prediction summary	RMSE	MAE	Q ² _predict	RMSE	MAE	ΔRMSE	ΔΜΑΕ	
ICT_1	1.189	0.935	0.113	1.259	0.994	-0.070	-0.059	
ICT_2	1.685	1.375	0.049	1.737	1.406	-0.052	-0.030	
ICT_3	1.746	1.462	0.104	1.857	1.530	-0.111	-0.068	
ICT_4	1.426	1.134	0.041	1.495	1.190	-0.069	-0.056	
ICT_5	1.371	1.111	0.226	1.461	1.130	-0.090	-0.019	
SI_1	1.253	0.916	0.070	1.296	0.947	-0.043	-0.031	
SI_2	1.044	0.784	0.100	1.103	0.845	-0.059	-0.062	
SI_3	1.286	0.994	0.139	1.323	1.033	-0.037	-0.038	
SI_4	1.161	0.917	0.117	1.218	0.973	-0.057	-0.056	
OC_1	1.304	0.858	0.088	1.370	0.896	-0.067	-0.038	
OC_3	1.711	1.394	0.092	1.753	1.413	-0.042	-0.019	
OC_4	1.900	1.552	0.065	1.907	1.580	-0.007	-0.028	
OC_5	1.512	1.262	0.126	1.573	1.322	-0.061	-0.060	
OC_6	1.685	1.290	0.082	1.770	1.375	-0.085	-0.086	
OC_7	1.614	1.232	0.146	1.672	1.270	-0.058	-0.037	
OC_8	1.206	0.947	0.099	1.280	0.997	-0.074	-0.051	
Engagement	0.966	0.701	0.088	1.006	0.734	-0.039	-0.033	
Learning	0.943	0.746	0.135	0.979	0.763	-0.037	-0.017	
Participation	0.931	0.729	0.151	0.954	0.760	-0.023	-0.031	
Reciprocity	0.938	0.736	0.135	0.984	0.784	-0.046	-0.048	
	Sk	ewness	Error used		Δ [PLS-LM]		Predictive power	
ICT_1	—1	.022	MAE		-0.059		YES	
ICT_2	_(0.740	RMSE		-0.052		YES	
ICT_3	_(0.588	RMSE		-0.111		YES	
ICT_4	_(0.659	RMSE		-0.069		YES	
ICT_5	_().759	RMSE		-0.090		YES	
SI_1	-1	.411	MAE		-0.031	YES		
SI_2	_().961	RMSE	-0.059		YES		
SI_3	-	.004	MAE	-0.038		YES		
SI_4	_().814	RMSE	-0.057		YES		
OC_1		2.267	MAE		-0.038	YES		
0C_3	_(0.690 RMSE		-0.042		YES		
OC_4	_().635	RMSE	-0.007		YES		
00_5	_()./28	RMSE		-0.061		YES	
00_6	-1	.145	MAE		-0.086		YES	
	-(1.996	RMSE		-0.058		YES	
	_(J.968	KMSE		-0.074		YES	
Engagement	[]	.291	MAE		-0.033		YES	
Learning	_(0.943	KMSE		-0.037		YES	
Participation	[]	.001	MAL		-0.031		YES	
Recipionity	=(0.010	KIVISE		-0.040		I LO	

social enterprises. First, NPO managers who wish to improve the social impact of their collaborations with social enterprises should strengthen their value co-creation processes by working on four basic principles: firstly, by achieving the effective participation of the social enterprise in this process, sharing with the NPO relevant information or suggestions that can be used in the different stages of the collaboration process, or, simply, participating in decision-making; secondly, by co-creation based on reciprocity between both organizations, seeking their long-term balance, regularly reviewing the collaboration and jointly questioning the development of the process or committing to the collaboration; thirdly, by encouraging continuous learning in the process, providing to enterprise relevant

information to improve its own activities or organizational processes and, consequently, its operational performance; and fourthly, committing to engagement in a long-term co-creation management perspective. To this end, it is essential that the managers of both organizations commit themselves to the collaboration, dedicating time, workforce personal involvement, and teamwork in order to meet the objectives of co-creation.

Secondly, the NPO managers who wish to improve their omnichannel management should dedicate more resources (time and effort) to improve the interaction and communication of both organizations through the more traditional channels (meetings at the headquarters of the organizations, telephone contacts, on-site visits to the projects, programmes, activities, and services in which they co-create) and online resources (social networks, online platforms, Web, e-mail, ...). Thus, both types of channel have to be integrated and coordinated, the information (communications, messages, ...) that flows through each one has to be the same, the social enterprise must be able to find out about the evolution of the projects regardless of the channel, the norms that govern the relationship have to be similar, ... Even the image or corporate identity elements that allow the NPO to be visualized have to be common in both types of channel.

Thirdly, for the effective adoption of an innovation orientation by the NPOs that will facilitate the value co-creation NPO-social enterprise, it is suggested that the NPO managers promote an innovative culture in their organizations at all times, paying attention to the environment so as to discover new opportunities or different ways of managing projects, and foster a work environment that encourages the contribution of ideas, the search for new solutions to the problems that arise, or the discussion of different options for doing things. In general, paying attention to innovation will help the NPO managers identify the resources needed for identify and design new projects. It is necessary however not to forget the need to manage the NPO-social enterprise relationship through the integration of the multiple channels in an omnichannel strategy. In this sense, agreeing to these changes and adaptations will positively influence the fulfilment of the mission of their organization and therefore in the society.

Limitations and suggestions for further research. The findings and implications of this study should be considered in the light of its limitations, which also open up several avenues for further research. Firstly, it is necessary to continue deepening into the impact of the value co-creation on the well-being of society. For this, it would be interesting to evaluate, following the proposal of Van Tulder et al. (2016), to what extent more efficient and effective collaborations would positively affect the social impact of the cocreation of value. Secondly, there is no certainty as to whether the model remains stable regardless of the environmental conditions. An in-depth study of this issue would make it possible to combine the research with the proposal of Bharti et al. (2015) about the fact that interaction with the environment is one of the determining factors in value co-creation processes. Thirdly, relational norms were not included in the model as potential intermediate conditioning factors of the effect of technological elements on cocreation. Studying this issue could bring together this line of research with that carried out by Díaz-Perdomo et al. (2021) who showed that the existence of norms in the NPO-business relationship was the key variable for the analysis of its background.

Data availability

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

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Author contributions

These authors contributed equally to this work.

Competing interests

The authors declare no competing interests.

Ethical approval

All procedures performed in this study were in accordance with the ethical standards of the university. Ethical clearance and approval were granted by Oviedo University (Spain).

Informed consent

Informed consent was obtained from all participants and/or their legal guardians for participation in the study.

Additional information

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