Managing technology and value co-creation in service ecosystems: toward social innovation

Introduction

The impact of digitalization on business processes encouraged markets transformation into complex networks based on actor's engagement and on unrepeatable co-creation of value that can give birth to innovation. The evolving nature of users' exchange increases uncertainty in decision-making that becomes more and more unpredictable.

Due to the connection between interactions, value co-creation and the generation of innovation, service research proposes the adoption of a transcending view that explores the effect of technology and ICTs on service improvement and on new service development. In particular, by introducing the concept of service ecosystems, Service- dominant logic (S-D logic, Vargo and Lusch, 2004; 2008; 2011) embraces of a systems perspective that understands service as the glue of resource integration among engaged actors that through a series of ICTs enabled-interactions can lead to value co-creation and innovation. Therefore, extant research introduces progressively the need to analyze how the use of technology can lead to value co-creation (Storbacka et al., 2016), well-being enhancement (Frow et al., 2016) and innovation (Boger and West, 2012; Lusch and Nambisan, 2015) that can produce social innovation in the long run (Polese et al., 2018a; Polese etal., 2018b).

However, the necessity of managing technology strategically (as one of the main dimensions of ecosystems) is a "new" topic expressed in the latest contributions from service and service innovation literature (mostly in Service-dominant logic research) and it can be viewed as a research agenda (Felin et al., 2015; Nambisan et al., 2017) to be addressed.

Moreover, it seems that decision-making process and the key steps leading to innovation through value co-creation are not explored sufficiently in extant research. In a co-creation based view, the process of (co-)innovation (Lee et al., 2012) that fosters the constant renewal of knowledge should be managed to handle the constant emergence of new value (Foss, 2007).

For this reason, the work advances a strategic framework that identifies the drivers that can help decision-makers to manage innovation from the early stages of business processes and throughout the different contexts in which actors are embedded (micro, meso- and macro-, Moore, 1996; Vargo et al., 2015).

The aim is to explore how managers can foster the continuous generation of new knowledge through ICTs enabled-interactions that can lead to service improvement and innovation (Fitzsimmon and Fitzsimmon, 2000; Lusch and Nambisan, 2015) -at a micro-level- and to social innovation -at a macro-level.

By proposing a strategic conceptualization of value co-creation, the model lays the theoretical foundations for the elaboration of a systems management of service platforms and value co-creation as key drivers for innovation. Additionally, a pathway for the management of ICTs-enabled co-creation can contribute to improve managers and scholars understanding on: 1) the drivers of value co-creation and innovation; 2) the mechanisms leading to the outputs (mainly new knowledge) of exchanges to knowledge renewal and the continuous production of innovation in the economic and social system.

The work aims at proposing a framework that identifies the main dimensions that decision-makers should evaluate to manage value co-creation as a key lever to produce innovation in the end. To reach this goal, the paper seeks to answer the following research questions:

RQ1 (innovation): does the dynamic combination of service ecosystem's main elements (actors, technology, resource integration, practices and institutions) produce value co-creation and innovation?

RQ2 (social innovation): does value co-creation foster the emersion of social innovation at a macro-level?

The model introduced advances that the optimization and strategic management of value co-creation can help organizations to gain sustainability in the long run: therefore, a transitioning from innovation (of technology, products, service) to social innovation (social development, renewal of culture and social rules, etc.) can be hypothesized.

The theoretical framework is assessed empirically through a case study that explores the main element-steps for managing value co-creation and sustainability performed by Palm Spa, an Italian company that is considered a best practice in the design, production and delivery of wood pallets.

Theoretical background: technology, value co-creation and innovation

Traditionally, service innovation is intended as ad hoc innovation arising in service exchanges in two ways (related to the dichotomy incremental-radical innovation): 1) through anticipatory innovations (development of new spheres of knowledge); 2) through the formalization of standardized procedures across multiple service providers/client interactions (Gallouj, 2002).

Several years later, in line with the redefinition of service as the glue of exchange and of markets as ecosystems, S-D logic emphasizes the need for «a transcending approach for considering different "types" of innovation» (Vargo et al., 2015), that are innovation in technology and in markets.

Service ecosystem perspective rethinks the relationship between technology and markets, by pointing out that market innovation or the institutionalization of new solution (knowledge) lie upon the merging of compelling value propositions (enabled through technology) that guide the on-going interactions among multiple actors or stakeholders.

Thus, Lusch and Nambisan (2015 p. 161) define service innovation as "the rebundling of diverse resources that create novel resources beneficial [...] to some actors in a given context". The generation of innovation stems from the combination of a heterogeneous set of resources, actors and contexts underlying service exchange. It follows that, according to ecosystems view, innovation represents is a generic mind-set that envelops product innovation (Barrett et al., 2015).

Despite the exploration of the role of actors' engagement and resource integration in fostering innovation in some contributions from S-D logic (Storbacka et al., 2016), the drivers for service innovation have been not systematized in service research. What is more, the nature of the relationship between technologies (the efficient use of platforms) and value co-creation is not clarified (Barile et al., 2017).

In extant research, three different views on the link between technology, value co-creation and innovation can be identified: 1) technology-driven approach, in which ICTs are considered as the main levers to enable co-creation and, then, innovation; 2) knowledge-driven approach, in which co-creation processes are seen as the essential drivers to use ICTs efficiently and to improve service

or create new services; 3) social approach, in which social sphere is viewed as a pre-determined and key driver that shapes value co-creation and creates innovation.

Technology-driven approach understands the use of technology (ICTs tools and the platforms classified below) as the main driver for value co-creation, which is seen as a lever that provides better results (rapidity, efficacy and competitive advantage) that are not reachable without employing technology.

In this perspective, ICTs are intended as the key antecedents of value co-creation and innovation (Neuhofer et al., 2012; Breidbach and Brodie, 2017). According to this view, co-creation occurs thanks to the use of platforms that improves the strength and effectiveness of relationships between actors, thanks to "objective" features (website quality, quality of information or technology acceptance, Jiménez-Barreto, and Martínez, 2018) or immaterial dimensions (value orchestration, Tilaar and Novani, 2015).

Moreover, in technology-based approach, platforms are defined from a structural point of view through some criteria as transparency, accessibility (easy content sharing), reflectiveness (adaptability to internal changes, Nenonen et al., 2012; Ramaswamy and Gouillart, 2010).

Over the course of time, line with the call from Vargo et al. (2017) to reframe value co-creation strategically, the definition of service innovation changes together with the conceptualization of the role of ICTs in co-creation and innovation processes.

Knowledge-driven approach is based on the assumption that ICTs can be employed successfully and can generate innovation only thanks to value co-creation mechanisms. Technology is viewed as a context-dependant variable that should be negotiated necessarily through human interactions and resource integration to produce value co-creation (Sigala, 2015). Thus, technology is a factor that fosters the attainment of competitive advantage "indirectly" and its use does not imply itself the automatic co-creation of value (Cabiddu et al., 2013).

The variables that can boost effectiveness in the utilization of ICTs for value co-creation are engagement (Koo et al. 2016; Buhalis and Amaranggana, 2013) and experience, conceptualized as mediating variables between value co-creation and the "empowered" use of ICTs.

Many contributions deriving from service research and experiential marketing (Sigala 2015; Chathoth et al., 2015: Campos et al., 2018) stress the interactive nature of value co-creation (*in-use* dimension, Vargo and Lusch, 2008). Other works, that are halfway between management and sociological research, emphasizes the leading role of human component (actor's attitude and roles) in the enhancement of value co-creation (Boes et al., 2015).

Therefore, a collaborative strategic approach to develop co-creation from the early stages of service delivery and thanks to ICTs mediation is proposed in a series of studies that highlight the pervasiveness of technologies as drivers for strategic innovation that all-encompasses all the phases of service provision (pre-, delivery and post-delivery, Chathoth et al., 2015).

Based on the increasing diffusions of contributions that combine social science and management, the third approach considers the social sphere as the leading antecedent of value co-creation that can boost innovation in turn. The main assumption of this perspective is that innovation does not lie in technology itself but in the use of technology made by actors (Gretzel, 2011). Consequently, the use of technology does not imply value co-creation that can vary depending on contextual dimensions (attitude, social rules, power relations, Gretzel, 2011; Hunter et al., 2015).

Social approach stresses the role of context-based variables and the specific performing roles of users in determining an effective use of technology (Hunter et al., 2015) and in influencing value co-creation through experience (Kelly et al., 2017). Social variables such as rules, conventions,

power relations, ideology and views can shape value co-creation (Kelly et al., 2017; Ge and Gretzel, 2018) and encourage the use of technology by increasing business growth, competitive advantages and innovation. Therefore, social dimension can be intended not only as a driver of value co-creation but as an outcome of co-created exchanges of value that can produce a social development and innovation in the society as a whole.

As this brief overview reveals, in extant research some antecedents for value co-creation and innovation are identified. First of all, there are some "objective" drivers related to technical dimensions of platforms proposed in technology-driven approach (Jiménez-Barreto and Martínez, 2018; Chen et al., 2017), such as platforms and technology quality and performance (Website quality) and technology adoption. Some other drivers are related to the relevance of resource integration, sharing and collaboration among stakeholders as essential enablers for successful value co-creation (Cabiddu et al., 2013) that is mediated through human component. Moreover, the relevance of interactive features leads to the introduction of other key drivers such as users' engagement and empowerment that can modify value co-creation experience, which is built collaboratively during the interaction between actors. Then, according to a social vision, context-based variables (such as institutions in work based on service ecosystems view, Barile et al. 2017), actor's attitude, capabilities, and their specific performing roles are viewed as external variables that can shape value co-creation process.

Table 1 shows a recap of the most relevant features of the three approaches such as the different view on the relationship between technology and value co-creation and on the main drivers of value co-creation and innovation.

Table 1- The role of technology in value co-creation: three main approaches

References	Approach	Drivers for value co-creation and/or innovation	Relationship	Innovation outcome
Neuhofer et al., 2012; Guo et al., 2014; Boes et al., 2015; Jiménez-Barreto and Martínez, 2018; Tilaar and Novani, 2015; Breidbach and Brodie, 2017	**TECHNOLOGY-BASED APPROACH** **Use of Icts→ value co-creation**	Website quality Technology quality Technology adoption	**ICTs (website quality/technology adoption)→ Value co-creation→ innovation**	**TECHNOLOGY INNOVATION**
Cabiddu et al., 2013; Sigala, 2015; Koo et al., 2016Chen et al., 2017; Chathoth et al., 2015; Campos et al., 2018; Lee et al., 2012; Barile et al., 2017	**KNOWLEDGE-BASED APPROACH** **Value co-creation → most effective use of Icts**	*knowledge-based-human-based* Resource integration, sharing and collaboration (interactive based) Engagement, experience	**Human-knowledge-interaction- → Effective use of ICTs→ VCC**	**SERVICE INNOVATION**
Gretzel, 2011; Gretzel et al., 2015; Hunter et al., 2015;.Kelly et al., 2017; Ge and Gretzel, 2018	**SOCIAL APPROACH** **Social rules → value co-creation→ use of ICTs/innovation**	Context-based (institutions) actor's attitude and capabilities performing roles	**Social dimension-context→ VCC→ Effective use of ICTs→ innovation**	**SOCIAL INNOVATION**

Source: our elaboration

As table 1 shows, it can be noticed that the different conceptualizations of the antecedents of value co-creation and ICTs effectiveness emphasize the generation of three different kinds of potential innovation.

The approaches derived from literature detect diverse main variables that influence the production of value co-creation and innovation: the first research stream focuses on the use of technology itself, the second stresses the role of knowledge sharing during service exchanges and the third is based on the leading role of social dimension. It follows that the three antecedents of value co-creation can generate three different innovation outputs (that can coexist or occur independently) related to three features: technology, service exchange, social sphere.

In line with the need to adopt a transcending view on innovation, introduced in service ecosystems view, it can be proposed that ecosystems can generate ideally three different innovation outcomes: 1) technology innovation (new technologies or new ways of using technologies); 2) service innovation (new services, improvement of service or new service modalities); 3) social innovation (enhancement of well-being for the entire community, new social rules, new practices and values).

A framework for innovation management: toward social innovation

Starting from the identification of the most common drivers for value co-creation and innovation and complying with ecosystems based view, a model that takes into account the strategic management of value co-creation and the potential innovation in service delivery can be proposed.

As a result of literature review, it can be hypothesized that value co-creation, which depends on three drivers- ICTs use, knowledge exchange and social dimension-, fosters three related and different kinds of innovation outcomes: technology innovation, service innovation, social innovation.

Since ICTs act on users' attitude (prior to delivery), on resource integration (occurring during delivery) and on user's feedback (post-delivery), their pervasiveness in each stage of delivery and value co-creation can be revealed. Technology should be adopted wisely to engage actors, to stimulate resource integration and knowledge renewal continuously and throughout the whole process. ICTs can be intended as an integrated set (see *Smart technologies*, Gretzel et al., 2015, or even *Internet of things* Wortmann and Flüchter, 2015) of instruments that should be employed strategically to increase customer's experiences in the short term and to enhance value co-creation that generates service innovation in the end. Thus, decision-makers should employ a perspective based on the strategic management of ICTs- enabled value co-creation experiences. Therefore, the use of technology should be spread in all the value co-creation phases and both ICTs use and value co-creation strategies should be managed in each stage of service delivery. It follows that technology is not only an output of the process (technology-based innovation) but it can be viewed as a driver and a key element of ecosystems, too.

The framework for decision-making is herein proposed to identify: the different stages of co-delivery and co-innovation (re-elaborated from the traditional innovation lifecycle Malerba, 2000; Gasman and Enkel, 2004; Kyffin & Gardien, 2009) in 3 contexts in which users act (micro, meso, macro).

The main steps of an ecosystems model for co-innovation and co-evolution are the following: 1) Co-Design (micro-level): diffusion of common value propositions; 2) Co-development (meso-level): realization of effective co-delivery based on shared goals; 3) Co- evaluation: (macro-level):

outcome evaluation and problems detection; 4) Co-learning: (meta-level) adjustment of the resource integration to obtain service improvement and innovation over time (Boger and West, 2012).

In each stage, decision-making should adopt different: 1) strategies for creating (maintaining and renewing) value propositions and for enhancing value co-creation; 2) ICTs tools; 2) fits for aligning the different finalities of the actors can give birth to co-innovation.

At micro-level, there is the strategic definition of value propositions and innovative co-creation strategies based on ICTs. At this level, value propositions can be identified and diffused in order to create cohesive culture (problem- solution design) through integrated decision-making processes including the strategic use of platforms for stimulating user's willingness to engage. Moreover, decision-makers should select adequate stakeholders to establish stable collaborations and give birth to a common set of shared values that should be shared in the single system through smart use of platforms and the strengthening of teamwork.

In pre-delivery, ICTs are used to enhance brand awareness and foster value proposition sharing, through social networks sites, on-line advertising or e-commerce sites (reservation systems) for users and through cloud computing systems for employees.

A useful fit mechanism to bridge the gap between individuals' and systems' goals is the strengthening of cognitive proximity (Parente, 2008). This tool should ensure the transition from strategic innovation goals to the realization of the innovation path by aligning intra-organizational and extra-organizational objectives. Fit mechanisms in this stage concern economic rewards (investments and collaborations, ventures, sharing risks policies) and incentives aimed at motivating employees in order to spread a common innovation culture.

At meso-level, relationships should be managed through strategic and tactical harmonization of the fit between the value pursued and the objectives accomplished. In this stage, engagement and in-use interactions should be monitored and optimized constantly to foster resource integration (co-delivery). The strengthening of culture and value propositions is accomplished through ICTs-enabled information flows and multi-levelled knowledge exchange among users. The internalization of common value propositions can enhance users' experience and the image of the whole ecosystem by increasing user's commitment. Therefore, after the diffusion of value propositions, common goals should be revised bottom-up constantly through sense-making aimed at strengthening relationships and participation and service improvement in progress. During delivery, ICTs such as instant messaging, social networks, cloud systems can promote real-time relationships and speeding up co-learning processes among users.

At this level, fit mechanisms should be communication-oriented and targeted at producing and strengthening resource integration through the development of shared symbols. The aim is to valorize complementarity in the competencies of the different actors aimed at creating new knowledge.

Macro-level is characterized by *in-context* interactions that affect the broader economic and social system by producing new institutions, practices and social development (strengthening of social capital, consensus reputation and sustainability). Feedback mechanisms are promoted through ICTs to enhance user's loyalty through their expression of suggestions and insights for stimulating co-creation continuously after service delivery and guide towards circular innovation. After the delivery, technologies allow to maintain the relationship with customers.

In this stage, institutional proximity can be defined as an innovative trajectory that permits to exploit the opportunities offered by the influence, sharing and renewal of social policies and norms as coordinating mechanisms fostering technological and social development**.**

In this way, the production of new knowledge and innovative practices, services through insights and feedbacks collection (ICTs mediated) can improve service and renew culture and value propositions. Then, the following restart of the cycle is based on the enrichment of the new knowledge through its reintroduction in the system and then its constant reproduction and renovation.

Finally, after the creation of new knowledge (post-delivery), creativity can give birth to innovation and competitive advantage can be encouraged by reproducing constantly knowledge and co-learning and boosting sustainability over time (social innovation).

In this way, a meta-level (co-learning) can be introduced. In this stage, that is potential and can ensure the regeneration of knowledge, co-evolution can be obtained through co-learning that can lead to institutionalization and co-innovation (Lee et al., 2012) and can be potentially never-ending.

The innovation obtained from the entire process can be classified according to the different contexts from which it arises: micro- and meso-level can give birth to technology and service innovation that in macro-level can be turned into (or be accompanied by) social innovation.

In line with the most recent development in S-D logic (see the call for research from Vargo et al., 2017), technologies, knowledge and social sphere can become drivers for service innovation and, consequently, social innovation. Social rules (defined institutions in S-D logic) have impact on social dimensions and allow the transition from "simple" service innovation to social innovation intended as the co-creation or collaborative recombination of practices that provide novel social practices, such as new value, culture, rituals, and symbols deriving from experiences integration.

Thus, the framework proposed advances that technology, knowledge and institutions shape value co-creation which can create innovation (technological, product, processes or service innovation at a T-time) in the short run and social innovation in the long run (ΔT time).

The aim of the process, depicted in figure 1, is to detect the main elements of a total extended experience co-creation space, from pre-delivery to interactions in the real phase of delivery to post-delivery.

Figure 1- A framework for the strategic management of value co-creation and innovation
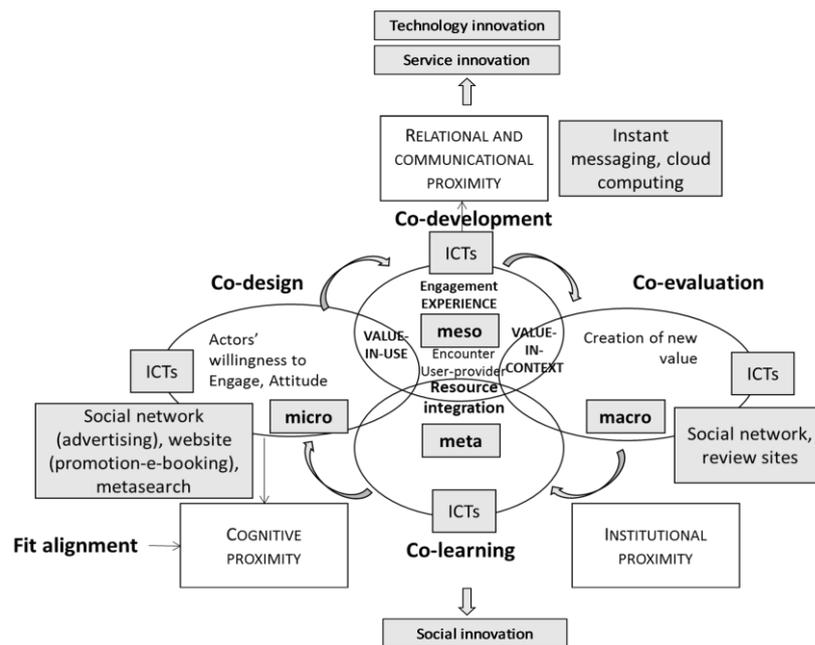
Source: our elaboration

Methodology

The empirical research discussed in the next paragraph adopts a qualitative approach in order to analyze a single case, a best practice in the field of sustainability and of innovation: Palm Spa, a company that designs, produces and sells wood pallets. Therefore, case study methodology (Yin 1984, 2015) is employed, since the technique allows at exploring deeply a single unit of analysis by providing the possibility of investigating the dynamics underlying a single setting through a holistic and systems analysis (Eisenhardt 1989; Feagin et al. 1991; Tellis 1997).

Moreover, a qualitative approach has been selected since the research is in a preliminary stage where little is known about the phenomenon under study (Corbetta, 1999) that cannot be operativized through the traditional numeric variables used in marketing empirical research. For instance, a quantitative approach seems to be not only unappropriated from a semantic point of view to take into account all the shades of meaning of complex constructs (such as value co-creation) but measurement items for the variables in the model have been not yet proposed and validated in previous research.

In line with ecosystems based view and the model proposed in the previous section, Palm is intended as a service ecosystem in which the main actors, resource integration and value co-creation practices should be detected across three contexts of analysis: micro, meso and macro. Moreover the relationships between the organization and its main stakeholder is explored together with its capability of establishing links with multiple economic and social systems and of producing different kind of sustainability (economic, social, environmental) and innovation (technology, service and social).

The technique employed for the case study is the qualitative content analysis that permits to extract from texts (the unit of analysis) fewer content categories and permits to find out the focal points of

the studies (Krippendorf, 2004) through the adoption of semantic criteria established by the researcher. The units of analysis are the official website of Palm- in all its sections and the different documents published on it (sustainability report, code of conduct, etc.)- and its social networks pages (Twitter, Facebook and Pinterest). The parameters employed to obtain the results have been some keywords and questions (ideally administered to the text) obtained from the main themes, macro-areas and main elements of service ecosystems introduced in the model (see the Appendix with the analysis sheet) that allow at detecting the following key dimensions:

1) Micro level: co-design practices, use of ICTs and cognitive proximity;
2) Meso level: co-development practices (service innovation), value co-creation activities in-use, use of ICTs for co-delivery and relational proximity
3) Macro level: new service development practices, social outcomes (social innovation), institutional proximity and feedback collection;
4) Meta level: renewal of knowledge, co-learning practices.

Results. Palm Spa: three-way sustainability and innovation

Palm Spa is a company from Northern Italy (Viadana, Mantova) engaged in wood pallets processing, from design to production, packaging and sale. By introducing social, environmental and economic sustainability in the production and packaging of Green Pallet, Palm represents a best practice in sustainability and innovation in the Italian context.

The mission of Palm is to create and co-create value thanks to the relevance of human component and of relationships in each stage of the value chain and of service delivery and to an innovative understanding of the role of the entrepreneur and the company within the territory. The philosophy of the corporation is based on continuous improvement to create value for the company, for the operators and for the overall context in which they operate.

Over the last ten years, Palm has been rewarded with a series of Green Awards concerning three fields: 1) environmental sustainability ("Impresa Ambiente 2007"; "Sustainable projects and Green Public Procurement" in 2009); 2) social responsibility ("Sodalitas Social Award" in 2003 and in 2010; CSR Award in Mantova district, 2004; "Premio Impresa best practice CSR" in 2005; "Sodalitas Social Award 2010"); 3) product-service innovation ("Oscar Packaging Conai 2004"; "Sodalitas Social Award" in 2010 for the category "innovation").

The results of content analysis are discussed as follows. Findings have been sorted according to the four contexts-stage of co-delivery identified in the model in which different kind of innovation (technology, product-service, social) and different practices of value co-creation and sustainability arise across economic, social and environmental dimensions.

As shown in the Appendix, for each context, the questions administered "virtually" to the website (and therefore the results deriving from the analysis) are classified according to four dimensions of analysis:

1) Strategic dimension: to assess the common sharing of value propositions settled and the joint process of decision-making;
2) ICTs role: to reveal whether ICTs are integrated in each phase of delivery;
3) Fit: to detect is the three fit (cognitive, relational and institutional) are employed actually;
4) Innovation type: to observe the emergence of different kind of innovative practices in the various phases of the process.

It can be noticed that since meta-level is a border crossing context that aims at coordinating and renewing the outcome produced in the other contexts, at this stage the two dimensions analyzed are only the strategic effort of Palm in encouraging knowledge enrichment and ICTs role in fostering co-learning (see the Appendix).

Micro level

Palm's value proposition can be detected through the mission statement on the website and through the code of conduct and the ethics codes published on the website (section "who we are-documents").

The mission seems to adopt a systems approach that is emphasized by a company payoff: "healthy, systemic, ethics". Healthy requires attention to the raw materials used to produce healthy packaging; systemic implies the activation of a relational network among the various stakeholders throughout the life cycle of the pallet that fosters environmental sustainability; ethics pursues the attainment and maintenance of social justice.

Fig. 2- Palm's value proposition

Therefore, starting from the establishment of corporate culture, Palm focuses on the accomplishment of a total sustainable approach based on the need to collaborate with stakeholder groups. As reported in the code of conduct, collaborations with stakeholders are considered as the "demonstration of the quality of the products and services offered".

To reach economic and social sustainability is the main goal of the organization, in which customers are seen as "real partners with whom to share a process of common, innovative, sustainable and shared growth". Thus, an innovation and sustainable orientation together with the search of competitive advantage stem clearly from the value proposition of the company.

Value propositions, mainly grounded on sustainable innovation principles, are then settled and enriched through partnerships with the different stakeholders thanks to co-design practices that foster integrated decision-making.

After a careful analysis of customer's needs, stakeholders are engaged in pallet design from the early stages of production. First of all, the approach to sustainability and social responsibility of Palm's industrial project starts from the budgeting phase, in which the company communicates to

its clients its main economic choices. Then, for each new project a product sheet is elaborated and shared with partners by providing all the information on pallets (description and dimensions, composition, technical drawing, etc.).

Moreover, Palm Spa provides its partners with a systems-based policy document that can be intended as a: "1) tool for communication and protection of values connected to a quality pallet; 2) an indicator of sustainable, social and ethical development of the company".

Thus, from a strategic standpoint Palm adopts a systems approach to supply chain that aims at involving stakeholders actively through transparent communication and shared responsibility and at preserving sustainability in each stage of the value chain.

The wide range of documents presenting value propositions on the website (code of conduct, policy document, mission, etc.) reveal that ICTs are employed starting from the first phase of value co-creation process to share corporate culture. Moreover, customers are contacted via e-mail for any update on the design process and can keep in touch with the corporation via chat (on the forum in the website) for complaints. Additionally, Twitter and Facebook are used to share corporate values: the first is immediate and is used to attract and to make promotion, whereas Facebook is employed to make storytelling and share institutional contents

These strategies of integrated communication allows at ensuring the fit between Palm's main goals and the specific objectives of each stakeholder groups by creating a cohesive and sustainable culture.

Palm's orientation to innovation produces some technological innovation co-designed with its partners, such as *Tenenga Alliance Group*, corporation that provides automation processes and information systems to monitor products and manage storage. This partnership gave birth to the innovative application of RFID on pallets by creating a new way to track and identify green pallets to foster their traceability during the event "Salone del Gusto" in Turin.


Meso level

From a strategic point of view, at meso-level Palm establishes multiple partnerships with numerous stakeholder groups that are involved actively in co-development and co-production of Green Pallets. The main result of this collaborative approach is the realization of a bio-samwill (bio-segheria) that introduces a systems production method that aims at fostering circular economy and at strengthening relationships with all the members of territory and local and national community.

Together with the implications on the economic side of the value chain, the sustainable outcomes of the bio-sawmill have effects on the social dimension, too.

Palm Spa aims at building and reinforcing constantly its network in the territory. As stated in sustainability report, the company has partnerships "with all the members of civil society by activating a systematic comparison with other social entrepreneurs that can help to find joint solutions to social problems by safeguarding the well-being of future generation".

In detail, based on CSR report, Palm's main stakeholders (as fig. 3 shows) can be identified: 1) other private companies; 2) non-profit organizations, consortia and trade associations; 3) customers; 4) employees; 5) research centres and University; 6) public administration and institutions; 7) local community.

Fig. 3- Main stakeholders in Palm's ecosystem
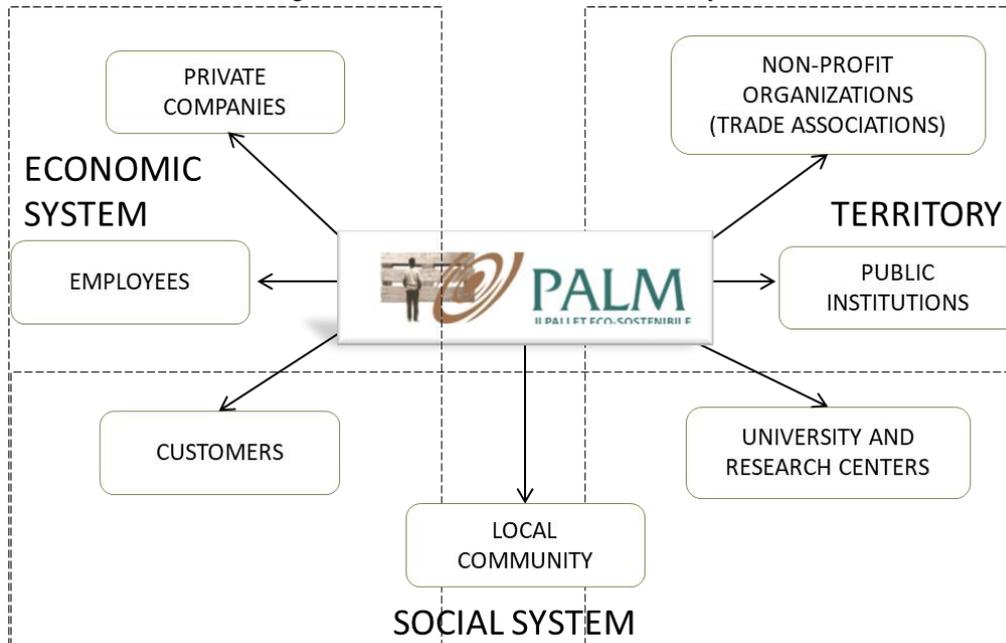
Source: our elaboration

The main private companies are: Biokal, an ESCO (Energy Service Company) accredited company for the installation and maintenance of plumbing systems, stoves and boilers; Gasser, producing thermal insulating bricks for Bioton brand; Tetrapak.

Palm is member of a series of non-profit and associations such as: "API Industria Mantova" (companies from Mantova district); Assolegno-Federlegno, that assembles the main corporations in the wood value chain; AssoSCAI (Association for the development of businesses competitiveness); CSR Manager network Italy that promotes policy of corporate responsibility as part of corporate strategies; RiLegno and Conai (National Packaging Consortium) consortia.

Moreover, Palm, together with other companies, founded "Businesses Friends of the Environment" network, with the aim of spreading the concept of Green Supply Chain in the market.

Palm has economic relationships and partnerships with customers, suppliers and employees that are engaged through workshops and training in order to engage them and support the promotion of value proposition and sustainable approach.

The organization develops partnerships with research centers and University too. Palm is member of CRIL (Research center for wood packaging and logistics) and organizes workshops and awareness raising projects with arts & sciences and agrarian departments from Italian university.

The main stakeholders in institutional system are local administration: the company participates in public-private working tables and organizes traineeships for recruiting new employees. Moreover, Palm joins the EU Forest Law Enforcement and the Governance and Trade (FLEGT) program.

In the local community, the company organizes and participates in social events aimed at promoting and sensitizing civil society on social issues such as environmental sustainability, economic crisis. In addition, Palm arranges some annual meetings with customers, media, academicians to share and increase knowledge on the issue of sustainability.

The symbol of Palm ecosystem is "Ecofriends", an association founded by Palm Spa to gather companies, organizations and citizens that acts as a platform, an opportunity for interaction between producers, suppliers and socially responsible customers. Ecofriends was founded in September 2009, with the goal of "creating a system" and to propose actively a model of economy based on transparency, participation and promotion of the common values.

The aims are to enhance corporations' sustainable and responsible practices, to make customer aware of their purchasing choices, to encourage institutions in co-creating together with companies and citizens.

The project offers a series of workshops on sustainability for companies and civil society members and organizes some round table discussions on sustainable packaging ethics to create virtuous supply chains. In addition, "risorgimentoLab" is introduced to co-develop innovative and sustainable services with the territory and "Q3 projects" proposes workshops with high schools and Universities on the topic of sustainability.

The main resources exchanged within Palm ecosystem are values, culture and attitudes: all the stakeholders are engaged, motivated and sensitized constantly on corporate social responsibility. Numerous events are organized, such as "the day of Systemic design" (in 10 June 2018, Buzzoletto di Viadana, Mantova) that consisted in experiential meetings between companies and users on the topics of sustainability, social justice, legality and traceability of the wood supply chain. Moreover, the event aimed at increasing sustainable values between conscious consumers/co-producers. By sharing common experiences and knowledge, these meetings can contribute to spread and enrich systems approach as a competitive and innovative lever to create shared value.

It follows that these events are a means to strengthen shared values and do "sense-making" by shaping, renewing and enriching value propositions. Thus, they can contribute to ensure the relational fits. For instance, "B Corps Day" (Benefit corporation day) in Rome, in which Palm owns its stand, contribute to foster value co-creation through the enrichment of value-in-use and the strengthening on value propositions in real time and through real experiences.

Concerning the role of ICTs, at meso level social media are employed to share and renew value propositions and boost value co-creation by publishing photos and videos in real time from events. Facebook is used to tell stories during the events and to motivate and sensitize stakeholders through mottos and claims: "and you? In which world do you want to live? […] Be able to change the world, but it is not possible to do it alone: we should to involve our partners in the change, we have communicate our ideas and our vision, we should have a say in the matter!".

Thus, Facebook is used actively at meso-level for informational objectives and to establish emotional links with users through photos, videos and posts aimed at mobilizing civil society.

Twitter is used to reach informational objectives and Live Twitting is not employed in real time during the events. The official website is utilized in a static way to publish link to newspapers articles and press releases.

One of the most useful tools used to make users more loyal and to realize storytelling is Youtube: for instance, on "B corporation" channel, the hymn of Bcorps has been shared.

Lastly, it can be concluded that multi-stakeholder partnerships, knowledge exchange, value co-creation and the renewal of knowledge in-use within the whole Palm ecosystem can help to realize new service jointly with users (RisorgimentoLab, Q3 projects, etc.) and to engage each systems' member in the co-development of innovative service and service modalities.

Macro level

The innovative orientation of Palm translates into social innovation at macro-level. Thanks to the collaborative approach in which each actor in the system is engaged in co-design and co-delivery through the constant renewal of value, some common practices and routines are created that enhance the social cohesion of the ecosystem.

Value co-creation and the dynamic recombination of practices across meso-level give birth at the end of the process to novel social practices, such as new value, culture, rituals, and symbols deriving from value-in-use and knowledge exchange.

For instance, Palm, as a Bcorp, employs its innovative approach to the production of pellets to pursue social and environmental challenges such as economic development of local community.

ICTs are strategically involved in the final creation of "Green pallet" culture: platforms are employed to not only share and strengthen value propositions but to make users more loyal and to renew and enrich the new value created incrementally over time.

The most useful platform for the enrichment of culture is Facebook, due to its "narrative" ability of creating history across the brand and of making every event a serial story (See Fig.4). In this sense, Youtube is another social medium suitable for storytelling and for the enhancement of loyalty thanks to the possibility of publishing videos from events and workshops, whereas Twitter is less effective since its orientation is mainly informational.

Moreover, through a wise and strategically integrated use of ICTs, Palm collects user's feedbacks and suggestions especially through "Ecofriends" pages on social network (twitter, Facebook and Pinterest) and the specific blog on the website.

Data collection contributes to supervise any changes in users' opinion and in their adhesion to value propositions. For this reason, to ensure the fit between the "old" knowledge and value and the potential creation of new value and social rules (institutionalization) and to bridge the potential gap deriving from conflicting knowledge, Palm organizes a series of strategies to collect feedback through the continued administration of surveys to companies and users.

Lastly, in terms of innovation, Palm's ecosystem, due to the continuous strengthening of value propositions at micro- and meso-level can realize the proposition of a new culture of Green Pallet that spreads innovative product and social practices at macro-level in the entire wood value chain and across society as a whole. Moreover, the organization introduces a new culture of training and information on sustainability and of internalization of green pallets' values by activating traineeships, education activities, workshops and an integrated set of actions to inform, share and make users participate into a green attitude to sustainable innovation (through the events, workshops and charity events described before). In this way, sustainability at triple bottom-lines can be obtained: 1) Economic (products quality); 2) Environmental (improvement of health): 3) Social (community development).

Fig. 4- Palm's call for the adoption of Green mind-set (Facebook page)

Source: https://www.facebook.com/AziendaPalmSpA/

Meta level

As discussed above, Palm's integrated strategies to co-create and co-innovate with users can contribute to the proposition of a new Green Pallet culture and of a three-way process of innovation and sustainability (see fig. 5).

Fig. 5- Palm's ecosystem: three-way sustainability and innovation
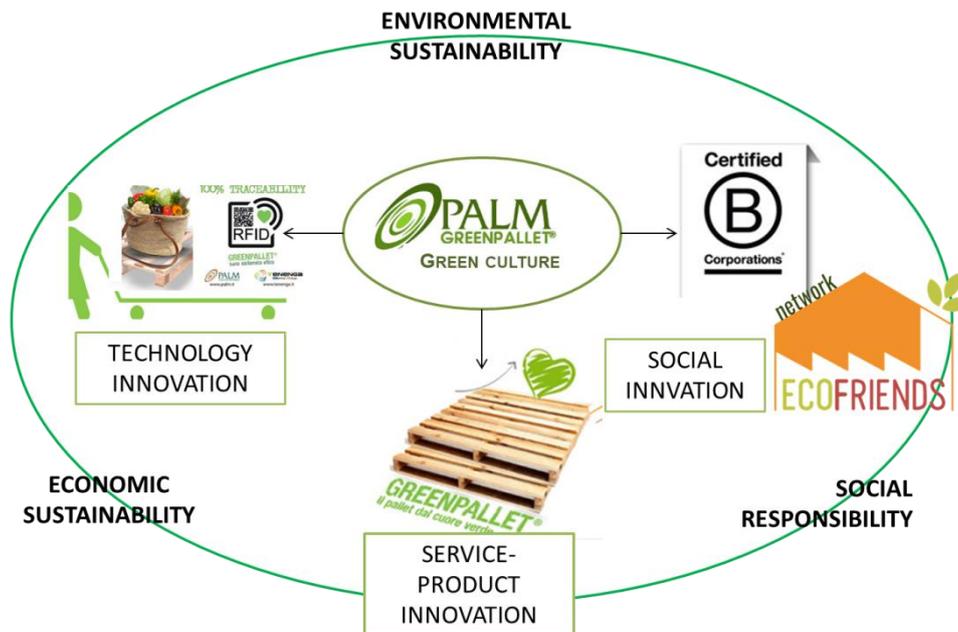
Source: our elaboration

However, this attitude should be monitored constantly through ad hoc strategies to renew and enrich company's values and knowledge over time by aligning it to system's changes and pursuing co-evolution.

This complex goal is reached through the management of co-learning at a meta-level which is a "transition" stage in which the organization should produce the "delta", the unique creativity deriving from the knowledge exchanged to exploit the new values, service, products, social norms produced and generate sustainable innovation.

To meet these aims, Palm seeks to enrich the knowledge co-created with users through specific and long-term education strategies. For instance, Ecofriends, through a course of 4 workshops, supports SMEs in the discovery of sustainability as a competitive lever to survive in national and international markets. What is more, Palm is partner of the "Systemic Food Design", the tool of education and promotion of sustainable models of production and consumption of food created by an association of enterprises such as Comieco, Rilegno, etc. The association, through the narration of the main phases of the production system of food and beverage supply chains for everyday use, allows the user to learn more on the multidisciplinary world of Gastronomic Sciences.

Social innovation as a transcending innovation that all-encompasses micro- meso and macro context can be viewed as the generation of new value propositions and the emergence of new informal rules, culture, and rituals leading to the development of the entire local system. At meta-level the innovative outcomes should be integrated to not create a gap between Palm and stakeholder's values.

ICTs can ensure this fit to foster co-learning and knowledge renewal through users' culture monitoring. For example, Palm customers who adopt environmentally sustainable packaging are rewarded with economic incentives compared to competitors with "traditional" pallets. Moreover, in an attempt to improve the alignment with stakeholder's values, Palm employs a simulation program that analyses the behaviour of their partners in real time throughout the entire value chain (from supplier's behavior, to the stages of storage and packaging).

In conclusion, the results obtained and discussed above can be applied to the strategic innovation model proposed in this work by depicting the sustainable innovation management cycle of Palm Spa (fig.6).

Fig. 6- The results obtained from case study: an application of the model
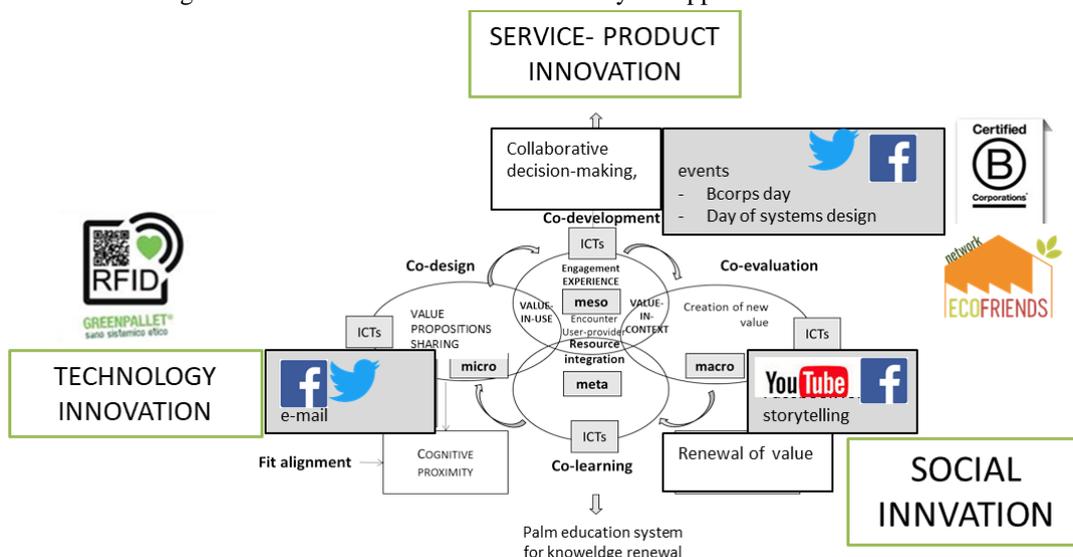
Source: our elaboration

Concluding remarks

Starting from the identification of the most common drivers for value co-creation and innovation in service research, a framework that pinpoints the most useful co-creation strategies in each phase of service delivery is proposed. In this way, some steps for strategic innovation and value co-creation management can be detected as a starting point for future research.

The results of the empirical research contribute to shed light on the emergence of innovation in ecosystems according to a transcending view that proposes the conceptualization of three different kind of innovation (technology, service and social innovation). The adoption of a systems view on value co-creation can propose some advancements in extant service research by proposing the analysis of both managerial and social implications of S-D logic. Moreover, the proposition of the shift from innovation to social innovation through the lens of ecosystems view seems to be an issue unexplored until now.

The work stresses the relevance of knowledge and interactive dimensions as drivers of value co-creation but also the importance of psychological (actor's attitude) and contextual dimensions (culture, institutions, values, etc.). However, a "technical feature" such as technology acceptance seems to be preliminary to resource integration that occurs during the real encounters and provide real value co-creation experiences (ICTs enabled) and should keep on going on after delivery with continuous enhancement of engagement and renewal of knowledge through feedback offered via social media, for instance.

The model proposed in the final part of the work permits to identify: 1) the main drivers of innovation and value co-creation; 2) the mechanisms leading to the new knowledge and knowledge renewal that point to the continuous production of innovation.

Since extant research focuses only on innovation process or outcomes (Nambisan et al., 2017), the approach adopted in this context is devoted to analyse simultaneously the drivers and the results of innovation and the dynamic relationship between them. Therefore, the framework addresses managers to understand better: 1) how inputs and outcomes of exchanges drive value co-creation and innovation processes; 2) how outputs (new knowledge) can be intended as a basis for the reimplementation of resource integration (by turning into "old" knowledge that is re-implemented in the process).

By emphasizing the necessity to manage platforms as strategic tools for value co-creation, the study addresses future research to the adoption of a "meta" perspective that moves back to the analysis of the antecedents of value co-creation and to its outcome.

From a theoretical point of view, the study introduces some advancements in extant research on value co-creation, in which the relationship between engagement and technology is still unexplored (Storbacka et al., 2016). In this way, the work proposes a research agenda for further research related to the necessity of elaborating a strategic framework defining the different value co-creation practices (Saarijarvi et al., 2013) enabled by technology. This systems mindset for rereading ICTs-enabled value co-creation is in line with the call for research from Nambisan et al. (2017) on the need to explore the multiple resources integration occurring among multiple actors in contemporary ecosystems.

The identification of ICTs instruments, resources and institutions fostering value co-creation can enhance current understanding on the different kinds of activities accomplished by users during joint service delivery and shed light on the mechanisms promoting users' active engagement.

Shedding light on some drivers and ICTs tools fostering value co-creation in ecosystems, the work can aid managers to understand how to manage relationships with actors and how to encourage and

enhance their engagement by optimizing knowledge exchanges and information flows. Therefore, decision-makers are encouraged to monitor value co-creation and innovation in progress during all the phases of service provision by supervising the emersion of co-creation in real time and increasing engagement at each stage. A better understanding on the mechanisms underlying value co-creation can address managers to the elaboration of integrated strategies increasing the competitiveness of economic systems and community as a whole by producing both service innovation and sustainable development (social innovation).

The study clarifies the different conceptualizations deriving from extant research on the relationship between technology and value co-creation and on the need to manage the two dimensions strategically.

The work has some limitations related to the methodology and the technique adopted. Case studies, in fact, do not allow any generalization of results. However, the paper proposes an exploratory research and can be considered as a first qualitative step that can address future research to the development of statistics model to be analyzed through quantitative approach starting from the results and the main dimensions identified in this research.

What is more, even if the goal is to explore deeply a specific context, the analysis focuses on a single company and this can be another obstacle to obtain a generalizable model. For this reason, future works can investigate other Italian companies to confirm the results obtained in other organizational contexts or to make some comparison between different green practices in different green companies.

Thus, further research can start from the framework proposed in this study to detect empirically the main drivers of value co-creation and innovation practices through quantitative analysis (statistical correlation between value co-creation, use of ICTs, innovation, etc.) or additional qualitative research (observations or interviews).

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Appendix- Analysis sheet for content analysis

Micro level- co-design
1) **Strategic profile:** are Palm's value propositions settled and shared through joint process of decision-making?
2) **ICTs role**: are ICTs integrated strategically in Palm's co-design? Which are the most common platforms used in this phase?
3) **Fit (cognitive)**: are values aligned within and outside the company?
4) **Innovation:** which kind of innovation outcomes are produced in this stage?

Meso level- co-development
1) **Strategic profile:** are services co-developed and co-produced by multiple stakeholders? Who are the main stakeholders groups chosen by Palm Spa? Which are the main resources exchanged by each group?
2) **ICTs role**: are ICTs employed in co-development to share knowledge? Which are the most common platforms used by Palm Spa to foster resource integration in co-delivery?
3) **Fit (relational)**: are relationships managed and harmonize strategically and tactically to bridge the gap between the value pursued and the objectives accomplished?
4) **Innovation:** which kind of innovation outcomes are produced in this stage? Is new service co-development produced in this stage?

Macro level- co-evaluation
1) **Strategic profile:** are services targeted to produce environmental and social sustainability?
2) **ICTs role**: are ICTs employed to collect feedback from users to maintain relationship and renew knowledge? Which are the most common platforms used by Palm Spa in this phase?
3) **Fit (institutional)**: are there practices related to the sharing and renewal of social policies?
4) **Innovation:** are there new social rules deriving from co-delivery? Are these outcomes related to social innovation?

Meta level- co-learning
1) **Strategic profile:** does Palm adopt some strategies to improve, renew and enrich company's values and knowledge over time?
2) **ICTs role:** Are ICTs employed to foster co-learning and knowledge renewal?