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Technology, Value Co-Creation and Innovation in Service Ecosystems: Toward Sustainable Co-Innovation

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Abstract: The work identifies the main enabling dimensions and the strategic drivers to foster value co-creation and sustainable innovation in service ecosystems. The aim is to explore how resource and knowledge integration, through technology-mediated interactions, can lead to the emergence of novelties (new products, services, processes, social, and environmental practices). Based on a re-elaboration of literature, the study introduces a framework that describes the main drivers for managing the emergence of value co-creation and innovation (co-design, co-development, co-delivery, co-learning) across the contexts of exchange of service ecosystems (micro, meso, and macro). A “meta”-level is conceptualized to investigate how management can harmonize an actor’s objectives with an ecosystem’s goal to encourage the diffusion and renewal of a sustainable and innovation-oriented culture. The empirical research applies the framework proposed in the theoretical section to a case study analysis on “Palm”, an Italian company that designs and produces wood packaging. The technique employed is qualitative content analysis. The findings permit conceptualization of the key strategic levers for the management of co-creation and to increase managers’ and scholars’ understanding of (1) the enablers of value co-creation and innovation; (2) the mechanisms leading to knowledge renewal and the continuous production of sustainable innovation.

Keywords: service ecosystems; value co-creation; innovation; sustainability; co-innovation sustainable innovation

1. Introduction

The impact of digitalization on business processes has encouraged the transformation markets into complex networks based on unrepeatable processes of value co-creation that can give birth to new or improved products, services, and relational modalities [1].

Due to the connection between interactions, value co-creation, and the generation of innovation [2], service research proposes the adoption of a transcending view that explores the effect of technology and ICTs (information and communication technologies) on service improvement and on new service development [3,4]. In particular, by introducing the concept of service ecosystems, service-dominant logic (S-D logic, [5–7]) embraces a systems perspective that understands service as the glue of resource integration among engaged actors that, through a series of ICT-enabled interactions, can lead to value co-creation and innovation. Therefore, extant research progressively advances the need to analyze how technology-mediated exchanges can lead to value co-creation [8], well-being enhancement [9,10], and innovation [11,12] that can produce sustainability in the long run [13,14].

However, the evolving and emergent nature of service exchanges increases the complexity and uncertainty in the harmonization and management of value co-creation, which becomes more and more unpredictable. The necessity of a strategic management of technology (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), which involves the introduction of a research agenda [15,16] to be addressed.

Moreover, it seems that the key drivers leading to innovation through value co-creation are not explored sufficiently in extant research. In a co-creation-based view, processes of (co-)innovation [17] that foster the constant renewal of knowledge should be managed to handle the constant emergence of new value [18].

For this reason, the work advances a strategic framework that defines the drivers toward managing co-created innovation from the early stages of delivery and throughout the different contexts in which actors are embedded (micro, meso, and macro [3,19]).

The aim is to explore how management can foster the continuous generation of new knowledge and co-creation of value through ICT-enabled interactions that can lead to service improvement and innovation [12,20]. A synthesis “meta”-perspective is introduced to investigate the emergence of economic (micro), social (meso), and environmental (macro) values toward the development of sustainability.

By proposing a strategic conceptualization of value co-creation, the current work lays the theoretical foundations for the elaboration of a systems approach to the management of value co-creation and innovation. Additionally, the definition of the drivers for the harmonization of ICT-enabled co-creation can contribute to improving managers’ and scholars’ understanding of (1) the enablers 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 advances a conceptual framework that identifies the main dimensions that managers should evaluate to encourage value co-creation as a key lever for innovation emergence. To reach this goal, the paper seeks to answer the following research questions:

RQ1 (co-innovation): Which are the main enabling dimensions of value co-created innovation in service ecosystems?

RQ2 (sustainable innovation): Which are the strategic drivers to foster the emergence of sustainable innovation at a micro-, meso-, and macro-level and manage value co-creation (at a meta-level)?

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

The findings of the empirical research reveal that the optimization and strategic management of value co-creation can help organizations to gain sustainability in the long run: therefore, the transition from innovation (of technology, products, service) to sustainable innovation (economic and social development, renewal of culture and social rules, environmental eco-sustainability) can be hypothesized.

2. Technology, Value Co-Creation, and Innovation

Traditionally, innovation is defined as the outcome of new or relevant improvements in products, services, or organizational and market practices [21]. In extant research, two different kinds of innovation are conceptualized: technology/product innovation, focused on changes in operation and processes; (2) market/customer innovation, focused on the proposition of innovative products in line with users’ needs [22,23].

In particular, service innovation is intended as an ad hoc innovation arising in service exchanges in two ways (related to the dichotomy of incremental–radical innovation): (1) through anticipatory

innovations (development of new spheres of knowledge); (2) through the formalization of standardized procedures across multiple service provider/client interactions [24].

Over time, the definition of innovation has been revised to involve human, social, and cultural dimensions. 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 [3].

A service ecosystem perspective rethinks the relationship between technology and markets by reframing market innovation and/or the institutionalization of new solutions (knowledge) as the result of the integration of value propositions (enabled through technology) that guide the ongoing interactions among multiple actors or stakeholders.

Thus, Lusch and Nambisan [12] (p. 161) define service innovation as “the re-bundling 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 can be conceived as a generic mindset that envelops product innovation [25].

Despite the exploration of the role of actors’ engagement and resource integration in fostering innovation in some contributions from S-D logic [8], the drivers for service innovation have been not been systematized in service research. Furthermore, the nature of the relationship between technologies and value co-creation has not yet been clarified [26].

According to a critical re-elaboration of extant research, three different views on the link between technology, value co-creation, and innovation can be identified: (1) technology-driven approach; (2) knowledge-driven approach; (3) social approach.

The first perspective considers technology as the main lever that enables co-creation and, then, innovation [27,28]. A technology-driven approach understands the use of technology (ICT tools and platforms) as a driver for value co-creation that provides results (rapidity, efficacy, and competitive advantage) that could not otherwise have been obtained without the adoption of technology.

According to this view, value co-creation occurs thanks to the implementation of platforms that improves the strength and effectiveness of relationships between actors [29]. Moreover, the development of innovation depends on the technical adequacy of technology (website quality, quality of information [30,31], transparency, accessibility, and adaptability to internal changes [32,33]), rather than on the use made of it.

Over the course of time, in line with the call for research from Vargo et al. [4] for a strategic reinterpretation of value co-creation, the definition of innovation is reframed through a new conceptualization of the role of technology in co-creation and innovation processes.

A knowledge-driven approach is based on the assumption that ICTs can be successfully employed and can generate innovation only thanks to value co-creation, the essential driver to use ICTs efficiently and to improve service or create new services. Technology should be negotiated necessarily through human interactions and resource integration to produce value co-creation [34]. Thus, the use of platforms and ITS and ICT systems can foster the attainment of competitive advantage “indirectly”, and its use does not imply itself the automatic co-creation of value [35,36].

The variables that can boost effectiveness in the utilization of ICTs for value co-creation are engagement [37,38] and experience, conceptualized as mediating variables between the “empowered” use of ICTs—that is, the active involvement of users in resource integration in the development of new services and in companies’ lives [39]—and value co-creation.

Many contributions deriving from service research and experiential marketing [34,40,41] stress the interactive nature of value co-creation (*in-use* dimension, [6]). Other works that are halfway between management and sociological research emphasize the leading role of the human component (an actor’s attitude and roles) in the enhancement of value co-creation [42].

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 encompasses all the phases of service provision (pre-delivery, delivery, post-delivery, [9,40]).

Based on the increasing diffusion of studies that combine social science and management, the third approach considers the social sphere as the leading antecedent of value co-creation that can, in turn, boost innovation. The main introduced assumption is that innovation does not lie in technology itself but in the use of technology made by actors [43] in which the social sphere is viewed as a predetermined and key driver that shapes value co-creation and creates innovation. Consequently, the use of technology does not imply the emergence of value co-creation, which can vary depending on contextual dimensions (attitude, social rules, power relations, [43,44]).

Social approach stresses the role of context-based variables and the specific performing roles of users in determining an effective use of technology [44] and in influencing value co-creation through value-in-context [45]. Social variables such as rules, conventions, power relations, and ideology can model value co-creation [45,46] and encourage the use of technology by increasing business growth, competitive advantage, and innovation. Therefore, the social dimension can be intended not only as a driver of value co-creation but also as an outcome of co-created value exchanges that can produce social innovation and the development of society as a whole [47].

The social connections among stakeholders across embedded contexts of exchange can be the sources for organizational change [48,49] and for the creation of new meanings of social practices, institutions [50], and cultural meanings [51].

Table 1 synthesizes the most relevant features of the three approaches discussed above (1. the main enablers of value co-creation and innovation; 2. the different relationships between them; 3. the innovation outcomes).

Therefore, extant research identifies some antecedents for value co-creation and innovation (see the third column in Table 1). First, there are some enablers deriving from the technical dimensions identified in the technology-driven approach [30,52], such as platforms and technology quality and performance (Website quality) as well as technology adoption. The enablers conceptualized in the second approach are related to the relevance of resource integration, sharing, and collaboration among stakeholders as essential enablers for successful value co-creation [36] that is mediated through the human component [53]. Moreover, the significance of interactive features leads to the introduction of other key enabling dimensions, such as users' engagement and empowerment, that can modify the value co-creation experience [54] 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 a service ecosystems view [26]) and an actor's attitude [55,56], capabilities, and their specific performing roles are viewed as external variables that can shape the value co-creation process.

As Table 1 shows, the different conceptualizations of the antecedents of value co-creation and ICT effectiveness noticeably emphasize the generation of three different kinds of potential innovation (the last column in the Table).

The approaches derived from the literature lead to detection of the 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 dimensions. 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, and social sphere.

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

Table 1. The main enablers of value co-creation and innovation: three main approaches.

References	Approach	Enabling Dimensions for Value Co-Creation and/or Innovation	Relationship	Innovation Outcome
Neuhofer et al., 2012 [27]; Boes et al., 2015 [41]; Tilaar and Novani, 2015 [31]; Breidbach and Brodie, 2017 [28]; Jiménez-Barreto and Martínez, 2018 [30]	Technology-based approach	Technology performance Technology quality Technology adoption	Technology adoption → Value co-creation → innovation	Technology innovation
Lee et al., 2012 [17]; Cabiddu et al., 2013 [36]; Chathoth et al., 2016 [39]; Sigala, 2015 [34]; Frow et al., 2016 [9]; Koo et al., 2016 [37]; Barile et al., 2017 [26]; Chen et al., 2017 [51]; Campos et al., 2018 [40]	Knowledge-based approach	Knowledge-based and human-based Resource integration, sharing and collaboration (interactive based) Engagement, experience	Human-intervention → Effective use of technology → VCC ¹	Human innovation
Gretzel, 2011 [42]; Gretzel et al., 2015 [56]; Hunter et al., 2015 [43]; Kelly et al., 2017 [44]; Ge and Gretzel, 2018 [45]	Social approach	Context-based (institutions) actor's attitude and capabilities performing roles	Social context and rules → VCC → Effective use of technology → Innovation	Social innovation

¹ Value co-creation.

3. Methodology

The empirical research adopts a qualitative approach in analyzing a single case, which can be considered a best practice in the field of sustainability and of innovation: “Palm”, a company that designs, produces, and sells wood pallets. Therefore, case study methodology [57] is employed to allow deep exploration of the unit of analysis by providing the possibility of investigating the dynamics underlying a single setting through a holistic and systems analysis [58–60].

Moreover, a qualitative approach has been selected, since the research is in a preliminary stage where little is known about the phenomenon under study [61] which cannot be operationalized through the traditional numeric variables used in empirical marketing research. For instance, in an exploratory stage, the quantitative approach seems to be too unappropriated from a semantic point of view to take into account all the shades of meaning of complex constructs (such as value co-creation). In addition, a univocal set of measurement items for the variables in the framework has not yet been validated in previous research.

Previous quantitative research on the topic proposes some measurement scales for value co-creation [62] and seeks to validate the statistical relationships with other key variables of marketing (innovation [63]; loyalty, satisfaction or commitment [64,65]) or of consumer behavior (behavioral intention). However, these studies do not employ a systems and multi-levelled perspective that clearly defines the different activities performed by actors in each phase of delivery and embrace a narrow viewpoint that takes into account some microdimensions such as informational, communication, and interactive features.

For this reason, an exploratory qualitative approach seems to be necessary for the preliminary conceptualization of a complex concept for in-depth exploration, firstly, of the semantic core of the construct and, then, to theoretically identify the potential and the multiple variations of the co-created value that evolves within and across different contexts of exchange. After the proposition of a theoretical framework that classifies the various co-creating and co-innovating activities and subdimensions at an exploratory level, a mixed method [66] that combines quantitative (measurement scales, regression analysis) and qualitative techniques (semi-structured interviews, observation) can be employed to test the conceptual validity of the enabling dimensions and detected drivers.

In line with an ecosystems-based view and the framework 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 four contexts of analysis: micro, meso, macro, and meta. Moreover, the relationships between the organization and its main stakeholders are explored together with its capability of establishing links with multiple economic and social systems and of producing

different kinds of sustainability (economic, social, environmental) and innovation (technology, service, and social).

The technique employed for the case study is qualitative content analysis that permits the extraction of fewer content categories from texts (the unit of analysis) and permits finding out the focal points of the studies [67] through the adoption of semantical criteria established by the researcher. The units of analysis are the official website of Palm—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 are a set of keywords and questions (ideally administered to the text) obtained from the main themes, macro-areas, and main elements of service ecosystems introduced in the framework (see the analysis sheet in Appendix A).

The main variables used for data interpretation and for the categorization of results (strategies, technology, fit, and innovative outcomes) are investigated into the four contexts of exchange as embedded among each other: the micro-, meso-, macro-, and meta-environments. The key dimensions and subdimensions of analysis have been derived thanks to a critical re-elaboration of literature that will be discussed in the following paragraph.

4. A Framework for Innovation Management: Toward Sustainable Innovation

Starting from the identification of the most common enablers of value co-creation and innovation and complying with an ecosystems-based view (see paragraph 2), a framework that takes into account the strategic management of value co-creation and of potential innovation in service delivery has been conceived to guide the coding activities and the conceptualization for content analysis.

As revealed in the literature review, it can be hypothesized that value co-creation enabled by technologies, knowledge exchange, and social dimension fosters three related and different kinds of innovation outcomes: technology innovation, human innovation, and social innovation.

Even if the last approaches do not focus on technology, ICTs and IT platforms can act on users' attitude (prior to delivery), on resource integration (occurring during delivery), and on user's feedback (post-delivery). Thus, their pervasiveness at each stage of delivery and value co-creation can be revealed. Technology should be adopted wisely to engage actors and to continuously stimulate resource integration and knowledge renewal throughout the whole process. ICTs can be intended as an integrated set (see smart technologies [68] or even internet of things [69]) of instruments that should be strategically employed to improve customer experiences in the short term and to enhance value co-creation that generates innovation in the end. Therefore, managers should employ a perspective based on the strategic management of ICT-enabled value co-creation experiences. In this way, the use of technology should be spread in all the value co-creation phases and both ICT use and value co-creation strategies should be managed at each stage of service delivery. It follows that technology is not only an output of the process (technology-based innovation) but it can also be viewed as a driver and a key element of ecosystems.

The framework is proposed to identify the different enabling dimensions of value co-creation and innovation at the different stages of service delivery (RQ1, re-elaborated from the traditional innovation lifecycle [70,71] in the four contexts in which users act (micro-, meso-, macro-, meta-level, RQ2).

Therefore, some classifying criteria are identified to detect the emergence of co-innovation:

- (1) Strategies—to assess the common sharing of value propositions in the ecosystem;
- (2) Technology & ICTs role—to reveal whether ICTs are integrated in each phase of delivery;
- (3) Fit alignment—to harmonize the different objectives of the different ecosystem's actors;
- (4) Innovative outcomes—to observe the emergence of different kind of innovative practices in the various phases of the process.

To address the second research question, thanks to a re-elaboration of extant studies on co-created innovation [72], the main drivers for the sustainable development of innovation and co-evolution are categorized for each ecosystem context (micro, meso, macro, [8,73]). The micro-level refers to the

internal resources of organizations (economic capitals, technological assets), intended as a set of actors and elements connected with different and individual objectives. At the meso-level, the connections between individual actors become relationships involving a broadened series of stakeholders that can generate new knowledge over time. The macro-level refers to the outcome of relationships in the broader social context in which new institutions, practices, and cultures can be introduced.

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, meta-level (co-learning) can be introduced to observe how value co-creation can lead to co-innovation (RQ1) and sustainability (RQ2).

Four different stages are proposed in each ecosystem's context: (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 problem detection; (4) Co-learning (meta-level)—adjustment of resource integration to obtain service improvement and innovation over time [11].

Thanks to the integration of the key steps described above with the different ecosystem's contexts, the following subdimensions of analysis (described in the following paragraph) can be identified:

- (1) Micro-level—co-design practices, use of ICTs, and cognitive proximity;
- (2) Meso-level—co-development practices (human innovation that can enhance relationships management and process), value co-creation through in-use activities, 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 and synergistic multiple outcomes across economic, social, and environmental dimensions (sustainable innovation).

4.1. Micro-Level

At the micro-level, value propositions and innovative co-creation strategies are strategically defined. In this context, value propositions can be identified and diffused in order to create a cohesive culture (problem–solution design) through integrated decision-making processes, including the strategic use of platforms for stimulating user's willingness to engage. Moreover, managers should select some key stakeholders that, on the one hand, comply structurally with the organization and, on the other hand, have a set of values suitable for the establishment of stable collaborations. In this way, some common shared values can be spread in the ecosystem 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, online advertising, or e-commerce sites (reservation systems) for users and through cloud computing systems for employees [74].

A useful fit mechanism to bridge the gap between individuals' and ecosystem's goals is the strengthening of cognitive proximity [75]. 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.

4.2. Meso-Level

At the 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 constantly monitored and optimized to foster resource integration (co-delivery). The strengthening of culture and value propositions is accomplished through ICT-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 constantly revised, bottom-up, through sense-making aimed at strengthening relationships and participation and service improvement in progress. During delivery, ICTs and IT systems can promote real-time relationships and speed up co-learning processes among users [76].

In this context, 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.

4.3. Macro-Level

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 continuously stimulating co-creation after service delivery and to guide towards circular innovation [77]. After the delivery, technologies allow maintenance of the relationship with customers [76].

In this stage, institutional proximity can be defined as an innovative trajectory that permits exploitation of 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 and services through insights and collected feedback (ICT-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 ecosystem and then its constant reproduction and renovation.

4.4. Meta-Level

In this stage, the new knowledge generated at the macro-level can be regenerated and co-evolution can be obtained through co-learning that can lead to institutionalization and co-innovation [17] and can potentially be never-ending.

Relationships should be managed through strategic and tactical harmonization of the fit between the value pursued by the different stakeholders and the overall ecosystem's goal. Users' engagement should be monitored constantly to improve resource integration and, thus, co-delivery and co-learning.

The innovation obtained from the 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 to reach sustainability at meta-level.

In line with the most recent development in S-D logic (see the call for research from Vargo et al., [4]), technologies, knowledge, and social sphere can become drivers for service innovation and, consequently, social innovation. Social rules (defined institutions in S-D logic) can affect 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 the integration of experiences.

Thus, the framework proposed advances that technology, knowledge, and institutions shape value co-creation which can create innovation (technological, human process, or social innovation at a given time, or T) in the short run and sustainability 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.

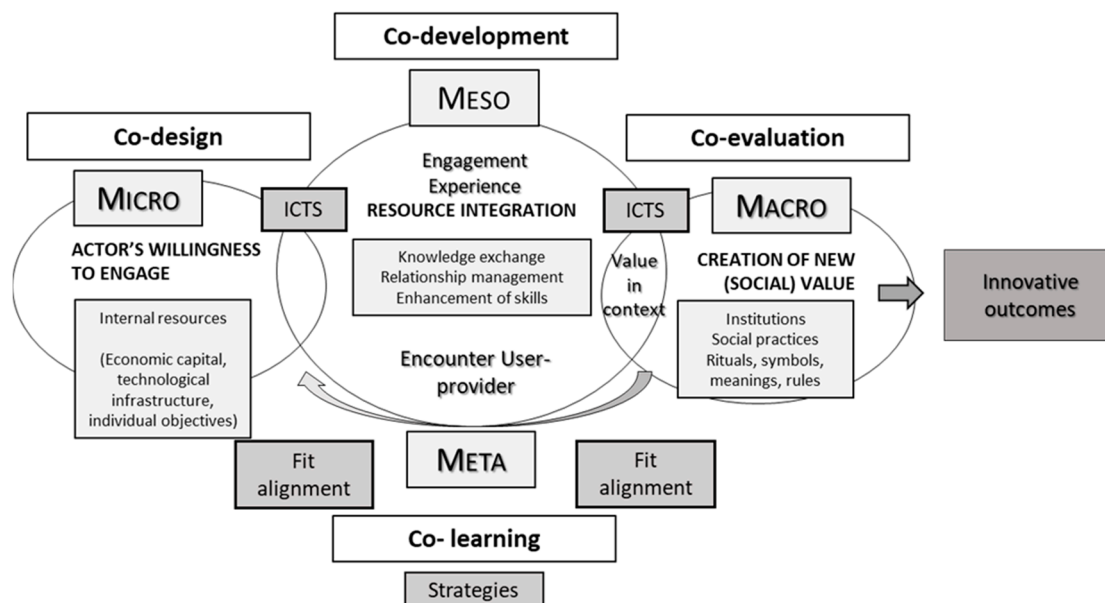


Figure 1. A framework for the strategic management of value co-creation and innovation.

5. Results

Palm is a company from Northern Italy (Viadana, Mantova) engaged in wood pallet design, production, packaging, and sale. By introducing social, environmental, and economic sustainability in the production and packaging of green pallet, Palm represents best practice in sustainable 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 at each stage of the value chain and of service delivery, and to develop an innovative understanding of the role of the entrepreneur and the company within the territory (public and non-profit organizations and local community). The philosophy of corporation is based on continuous improvement to create value for the company, the operators, and the overall context in which they operate.

Over the last ten years, Palm has been awarded 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 Mantua 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 all-encompassing approach to sustainability can be detected in the mission of the company (see Figure 2) that seems to adopt a systems approach (“meta”), emphasized by the payoff: “healthy, systemic, ethics”. Healthy requires attention to the raw materials used to produce healthy packaging and can be associated with the attainment of technological and economic development (micro); systemic implies the activation of a relational network among the various stakeholders throughout the lifecycle of the pallet that fosters environmental sustainability (meso); ethics pursues the attainment and maintenance of social justice (macro).



Figure 2. The core values of Palm's value proposition. Source: Adapted from <http://www.palm.it/Chisiamo.aspx>.

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 framework 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 Appendix A, for each context, the questions administered “virtually” to the website (and, therefore, the results derived from the analysis) are classified according to the four dimensions of analysis: (1) Strategies; (2) Technology & ICTs' role; (3) Fit alignment; (4) Innovative outcomes.

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 only two dimensions analyzed are the strategic effort of Palm in encouraging knowledge enrichment and the role of ICTs in fostering co-learning (see Appendix A).

5.1. 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”).

Therefore, starting from the establishment of corporate culture, as Figure 2 shows, 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 a “demonstration of the quality of the products and services offered”.

The main goal of the organization is to reach economic and social sustainability 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, the approach to sustainability and social responsibility of Palm's industrial project starts from the budgeting phase, in which the company communicates its main

economic choices to its clients. Then, for each new project, a product sheet is 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 the communication of values and for the promotion of green 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 actively involving stakeholders 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.) confirms 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 allow 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, a 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.

Table 2 synthesizes the findings obtained from the investigation of the micro-level, classified according to the main variables employed for content analysis.

Table 2. The main findings for the micro-level.

Enabling Dimensions of Co-Innovation (RQ1)	Strategic Drivers for Co-Creation and Sustainable Innovation Management (RQ2)
Strategies	Actor’s involvement in: <ul style="list-style-type: none"> - The shared definition of values propositions; - Service co-design; - Raw material selection and production policies; - Supply process.
Technology & ICTs	Total approach to sustainability: from budgeting to raw material and supplier selection, to stakeholder inclusion in service design and policies Diffusion of value proposition through: <ul style="list-style-type: none"> - Websites (mission, code of conduct); - E-mail and instant messaging for booking and orders; - Social networks to: <ul style="list-style-type: none"> o Attract users and offer promotion (Twitter); o Share institutional communications and storytelling (Facebook).
Fit alignment	Alignment between: <ul style="list-style-type: none"> - Organization/stakeholder values; - Ecosystem’s main goal/actors’ objectives.
Innovative outcomes	RFID and digital technologies for product traceability, automation of process, smart monitoring of storage, and tracking of raw materials.

5.2. Meso-Level

From a strategic point of view, at the meso-level, Palm establishes multiple partnerships with numerous stakeholder groups that are actively involved in the co-development and co-production of green pallets. The main result of this collaborative approach is the realization of a bio-sawmill (biosegheria) that introduces a systems production method that aims at fostering circular economy and at strengthening relationships with all the members of territory [78], composed of the main public and non-profit institutions in the environment and local and national community.

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

Palm Spa aims at building and constantly reinforcing its network in the territory. As stated in the 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”.

As revealed in the CSR report, Palm’s main stakeholders (see Figure 3) are (1) other private companies; (2) non-profit organizations, consortia and trade associations; (3) customers; (4) employees; (5) research centers and universities; (6) public administration and institutions; (7) local community.

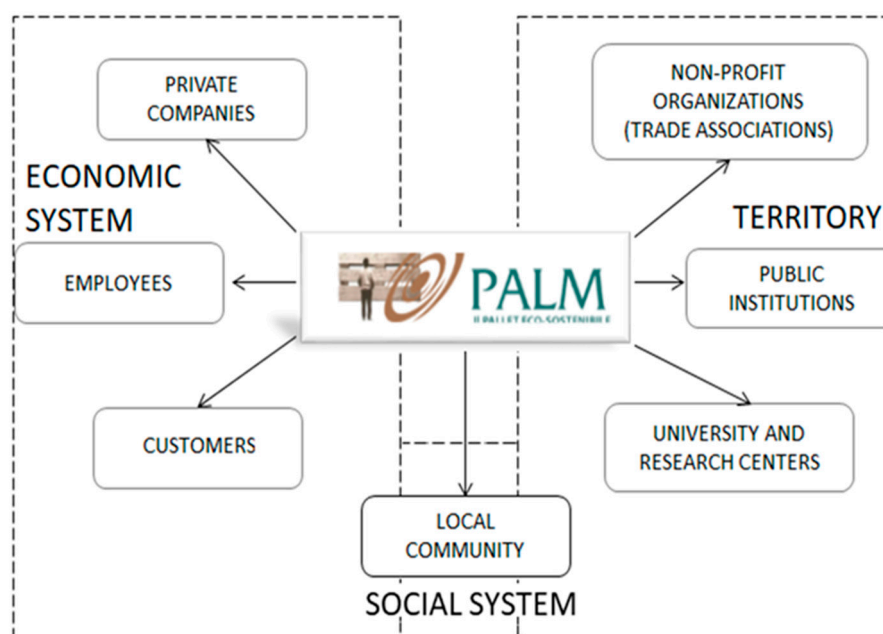


Figure 3. The main stakeholders in Palm’s ecosystem.

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 the 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 a green supply chain in the market.

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

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

The main stakeholders in the institutional system are local administration: the company participates in public–private working tables and organizes traineeships for the recruitment of 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 such social issues as environmental sustainability and economic crises. In addition, Palm arranges some annual meetings with customers, media, and academics to share and increase the 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 or 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 actively propose a model of economy based on transparency, participation, and the promotion of common values.

The aims are to enhance corporations’ sustainable and responsible practices, make customer aware of their purchasing choices, and 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, “Risorgimento Lab” is introduced for the co-development of innovative and sustainable services with the territory, and “Q3 projects” propose workshops with high schools and universities on the topic of sustainability.

The main resources exchanged within Palm ecosystem are values, culture, and attitudes: all stakeholders are engaged, motivated, and constantly sensitized on corporate social responsibility. Numerous events are organized, such as “The day of systemic design” (in 10 June 2018, Buzzoletto di Viadana, Mantua) 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 promoting sustainable values between conscious consumers/co-producers. By sharing common experiences and knowledge, these meetings can contribute to spreading and enriching a 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 ensuring relational fits. For instance, “B Corps Day” (Benefit corporation day) in Rome, in which Palm owns its stand, contributes to fostering value co-creation through the enrichment of value-in-use and the strengthening of value propositions in real time and through real experiences.

Concerning the role of ICTs, at the 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? [. . .] You are able to change the world, but it is not possible to do it alone: we should to involve our partners in the change, we should communicate our ideas and our vision, we should have a say in the matter!”.

Thus, Facebook is actively adopted at the 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 tweeting 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 key tools used to realize storytelling and to enhance users’ loyalty is YouTube: for instance, on “B corporation” channel, the hymn of Bcorps has been shared.

Lastly, it can be noticed that multi-stakeholder partnerships, knowledge exchange, value co-creation, and the renewal of in-use knowledge within the whole Palm ecosystem can help the joint creation of new service (Risorgimento Lab, Q3 projects, etc.) and the engagement of users in the co-development of innovative service modalities.

Table 3 shows a synthesis of the findings obtained from the analysis at meso-level.

Table 3. The main findings for the meso-level.

Enabling Dimensions of Co-Innovation (RQ1)		Strategic Drivers for Co-Creation and Sustainable Innovation Management (RQ2)
Strategies	Diffusion sustainable culture and promotion of training and educational projects to raise awareness on green pallet and packaging/product sustainability Informational aims (“static” use) - Website; - Twitter.	Actor’s involvement in: - Co-production and co-delivery of services; - The sharing of green attitudes;
Technology & ICTs	Emotional aims (sensitization towards sustainability) - Facebook and YouTube for engagement and storytelling.	- Co-development of new ideas for service improvement.
Fit alignment	Between organization’s/actor’s skills and experience through: - Sense-making; - Renewal of value propositions through Living Labs, contests for new product development and social events	
Innovative outcomes	New production methods to meet the standards of circular economy New ideas for service development proposed by users and other stakeholders (actor-driven)	

5.3. Macro-Level

The innovative orientation of Palm translates into social innovation at the macro-level. Thanks to the collaborative approach, each actor is engaged in co-design and co-delivery through the constant renewal of value. Some strategies are implemented to foster the development of common practices and routines that can, in turn, enhance the social cohesion of the ecosystem.

At the end of the process, value co-creation and the dynamic recombination of practices across the meso-level give birth 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 the 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 also 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 (see Figure 4), due to its “narrative” ability of creating history across the brand and of making every event a serial story. 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.



Figure 4. Palm’s call for the adoption of a green mindset (Facebook page); Source: <https://www.facebook.com/AziendaPalmSpA/>.

Moreover, through the wise and strategically integrated use of ICTs, Palm collects user’s feedback and suggestions especially through its “Ecofriends” pages on social network (Twitter, Facebook, and Pinterest) and the specific blog on the website.

Data collection contributes to supervising 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 the micro- and meso-level, can realize the proposition of a new culture of green pallet that spreads innovative product and social practices at the 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 in adopting a green attitude to sustainable innovation (through the events, workshops, and charity events described earlier). In this way, sustainability at the “meta”-level across the triple bottom-line of sustainability [79] can be obtained: (1) economic (product quality); (2) environmental

(improvement of health); (3) social (community development). Table 4 reports the main findings extracted from the content analysis on the ecosystem's macro-level.

Table 4. The main findings for the macro-level.

Enabling Dimensions of Co-Innovation (RQ1)		Strategic Drivers for Co-Creation and Sustainable Innovation Management (RQ2)
Strategies	Strengthening of proactive innovation approach to attain: <ul style="list-style-type: none"> - Community development and well-being enhancement; - Resolution of environmental challenges. 	Actor's involvement in the co-development of: <ul style="list-style-type: none"> - Institutions and new social practices; - Social and sustainable policies.
Technology & ICTs	Enhancement of actor loyalty through: <ul style="list-style-type: none"> - Use of Facebook for narrative of recall marketing strategies; - Storytelling and live streaming of events on YouTube. 	
Fit alignment	Monitoring of: <ul style="list-style-type: none"> - Actor's adhesion to value propositions; - Compliance of knowledge between actors; - Actor's feedback on services over time (survey and data collection) 	
Innovative outcomes	New social practices and modalities for service exchanges. New culture of green packaging.	

5.4. 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 sustainability.

However, this attitude should be constantly monitored through ad hoc strategies to renew and enrich a company's values and knowledge over time by aligning it to ecosystem changes and in 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 exchanged knowledge [80] to exploit the new values, service, products, and produced social norms to 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 four workshops, supports SMEs (Small and medium-sized enterprises) in the discovery of sustainability as a competitive lever to survive in national and international markets. Furthermore, Palm is partner of "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 about the multidisciplinary world of gastronomic sciences.

Sustainable innovation as a transcending innovation with an all-encompassing 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 ecosystem developed across Palm's business processes, projects, and activities. At the meta-level, innovative outcomes (that encompass economic, social, and environmental benefits for the community and technological, human, process, and social innovation) should be integrated to avoid the creation of a gap between Palm and stakeholder's values.

ICTs can ensure this fit to foster co-learning and knowledge renewal through the monitoring of user culture. 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 analyzes the behavior of their partners in real time throughout the entire value chain (from supplier behavior to the stages of storage and packaging). Table 5 synthesizes the results discussed above.

Table 5. The main findings for the meta-level.

Enabling Dimensions of Co-Innovation (RQ1)		Strategic Drivers for Co-Creation and Sustainable Innovation Management (RQ2)
Strategies	Renewal of values through constant adaptation to market and actor’s needs evolution Continuous enrichment and adaptation of knowledge for the acquisition of durable know-how and sustainable competitive advantage	Actor’s involvement in: - Co-learning and continuous learning and improvement in employees, citizens, and user skills and competencies (creativity) - Co-monitoring of actor’s evolving needs
Technology & ICTs	Simulation program to check the evolution of user opinions, engagement, and behavior	
Fit alignment	Analysis of compliance between an ecosystem’s goal and an actor’s objectives Proactive monitoring of changes in user values and behaviors	
Innovative outcomes	New value propositions New rituals and new ways to experience the environment New approaches to systematic innovation	

6. Discussion

The results of the study show that the different enabling dimensions (strategies, technology, fit alignment, and innovative outcomes) activated by Palm ecosystem can be combined and managed (at meta-level) across the micro, meso, and macro contexts of exchange to pursue co-innovation (RQ1) and sustainable innovation in the long run (RQ2). Thus, the investigation of the transition from micro- (economic and technological development) to meso- (social development) and macro-level (environmental development) can allow for the detection of the main strategies to shape co-creation and address innovation toward the attainment of sustainability.

The dynamic combination of resource integration mediated by technology can enhance individual skills and ecosystem knowledge [81], which can give birth to a synergistic value-creating process that generates different kind of novelties—from new products and services to enhanced process, new business strategies, and new social and cultural values.

The results obtained and discussed above can be reframed through the key dimensions of the strategic innovation framework proposed in Figure 1 to depict the sustainable innovation management cycle of Palm (Figure 5).

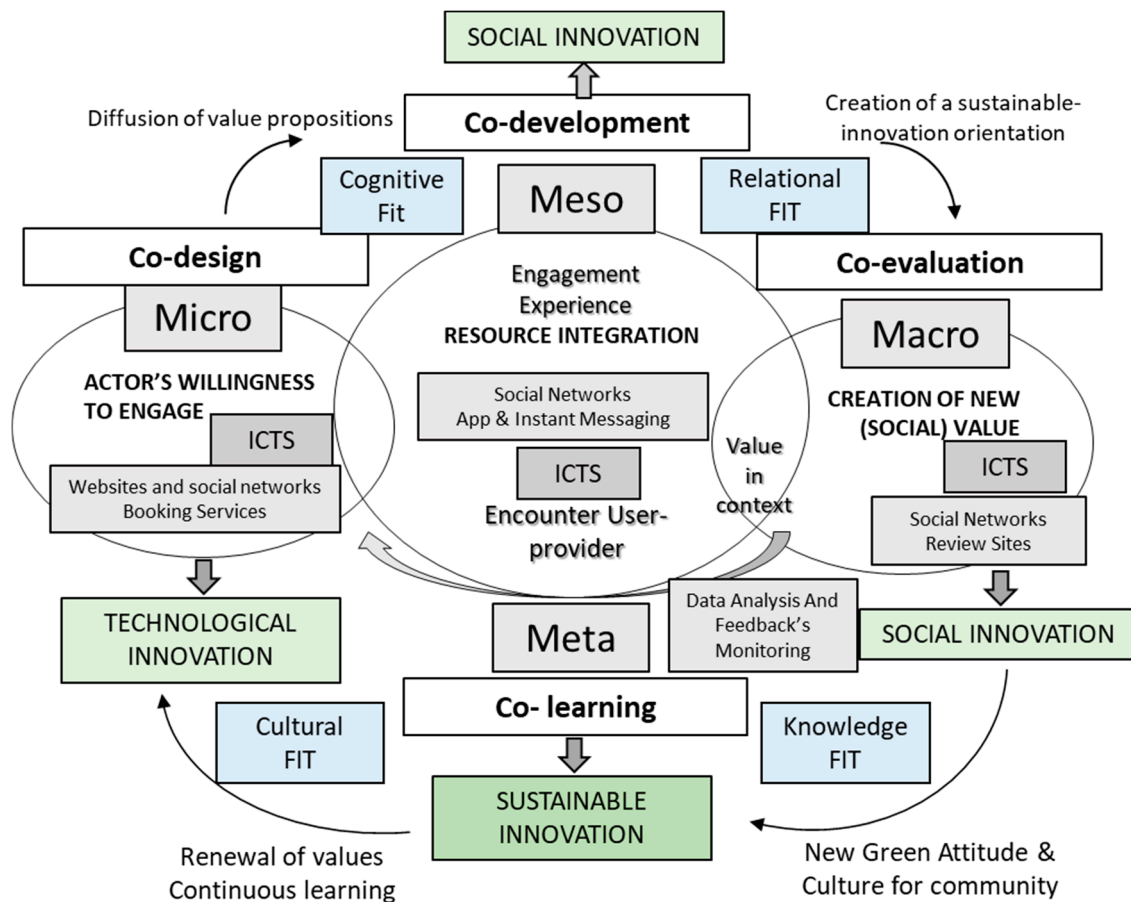


Figure 5. The results obtained from case study: an application of the model.

Therefore, sustainable innovation can be reinterpreted as a complex and emergent process that (1) envelops different spheres (technological, human, relational, cultural, and social); (2) spreads across embedded contexts (micro, meso, and macro); (3) should be managed and harmonized (at the meta-level).

Sustainable innovation in service ecosystems can be reread as the outcome of totalizing resource integration and knowledge exchange [82] that generates the creation of novelties. The new “entities” are developed from the organizational climate spread in the cluster, and the strategic adoption of an innovation-oriented mindset envelops all the business functions, operations, and strategies as well as all actors’ needs in the cluster (social sphere) by creating different shades of innovation harmonized to pursue systematic innovation.

The systematic approach to innovation is confirmed by the existence of a continuous learning orientation in which the diffusion of the innovation culture enables the harmonization over time of continuous technology flow, ICT use, relationship management, and fit alignment of ecosystem’s goal with stakeholders’ individual objectives.

The findings confirm that the optimization of strategies for value co-creation and innovation can give birth to different types of innovation (see Figure 6):

- (1) Technology innovation (micro)—development of new IT and ICT-based systems for the automation of processes, raw materials flows, and information exchange thanks to the smart monitoring of stocks and of communication with users;
- (2) Human innovation (micro-meso)—empowerment of human knowledge for the optimization of relationships and the enhancement of communication between and among business functions/between and among the different ecosystem’s stakeholders in the supply chain;

- new operation management standards for improved process; new standards for supply chain, process security, and products safety;
- (3) Social innovation (meso–macro)—creation of a strategic orientation based on a green attitude that increases the social inclusion of users and citizens and well-being of communities and promotes the creation of new cultural and social meanings, practices, rules, and standards;
 - (4) Sustainable innovation (meta)—systematic diffusion of innovation culture that encourages continuous learning and fosters the alignment between ecosystem’s goals and the objectives of industrial players (economic); civil society, users, and the research system (social); and public administration, associations, and institutions (environmental).

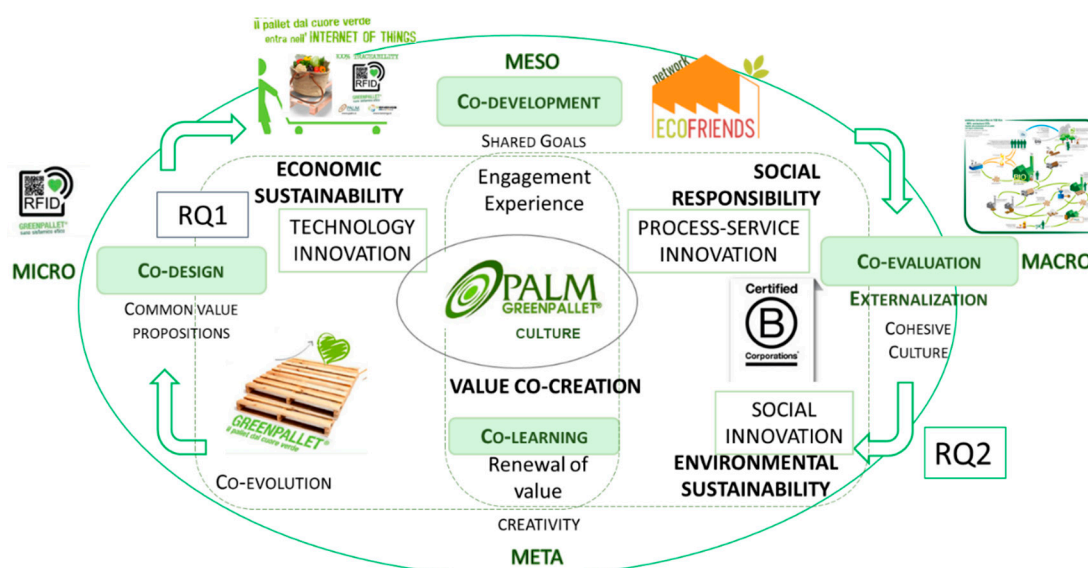


Figure 6. Palm’s ecosystem: three-way sustainability and innovation.

7. Theoretical and Managerial Implications

The framework proposed in the final part of the work permits identification of (1) the main enabling dimensions of innovation and value co-creation; (2) the mechanisms leading to new knowledge and knowledge renewal that point to the continuous production of innovation.

Since extant research focuses only on innovation process or outcomes [16], the approach adopted in this context is devoted to simultaneously analyze the antecedents and the results of innovation and the dynamic relationship between them. Therefore, the framework addresses managers to better understand (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 [8]. 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 [83] enabled by technology. This systems mindset for rereading ICT-enabled value co-creation is in line with the call for research from Nambisan et al. [16] on the need to explore the integration of multiple resources occurring among multiple actors in contemporary ecosystems.

The identification of ICT 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 enablers and ICT 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 exchange and information flows. Therefore, managers are encouraged to monitor value co-creation and innovation in progress during all the phases of service provision by supervising the immersion of co-creation in real time and increasing engagement at each stage. A better understanding of 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 strategically manage the two dimensions.

8. Conclusions

Starting from the identification of the most common enabling dimensions 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 drivers 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 shedding 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 that was unexplored until now.

The work stresses the relevance of knowledge and interactive dimensions as enablers 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 a prerequisite for resource integration that occurs during real encounters and provides real value co-creation experiences (ICT-enabled) and should continue after delivery with continuous enhancement of engagement and renewal of knowledge through feedback offered via social media, for instance.

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

Furthermore, even if the goal is to deeply explore a specific context, the analysis focuses on a single company and this can be another obstacle to obtain a generalizable framework. 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 empirically detect the main enabling dimensions 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). Thanks to the adoption of a mixed method that mediates between induction and deduction [84], the key enabling dimensions and drivers identified in this study can be validated in future studies through (1) a quantitative approach (micro-level for the analysis of "which") to identify and measure some "typical" activities performed by co-creating and

co-innovating actors; (2) a qualitative approach (meso-macro levels for the analysis of “how”) to detect how the different co-created values and novelties can vary and evolve across the various contexts of ecosystems.

Author Contributions: The work can be considered as the result of the joint effort of all authors. However, each author handled some paragraphs. M.G. wrote the Introduction (Section 1); the Sections 4 and 4.4 (in the Section 4, introduction of the framework); the Sections 5, 5.1 and 5.4 in the Results (Section 5); and the discussion (Section 6). C.A.S. elaborated the Theoretical background (Section 2), the Sections 4.1 and 4.2 (Section 4, introduction of the framework); the Section 5.2 (Section 5, Results); and the Section 7, concerning the Theoretical and Managerial Implications of the work. F.L. elaborated the Methodology (Section 3); the Section 4.3 (Section 4, introduction of the framework); the Section 5.3 (Results); and the Appendix. S.B. wrote the Conclusions (Section 8). All authors have read and agreed to the published version of the manuscript.

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Appendix A

Box A1. Analysis Sheet for Content Analysis.

Micro-level: co-design
(1) Strategic profile: How are Palm’s value propositions settled and shared through joint process of decision-making?
(2) ICTs’ role: How 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: How multiple stakeholders co-develop and are co-produced? Who are the main stakeholder groups chosen by Palm Spa? Which are the main resources exchanged by each group?
(2) ICTs’ role: How 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 harmonized 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 at this stage?
Macro-level: co-evaluation
(1) Strategic profile: Are services targeted to produce environmental and social sustainability?
(2) ICTs’ role: How do ICTs permit to collect feedback from users to maintain relationships 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 the company’s values and knowledge over time?
(2) ICTs’ role: How do ICTs foster co-learning and knowledge renewal?
(3) Fit (institutional): Are there practices related to the sharing and renewal of culture?
(4) Innovation: Are there new environmental standards?

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