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A holistic model integrating value co-creation methodologies towards the sustainable development

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ABSTRACT

In the current context, it is observed the need of organizations and institutions not only to satisfy diverse stakeholder expectations as well as meeting the growing need for sustainability innovations. Taking that into account, co-creation can play a key role in stakeholders engagement and sustainable practices could provide a participatory and integrative environment. However, it is barely discussed by academics and practitioners how value co-creation can be a relevant mechanism for sustainable development (SD), what are the key factors for co-creation aimed at SD and how to align co-creation with sustainability. To answer these questions, this study aims to propose a conceptual model of co-creation for sustainability, involving techniques and methodologies aimed at stakeholder engagement and contribution to SD. We used mixed methods approach, based on the use of a bibliometric model, followed by a Survey with application of a structured questionnaire for participants from virtual communities of co-creation processes or sustainability. Based on content analysis and statistical analyzes, a complex interconnection was observed, demonstrating the configuration of an open system, which could be better understood from the construction of a holistic model of co-creation for sustainability. The model can contribute to the meeting of the disciplines of co-creation and the triple bottom line vision of sustainability, integrating key factors and different methodologies that generally are studied in an exclusive and non-complementary way, becoming innovative for the academic, business and social environment. Lastly, it can be concluded that the model can be used integrally or in parts, in organizations of any nature, formal or otherwise, or even from the integration of some individuals of the society who seek solutions for sustainable development.

1. Introduction

The concept of sustainable development (SD) - which was born at United Nations Conference on the Human Environment (Stockholm Conference) in 1972 – is being widely discussed by academics and practitioners due to increased concern for the planet's sustainability over the last decades (Caiado et al., 2017). In the current context, it is observed the need of organizations and institutions not only to improve their economic performance, but also to act with social responsibility (SR) to meet diverse stakeholder expectations (Sarmah et al., 2015) and to address environmental and social impacts. This three-dimensional view of sustainability, known as the triple bottom line (TBL), was proposed by Elkington (1998) based on the proposal of the Brundtland Commission report, in a document entitled *Our Common Future* (WECD, 1987), in which sustainability would be achieved through a balance between economic return, social equity and environmental preservation (Harris et al., 2001).

Although sustainable development is a global cause and society is increasingly sensitive about it (Lozano et al., 2013), there are many complex challenges as the need to align diverse stakeholder expectations as well as the growing need for sustainability

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innovations, implement SR strategies, define and assess sustainability performance (Dias et al., 2014). Furthermore, SD requires collaboration in the form of integrative thinking and action (Keeys and Huemann, 2017; Roome, 2013).

In 2000, Prahalad and Ramaswamy brought to the academy a term and business practice for competitive advantage: co-creation. In 2004, the authors launched the best-selling "The Future of Competition" in which, focused on consumer power, indicate that business-consumer interaction and co-creation experiences between them reveal great opportunities for innovation and value creation. What Prahalad and Ramaswamy (2004b) propose evolves from a business objective of persuading their public and even goes beyond the objective of establishing ties with their buyers because, with co-creation, consumers become part of the extended network of skills, creating value for the business so that the company and itself are benefited. Ramaswamy and Gouillart (2010a) broaden the understanding of co-creation with consumers for co-operation with stakeholders as a way of assuring companies the correct exercise of SR, given that in a co-creative ecosystem it would be possible all interested parties could have an opinion and benefit from the results.

In the SR context, the co-creation phenomenon can play a key role in stakeholders engagement if this business practice involves the other affected stakeholders, besides considering the consumers and the company expectations. In this way, co-creation is an iterative process that can be used as a strategy for achieving SD - a holistic management approach that integrates the dimensions of TBL and considers multiple stakeholders (Keeys and Huemann, 2017).

Based on the aforementioned scenario, co-creation could thus enable the development of new sustainability innovations (Zwass, 2010; Payne et al., 2008; Prahalad and Ramaswamy, 2004b), considering that this approach is supported by an innovative, transparent, adaptive and participatory environment. Moreover, as Arnold (2017), co-creation "changes the perspective of organization-based production processes to (value) 'chain-based' production processes" and is based on the vertical chain-production within inter-organizational relationships.

Currently, it is noticed in the literature that different co-creation methodologies have been used as enablers for sustainability. For example, according to Geissdoerfer et al. (2016), the Design Thinking includes formerly underserved stakeholders in the value proposition, and thus helps companies to improve. their performance while becoming more sustainable. Likewise, Jurietti et al. (2017) states that Living Lab can increase stakeholders interaction in SR processes and dialogues. Considering that many methodologies have differences in relation to the focus, the phases to obtain results, and their potential influence over the interested parties, the alignment of concepts of diverse methodologies in a complementary way could help to create a collaborative approach among all stakeholders, with fewer constraints and more resources and flexibility. So that effective short-term intervention for rapid change can be addressed, as well as the evolving needs and priorities of those involved through a continuous process of exchange of knowledge and long-term and sustainable programs that will enable new learning and innovations in favor of socio-environmental issues. In this sense, the integration of co-creation methodologies can be a viable way to achieve SR and even organizational sustainability, thus contributing to SD.

The integration of value co-creation with SR or even the three dimensions of sustainability is an area that requires further research, since there are limited literary and empirical studies about this (Aquilani et al., 2017; Keeys and Huemann, 2017; Lacoste, 2016; Sarmah et al., 2015). In addition, it is barely discussed how organizations can institutionalize the processes or be responsible for continuous co-creation with a focus on sustainability (Arnold, 2017). There is also a need for a model enabling organizations and institutions to manage their value co-creation processes for the creation of sustainable goods and services.

To address these research gaps, this article intends to follow a strategic perspective of co-creation of value, sharing with sustainability a broader role that addresses society as a whole (Aquilani et al., 2017) and brings about a lasting expansion of wealth-welfare-wellbeing (Ramaswamy and Ozcan, 2014). This exploratory work uses a combination of qualitative and quantitative methods to propose a conceptual model of co-creation for sustainability, involving relevant factors and methodologies for the success of the co-creative activity, engagement of stakeholders and to sustainable development. Then, an empirical study was applied to evaluate the correlation (through statistics) and conceptual relations (through content analysis) between the factors of co-creation towards sustainability. Thus, we investigate the following research questions:

- What are the key factors for co-creation towards sustainable development?
- How can co-creation be a relevant mechanism for sustainable development?
- What are the benefits generated for value creation and sustainable development by integrating these two approaches?
- How to apply co-creation aligned with the concept of sustainability in private or public organizations, third sector and non-formal organizations?

By answering these questions, we make several contributions. First, we contribute to find out the key factors for value co-creation towards sustainable development and the main methodologies involved in this. Second, this research provides a novel holistic model that aims to promote the TBL vision of sustainability through co-creation, by analyzing the outcomes from a mixed-method approach. Finally, it improves our understanding of sustainability, linking this construct to value co-creation.

From a theoretical point of view, the paper contributes to literature, since this model will serve as a reference to guide academics and future research towards the transition to sustainable development. The findings of this study have several important implications for the theory of value creation. First, this is one of the first studies that empirically tests virtual communities - made up of public experts on the issues of co-creation and sustainability - regarding their perception of the main themes, co-creative methodologies and relevant factors. In addition, this model is innovative, as it seeks to present a holistic methodology of co-creation that integrates different methodologies that are usually studied in a substitute rather than complementary form. Finally, the model is interdisciplinary and seeks to meet the needs of multiple stakeholders and the TBL sustainability in an integrated way.

From a managerial standpoint, this model can help managers, leaders, and decision makers in organizations integrate different management approaches, sharing key and common characteristics, to create a unique model that converges the strengths of different co-creation methodologies and seeks to align the perspectives of different stakeholders, by equitably sharing the value created together through collaboration and innovation for the transition to sustainable development.

2. Background

2.1. SD and SR insights

Historically, the World Commission on Environment and

Development's (Brundtland Report), in a document entitled *Our Common Future*, defined SD as the development that must be planned in order to "meet the needs of the present without compromising the ability of future generations to meet their own needs" (WECD, 1987: 37).

Most recently, at the Rio+20 Conference, in its final document *The Future We Want*, the Sustainable Development Goals (SDGs) have been approved and negotiated through a series of measurable targets that require a large amount of global multi-level monitoring effort (Giupponi and Gain, 2016). It is expected that the new SDGs and its targets define a global agenda that adheres to economic growth, social inclusion, and to environmental protection (Stafford-Smith et al., 2016).

According to Hubbard (2006) the three pillars of TBL sustainability show that organizations must evaluate their performance against a wider group of stakeholders with a more holistic view of sustainability. The idea of stakeholders management to strategic management, suggests that managers should formulate and implement processes that satisfy all and only those groups that have a stake in the business, and it is essential to manage and integrate the relationships and interests of these stakeholders in a way that guarantees long-term success (Freeman, 1984). This approach emphasizes the active management of the business environment, relationships, and the promotion of common interests.

Besides that, as Barrena Martínez et al. (2016), there is no consensus on the definition of SR, nor tools or guidelines on how to manage its effects. On the other hand, they reveal the importance of socially responsible behavior on the part of companies as a strategy to legitimize and survive these and indicate the construction of shared value as a basis for this purpose. As Macêdo and Cândido (2011), SR process voluntarily integrate social and environmental concerns into organization operations and can improve partnerships and the commitment to work, being an interaction point in the search for promising and effective actions to improve both the company and its relationship with society.

The relationship between SD and SR can be broken down into three important points: (i) focusing on a wide variety of stakeholders to satisfy their demands and address the triple bottom line of sustainable development; (ii) integrating the considerations of stakeholders into business processes, and (iii) observing a voluntary basis (Steurer et al., 2005).

Thus, SD represents the development focused on a state of sustainability for society as a whole and for the planet and SR, in turn, it is about the behavior of organizations and refers to the responsibilities they have to meet expectations today expressed in society. Therefore, if sustainability is a state to achieve, SD is the means and SR is the contribution of organizations to this environment.

2.2. Value co-creation: concepts and methodologies

Prahalad and Ramaswamy (2004a) made a counterpoint to the traditional concept of co-creation, that the company creates value and that the relationship with consumers is a mere exchange of values, stating that, in fact, co-creation supplants the exchange process, since involves personalized relationships that are relevant and even sensitive to individuals, which brings benefits to consumers and, of course, to businesses and value is co-created, that is, created by both the company and the consumer. It can be concluded in this way that in order to have value creation, it is not enough for the solutions to be co-created, but their benefit (value) must be shared.

Ind and Coates (2013) in the article "The meanings of co-creation" have identified that the concept of co-creation can not be fully attributed to Prahalad and Ramaswamy since the process has roots in the twentieth century. They cite Mary Parker Follett (1868–1933) as a reference. Follet recognized the holistic nature of the community and advanced the idea of "reciprocal relations" and advocated the principle of what it called "integration", or sharing of non-coercive power ("power with" instead of "power over"), as observed by Metcalf and Urwick (2004). In the study, Ind and Coates (2013) propose that "co-creation should be recognized by bringing together psychotherapy, management science, innovation and open innovation, design, literary theory and the creativity practice". The authors conclude that when these new opportunities are combined, the concept of co-creation departs from a vision of enterprise value creation (domain) for a collaborative view in which individuals collaborate with each other to meet their socialization and meaning, putting the organizations in a position of equality, not of dominion.

Pombinho (2015) brings two dimensions of value co-creation: structural (as each part generates value to the network) and temporal (mutual adaptation to increase the value created for the actors involved). The author cites the continuous improvement of service contract from customer feedback. (Pombinho, 2015). Vargas evaluated how sustainable practices in the retail supply chain are developed in front of seven manufacturing companies in Brazil and concluded that sustainable practices are not implemented in the organizations evaluated "without economic gains, pressure from legal norms or restriction on access of raw materials" (Vargas, 2016, p.100). Vargas identified that stakeholder engagement in the chain, through win-win negotiations and cost sharing, is a way to get more sustainable products at more affordable prices, demonstrating that, in practice, the applied concept is still the traditional one.

According to Vargo and Lusch (2004), the value co-creation takes place from the perspective of the dominant logic of service, in which the client is mainly an operant resource, an active participant in relational exchanges and coproduction. However, coproduction can be identified not only in the corporate vision. Bovaird (2007) identified that policy making and service delivery in the public domain are no longer viewed as one-way processes, indicating a coproduction approach in which users and communities are part of service planning and delivery. Thus, based on the authors' use of the terms co-creation, coproduction and value co-creation almost as synonyms and always focused on their greater objective - which is the shared value - for the purposes of this study, when presenting the term co-creation, it is briefly understood as the joint verification of problems and solutions for creating shared value.

De Morais and Santos (2015) state that coproduction and co-creation are independent variables and for both cases, combined or separately, there may be co-created value. What determines the co-created value is the integration, and the level of integration is determined by the degree of depth in the process adjustments for the co-creation, the integration of resources, the availability of the actors and the richness of channels and clarity of communication among customers, suppliers and other stakeholders.

Table 1 summarizes some of the main methodologies for co-creation, considering any and all techniques that aim to apply a collaborative work from conception to results.

Furthermore, the co-creation makes CSR to take a significant step forward because it generates benefits such as allowing all stakeholders to have an opinion and benefit from the results, increasing the social legitimacy of companies and simultaneously expanding and transforming the value of the business, bringing together the various stakeholders in what could be called "social ecosystems" (Ramaswamy and Gouillart, 2010a,b, p. 112).

Table 1
Co-creation methodologies.

Metodologies	Description	Focus/Diferential	Author(s)
Design Thinking (DT)	It uses divergent and convergent thinking and consists of a process based on the user experience, formatted in three stages: inspiration (circumstance of the problem and/or opportunity that motivates the search for solutions, change), ideation (brainstorming, generation, development and testing of ideas that can lead to solutions) and implementation (business model and verification of results for the new project).	Use of techniques (sometimes experiential) to know the users' perspective and use of prototypes in the ideation phase (brings gains in agility and creativity for the development of solutions).	Brown et al. (2008)
Appreciative Inquiry (AI)	The process begins with the choice of an affirmative topic and is conducted in four stages: Discovery (investigation of what is best), Dream (sharing, checking of common themes and development of shared dream), Planning (construction of the plan for the dream to become reality) and Future (public declaration of the actions intended by all involved).	Methodology of organizational change focused on quality, on the positive, not on the problem to be solved (confers a solution based on something that is already in the nature of the organization and can facilitate implementation).	Cooperrider et al. (2008)
Dragon Dreaming (DD)	It is part of the priorities and values of the individual and is conducted in four stages: dreaming (stimulating the intention of the relationship), planning (threshold of possibility in context), performing (acting with commitment) and celebrating (response with expected satisfaction).	The methodology uses deep listening tools in order to have a more transparent dialogue to establish great empathy (which allows the project scope to emerge from the group itself).	DRAGON DREAMING BRASIL (2014)
U Theory (UT)	A framework of leadership and change based on consciousness in a process that can be demonstrated graphically as the letter “U” because it includes: descent (listening tools), bottom of the “U” (moment of reflection) and ascent (prototype, feedback, adjustments and evolution).	Although it is useful as a technique for co-creation, it is much more than a punctual methodology with beginning, middle and end because it presents a series of tools that act on the behavioral change of individuals and society.	Scharmer and Kaufer (2014)
Living Lab (LL)	An open, user-centric ecosystem of research and innovation, integrated with society and real-life contexts, using a variety of methods of co-creation, with multi-stakeholder participation and generally provided by a scientific or academic institution.	It is a platform for co-creation, not a co-creative methodology in itself, therefore, it uses several methodologies of approach of experimentation, providing more flexibility and greater conditions for prototyping in real situations.	Vérilhac et al. (2012); Schaffers et al. (2011a); Ståhlbröst e Holst (2012); ENOLL (1999)
Open Space Technology (OST)	This technique introduces a step-by-step process to generate the collaborative process, free and that provokes the sense of responsibility, that disposes the people in circles, in order to provoke the dialogue, without a clearly defined agenda (the group agenda, collaboratively).	Commonly used to facilitate the exchange of information and building solutions for complex and potentially conflicting issues in large groups.	Owen (2003)
Nonviolent Communica-tion (NVC)	Language and communication skills, based on awareness of what we are perceiving, feeling and desiring, that allows us to reformulate the way in which we listen and express ourselves, with honesty and clarity, generating empathy.	It presents more as a behavior, a value translated in the form of communication that stimulates inclusive, collaborative and productive dialogue, leaving generalizations and judgments out of the conversation. It is complementary to other co-creative techniques.	Rosemberg (2006)
Networks	Tools that facilitate interaction and, make it possible to convert, as a result of their dynamics, competition in cooperation.	In general it is used in support of a process, since the purpose must be assumed by the members in order for the network to transform, in fact, competition in cooperation.	Franco (2008)
Listening	It is a practice of listening deeply. It is presented in four levels: Level 1 or Downloading (basic, ruled by habitual judgment, that only serves to reconfirm old opinions); Level 2 or Factual (occurs when the individual opens the mind to receive different information), Level 3 or Empathic (occurs when the individual establishes an emotional connection, which we see from the eyes of another person) and Level 4 or Generative when, connected to the medium, it enters into a generative process and liberates collective creativity).	Like the NVC, it presents itself more as a behavior, a value translated in the way of listening in an open way and without judgments. It is complementary to other co-creative techniques.	Scharmer and Kaufer (2014)
World Café (WC)	Participatory dialogue in groups, distributed in a receptive and hospitable environment (like coffee tables) that talk about relevant questions around a purpose.	It allows the group to have access to a form of collaborative intelligence, since it stimulates the participation of all (from smaller groups), allowing richness in the variety of points of view and their connections, patterns and insights (table rotation and conclusion in the form of plenary).	Brown (2010)
Circle Process (CP)	Focused on a single circular group, it is a process that, from the use of a “stick of the word”, passed from person to person consecutively around the circle, is configured the dialogue, in which the person can speak without being interrupted.	It combines empathy-generating and participatory techniques, facilitating collective awareness and consensus.	Pranis and Boyes-Watson (2011)

2.3. Co-creation for sustainability

Sustainability co-creation means combining resources, knowledge and (cap-)abilities across multiple stakeholders, which means that co-creation is related to sustainable learning, relationship management and the support of sustainable tools (such as life cycle assessment - LCA) in order to achieve improvements in the value chain, products and services in the three dimensions of sustainability (Arnold, 2017). On a complementary basis, it can be seen that through the adoption of SR strategies and initiatives, organizations can keep community members as stakeholders for co-creation of value, generating profitable business results, while motivating partners to pursue integrity (Sarmah et al., 2015). Thus, the more stakeholders are engaged, the greater the influence on the development of sustainable innovative processes, which shows that just as co-creation is a powerful way of advancing sustainability transformations, the adoption of sustainable practices fosters dialogue among stakeholders, provides a systemic view of societal problems and acts as a holistic, participatory and integrative strategy that leverages the co-creative environment. Considering the literature related to this theme, we observed 20 relevant factors for the implementation of a co-creative process towards sustainability (Table 2). It should be emphasized that the authors marked in the table approach the related factor, partially or totally.

Table 2 shows that three factors were unanimous in the literature review and therefore require greater importance in the co-creation process: in terms of "selection" of participants, "participation" and "propagation" of the information, being considered critical from this perspective.

3. Research methodology

This study adopted the exploratory method in order to clarify the perception of market with regard to co-creative processes for sustainability and find out what's in the literature on value co-creation and sustainability. It was also decided to conduct a descriptive research using the cross-sectional survey, quantitative variables, using a structured questionnaire, in which we analyzed the perceptions of experts and better understanding of the data. In this way, the mixed methods approach was adopted, since it provides more comprehensive understandings (McKendrick, 2009), as well as multiple ways and with a broader range to detect new practices and new learning opportunities (Iaquinto, 2016). Briefly, the research steps and the methods used in data collection for the proposition of the model are indicated in Fig. 1.

3.1. Identifying preliminary concepts

An extensive literature review was conducted with a view to identifying and describing some concepts and methodologies of co-creation for stakeholder engagement and contribution to SD, materialized in section 2, which served as a basis to support the survey. The literature was searched in line with the biliometric model of Costa (2010), called the webibliomining, using the Scopus database as Santos and Mexas (2016). Much attention was paid to selecting the right keywords to retrieve papers. The search was performed on January 4, 2017 using the following search string: {("*co-creation*" *OR* "*collaborative methodology*") *AND* ("*engagement*")} *OR* {("*co-creation*" *OR* "*collaborative methodology*")) *AND* ("*sustainable development*" *OR* "*sustainability*")} *OR* {("*co-creation*" *OR* "*collaborative methodology*") *AND* ("*social responsibility*" *OR* "*stakeholders*" *OR* "*accountability*")}. After excluding duplicities, a total of 745 documents were obtained. In this research, we selected the first documents on the subject, the documents of the main authors, the most cited documents throughout the research period and the most cited ones per production cycle, obtaining a total of 142 documents, which were analyzed. As inclusion/exclusion criteria, only those articles that had content of co-creation or co-creative practice focused on SD were considered as purpose. From the reading of the titles of the documents, those that were further from the research objective were excluded, resulting in 62 documents, from which all the abstracts were read and 31 main documents were selected for full reading.

Then, critical and in-depth review and analysis on the selected papers was performed through qualitative content analysis. The content analysis in relation to the process was performed with the editing, coding and tabulation of case studies in *Microsoft Excel*. Such a content analysis was done to systematically identify characteristics among the articles in order to reveal important elements of such process, as indicated by Gray (2012). Thus, there was a categorization of the content of the selected articles, observing similarity in the processes studied and identifying 20 key factors for the development of a co-creative process with a goal related to SD, which are detailed in section 2.3.

3.2. Survey design

The exploratory survey method was considered more appropriate to understand the perception of the virtual publics of co-creation and sustainability (Forza, 2012), regarding the application of co-creation to define problems and solutions for sustainable development. Firstly, a pilot questionnaire was applied with four professionals with high experience and knowledge in innovation, co-creation and sustainability, in order to test content validity and readability of the issues. Professionals were chosen because of their professional nature (experience time greater than ten years in co-creation and greater than five years in sustainability). The result was very positive, demonstrating the need for only two settings: in relation to the scale, which now includes a central category (neutral) (Likert, 1932) and changing the order of the factors, "lucidity" followed by "selection ", for didactic and logical purposes. Thus, the pilot questionnaire provided a better refinement of the questions, ensuring that there was clarity and objectivity to answer the questions.

The web questionnaire was structured as follows: (1) identification of the respondent's country; (2) self-declaration if they participated in a co-creative process (definition of the study); (3) self-report if they participated in a co-creative process for SD; (4) evaluation as to the scope of the objective of the process (totally, partially, not reached); (5) spontaneous indication of the key factors for the result obtained; (6) indication of the methodologies used; (7) perception regarding the contribution of the co-creation to SD; (8) evaluation of the relevance of factors identified in the literature; (9) spontaneous indication of unquoted factor of the previous question; (10) observation regarding the search and (11) indication of e-mail to send the result. The question (8) was answered using a Likert 5-point scale (1 = "irrelevant", 2 = "little relevant", 3 = "neutral", 4 = "relevant" and 5 = "very relevant") allowing answers with varying degrees of classification to indicate the significance of the factors (Blok et al., 2014). Moreover, the open questions (5) and (9) aims to identify and validate the key factors as well as help to understand the causal relationship between factors involved in the sustainable co-creative process.

3.3. Data collection and sample

Considering that for the application of the research it was important to have people who had some experience in a co-creative and/or in co-creation process for sustainable development, the web survey was sent in August 2017 to the most relevant

Table 2
Factors to implementing a co-creative process for sustainability.

Factor	Description	Knight et al. (2012b)	Schaffers et al. (2011b)	Mauser et al. (2013)	Trencher et al. (2013)	Reed et al. (2014)	Ramaswamy and Chopra (2014)	Ramaswamy and Gouillart (2010b)	Batterham et al. (2014)	Steelman et al. (2015)	Evans et al. (2015)	Sitas et al. (2016)	Voytenko et al. (2016)
Selection	Choice of participants made in a non-random way, but from the materiality, influence and diversity.	●	●	●	●	●	●	●	●	●	●	●	●
Knowledge	Inclusion of participants who are reference in the theme and/or complete assessment of the problem, its impacts, related behavioral and environmental conditions and any known determinants.	●		●	●		●		●	●		●	●
Lucidity	Purpose and process clearly understood among those involved.	●	●	●	●	●		●	●	●	●	●	●
Relevance	Recognition of the relevance of the theme by participants for sustainable development.	●	●	●	●	●	●	●	●	●	●		●
Interest	Identification of the interests of those involved in the process.			●	●	●		●			●	●	
Legitimacy	Interests of participants aligned with the purpose of the activity.				●	●							●
Scenario	Knowledge of participants' needs and situation and/or mapping of interactions between them.				●	●		●		●	●	●	●
Resources	Survey of resources needed for the activity (financial, time, human, among others).			●	●	●			●	●		●	●
Risk	Risk analysis of involvement, ethical implications, transdisciplinary friction and political processes.		●			●					●		
Capacity	Similar capacity between the participants for the dialogue (for example, there are no concept or linguistic barriers).	●				●	●			●		●	●
Trust	Establish an environment of trust, empathy and goodwill among the participants, which may include initial involvement, mobilization and awareness activities.	●			●	●	●		●	●	●	●	
Facilitation	Use of facilitators who are trained for the co-creative process, motivators and with their defined roles and responsibilities.	●		●	●	●	●	●			●	●	●
Participation	Interactive and dialogical activity, offering tools or platforms (face-to-face or virtual).	●	●	●	●	●	●	●	●	●	●	●	●
Balance	Fair interaction process, with balanced participation among the participants.					●				●	●	●	●
Engagement	Method with level of involvement adequate to the participants' expectation.					●				●		●	●
Flexibility	Methodology that allows adaptation when the needs and priorities of the participants evolve.					●					●		●
Experimentation	Prototyping or environment for experimentation of co-creative products.	●	●		●		●	●	●	●	●	●	●
Result	Execution of a plan of action to achieve the objectives and to bring results to society.	●	●	●	●	●			●	●	●	●	●
Propagation	Communication of results, maintenance of the dialogue and tools to expand the spread of information to other levels.	●	●	●	●	●	●	●	●	●	●	●	●
Follow up	Constant evaluation of the action plan, monitoring and study of future activities.	●	●	●		●			●				●

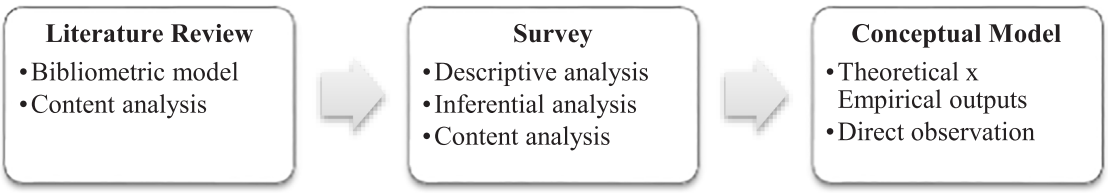

Fig. 1. Mixed methods approach to propose the Conceptual Model.

and representative professional groups existing on LinkedIn® and Facebook® platforms using the keywords "cocreation", "design thinking", "U theory", "appreciative inquiry", "dragon dreaming", "world cafe", "living lab", "nonviolen communication", "circle process ", " sustainability "and" sustainable development". The message with the web questionnaire was sent in English and Portuguese, according to the language of the group. The selected communities were: *Design Thinking*, *Copenhagen Co-Creation*, *Appreciative Inquiry 1st*, *Corporate Social Responsibility CSR* and *Sustainable Development (Sustainability)*, *Sustainability Professionals* on LinkedIn® and *Theory U in Practice*, *Dragon Dreaming Brazil* and *Service Design, Design thinking, Service Innovation* on Facebook®.

After an eight-week survey period, a total of 165 experts agreed to participate. Of this total, 60 responses were excluded for incomplete data, totaling 105 valid answers, with complete answers, which represents a return of more than 63.6%. The sample is considered non-probabilistic (sampling for convenience), since the researcher does not know the probability that an element of the population must belong to the sample (Sekaran and Bougie, 2010) and that the publics were selected from according to the platforms, criteria of accessibility and availability (Megliorini, 2004, p.42).

About the nationality distribution, although the vast majority of respondents are from Brazil, it is possible to verify that respondents from 24 different countries around the world answered the web survey. The other five countries with the largest number of respondents were: (i) United States (USA), (ii) Netherlands, (iii) United Kingdom, (iv) India and (v) Colombia.

3.4. Data analysis

To make better use of the collected data, the logical sequence for analysis was adapted in line with the research objectives and consistent with the current theory studied. Firstly, the webibliomining model was used in order to identify documents already published on co-creation techniques for stakeholder engagement and contribution to sustainable development. We then proceeded to the content analysis stage of the selected articles. This allowed the analysis of the repetition of important characteristics and a phrasal construction of each key factor. As a result, it was possible to identify 20 key factors for the success of co-creative activity for this purpose.

We then proceeded to verify these factors by means of an online exploratory survey, in order to test the results obtained in the bibliographic research with the perception of the public (virtual communities). The questionnaire was structured in order to first identify the members of the communities that have already participated in the sustainability processes so that they could spontaneously point out key factors for the success of the activity. For this, open questions were asked to the respondents, so that it is possible to identify key factors complementary to the already identified from the content analysis of the secondary data, articles. The questionnaire was also constructed in order to obtain the respondents' perception of the relevance of each of the 20 key factors previously identified.

In the questionnaire a free field was placed below each closed question that assessed the level of relevance of the factor. In the content analysis of these responses, one point of contact was assigned each time when the respondent referred to another item when evaluating the relevance of one of the items. We identified 0 to 5 contact points. It should be noted that respondents were not asked to identify correlations. This indication was spontaneous and, therefore, has no statistical relevance, but indicates, qualitatively, interpretations of the relations between the key success factors for the co-creative process for sustainability, allowing, together with the statistical analysis of correlations, to construct the model, approaching or distancing the factors at each stage. As the last attempt to extract from the respondents the key factors for successful co-creative activity, an open question was posed after the evaluation of the 20 factors, so that they could indicate one or more factors that were not covered in the previous question. Again no new key factor was identified.

The closed questions were analyzed using descriptive and inferential statistics using the R software (R Development Core Team, 2013) while the open questions were analyzed through content analysis, following the methodology of Gray (2012) using a spreadsheet in the *Microsoft Excel* application for categorizing the parsed data manually. The descriptive statistics used included frequencies/percentages to describe sample characteristics analyzed and the calculation of Cronbach's alpha, to measure the internal validity. Cronbach's alpha statistic (Cronbach, 1989) presented by Lee J. Cronbach in 1951 is one of the main ways of estimating the internal consistency of each construct in a questionnaire (Forza, 2012), and should reach the minimum level of 0.70 and can admit 0.60 in exploratory research (Hair et al., 2010). Inferential statistics were also used as the Shapiro-Wilk normality test (S-W) and the correlation analysis between items of the construct. Many authors (Leotti et al., 2005; Öztuna et al., 2006; Cirillo and Ferreira, 2003) consider S-W to be the best test for adherence to normality. Shapiro and Wilk (1965) developed the test to show that it is efficient for different distributions and sample sizes. As the data did not present a normal distribution, the Spearman coefficient ρ was used, which is a bivariate correlation procedure that does not require the relationship between the variables to be linear, to measure the strength of the association between the ordinal variables and uses the order of observations, instead of the observed value, only (Pestana and Velosa, 2006).

Furthermore, for the treatment of qualitative data, again the content analysis was used through a coding system to interpret the data. Descriptive responses were grouped into categories and most of them addressed a key factor. We categorized the data into nominal (respondents' comments) and grouped manually all the placements relative to each category based on the twenty key factors for the analysis. Another analysis was done specifically on the relevance of each factor. Besides that, each respondent could freely comment on this factor, spontaneous indicating the possibility of interrelationship between the factors.

The questionnaire also allowed the respondents to indicate the co-creative methodologies used. As a result, it was observed that DT

is the most used and the Open Space, a methodology which was not previously identified, was spontaneously indicated to compose the questionnaire. From the survey in the literature of each one of the methodologies used by the respondents, it was possible to distribute them in the model, respecting the phases of the process, with the intention of being a practical application orientation, thus being able to contemplate the key factors related to each one of them. These methodologies are references for the delivery of the factors and, given that new techniques are created over time, the continuous enrichment of the model with the addition of new tools is indicated, in order to allow, more and more, flexibility to the applicators, adjusting to their reality and practical ability.

4. Results and discussion

4.1. Descriptive statistics

In the analysis of the first part of the questionnaire, it was noticed that among the 105 respondents, 84 already participated in some co-creative process, 59 of them doing so focused on sustainable development. The 59 respondents were invited to choose a case of co-creative process to contribute to the SD and state whether, in their perception, the specific objective of the co-creative process had been reached. As a result, 26% stated that the specific objective of the co-creative process was fully achieved, 59%, partially achieved, 12%, was not reached, and 3% did not know how to respond. From these answers, each respondent was asked spontaneously to inform the relevance of these key factors for the result obtained. The content analysis from such questioning is in session 4.3.

From the list of methodologies identified in the literature review, the 59 respondents should also identify which co-creative methodologies are most commonly used for sustainability. It was observed that DT (26 cases), AI (17 cases) and the use of virtual communities or networks (17 cases) were the most cited techniques. In addition, all of the 105 respondents stated that co-creative processes can contribute to sustainable development.

Then, we sought to verify what is the degree of relevance of the factors for the success of co-creative processes aimed at sustainable development. The result can be seen in Fig. 2.

From the analysis of Fig. 2, it is observed that the factors are considered, in general, as relevant or very relevant. The factors considered key under this point of view are “lucidity” and “trust”, which had more than 70% of responses in the “very relevant” degree, as well as “selection”, “interest”, “flexibility”, “result”, “propagation” and “follow up”, which had a percentage greater than 90% when adding a “relevant” or “very relevant” response. On the other hand, the factor “capacity” was the one with the highest percentage of “irrelevant” and “little relevant” (above 30%).

“Lucidity” was identified as the most relevant for all respondents (highly relevant = 80% and relevant = 17.14%). Establishing a “trusting” environment was the second most relevant aspect to the success of the co-creative process, 73.33% considered this point very relevant and 19.05% relevant.

The execution of a plan of action to achieve the objectives and to bring “results” to society was the third item identified by the respondents as more relevant (highly relevant = 59.05% and relevant = 36.19%), followed by the identification of the “Interests” of those involved in the participation of the process (highly relevant = 52.38% and relevant = 40.95%).

As each question has made room for comments, in session 4.3 there is a qualitative analysis on this point that needs to be considered beyond the quantitative numbers expressed in the current session.

In order to ascertain the internal reliability of the issues related to the survey' second part, the Cronbach's alpha was used. For a sample of 105 respondents and a total of 20 items, the alpha of the entire set was 0.9152, which shows high reliability (Hair et al., 2010).

For each of the factors, the value of the Cronbach alpha was also calculated, in case the factor was removed from the set of items. Table 3 shows that Cronbach's Alphas, after item removal, do not suffer from large oscillations, ranging from 0.9037 to 0.9224, which is acceptable and highlights the high internal reliability of the questionnaire.

4.2. Inferential statistics

By normality test it was noticed that there was no statistical significance between the S-W values of the variables of the test (Table 3). Therefore, by considering the greater efficiency of S-W test, it was possible to verify that the data are not normally distributed.

Then, considering the non-normality of the factors, the coefficient of correlation between the different factors of the sustainable co-creation of the questionnaire was calculated (Table 4). We used the Spearman's correlation coefficient, which is the most appropriate for non-parametric data, because the coefficient measures the intensity of the relationship between variables, using only the order of observations instead of the observed value (Frugoli et al., 2015).

Through the application of the Spearman test, correlations between factors are verified. The correlation between “follow up” and “propagation” and “result” can perhaps be explained by taking into account the sequence of the process, that is, it is necessary to draw up a plan (“result”) so that “follow up” and dissemination to other instances (“propagation”). At the same time, it is natural to have a correlation between “legitimacy” and “interest”, since the definition of “legitimacy” includes the alignment of the “interest” of the participants with the purpose of the activity.

Positive and moderate correlation between “balance” and “scenario” factors ($r = 0.3837$). was observed by Ramaswamy and Gouillart (2010b), since it is fundamental to understand and map the current interactions between those involved and that they are able to interact directly with each other, and that capacity allows the “balance” of dialogue.

Besides that, it was identified a correlation between the “risk” factor and the “resources” ($r = 0.4130$) and “participation” ($r = 0.3605$) factors. These correlations could be explained considering that what each participant “donates” to the co-creative process is a resource. In this perspective, as identified by Reed et al. (2014), conflicting stakeholders need to be identified at the beginning of the process, given that conflicts impact on the performance of each participant (“participation”), which is a relevant resource.

It was also identified a correlation between the “result” factor and the “lucidity” factor ($r = 0.3524$), which can also be explained by the definition of the items themselves. Since lucidity consists in the purpose and the process being clearly understood among those involved, it is natural to have a correlation with the results, since it consists in the execution of a plan of action to reach the objectives and to bring results to the society. In this way, it would be inconsistent to develop a plan of action for reaching an unenlightened purpose.

Ramaswamy and Gouillart (2010b) recommend workshops to facilitate sharing and devise ways of improving them, as well as building platforms for new interactions, in order to maintain dialogue and the generation of new ideas (“participation”). In a complementary way, the level of “engagement” correlates with “balance”, as observed by Reed et al. (2014) and Steelman et al.

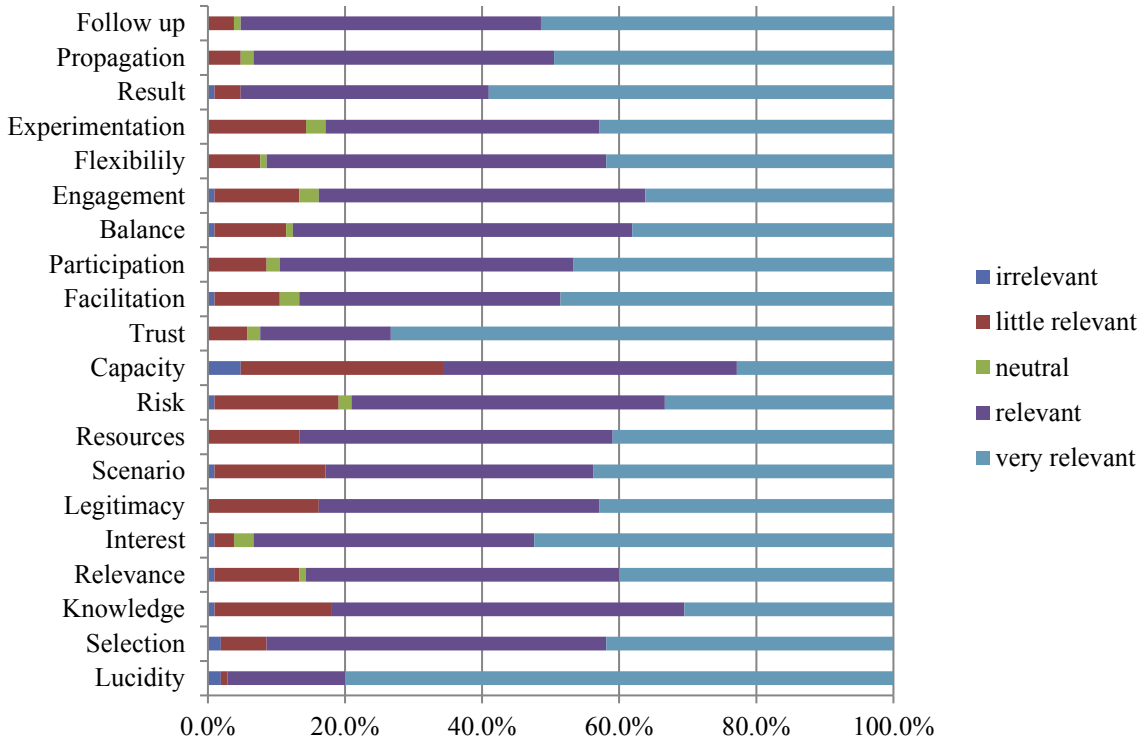

Fig. 2. Degree of relevance of the factors for the success of co-creative processes for sustainable Development (n = 105).

Table 3
Reliability and normality analysis.

Items	Cronbach's alpha (if item removed)	S-W test	
		Statistic	p-value
Lucidity	0.9151	0.4329	<2.2E-16
Selection	0.9150	0.7007	2.51E-10
Knowledge	0.9162	0.7603	8.41E-09
Relevance	0.9184	0.7449	3.23E-09
Interest	0.9174	0.6938	1.73E-10
Legitimacy	0.9177	0.7316	1.45E-12
Scenario	0.9185	0.7413	2.59E-12
Resources	0.9146	0.7273	1.13E-12
Risk	0.9139	0.7792	2.92E-08
Capacity	0,9224	0.8164	4.20E-10
Trust	0.9144	0.5544	2.53E-16
Facilitation	0.9037	0.7303	1.35E-12
Participation	0.9037	0.7195	7.19E-13
Balance	0.9037	0.7383	2.16E-12
Engagement	0.9037	0.7662	1.23E-11
Flexibility	0.9037	0.7149	5.55E-13
Experimentation	0.9037	0.7495	4.29E-12
Result	0.9037	0.6353	8.98E-15
Propagation	0.9037	0.7041	3.03E-13
Follow up	0.9037	0.6858	1.13E-13
Total alpha = 0.915199			

(2015): one must understand the context in which such workshops or platforms are generated and one must consider the understanding of the traditions and culture involved, given that the process needs to consider the ability to engage culturally and politically the participants in order to allow effective transdisciplinary interaction.

In addition, knowing the participants' scenario, process and expectations, it is understood what will make it continue to "participate". This construction needs to be carried out over the long term on the basis of two-way dialogue ("balance"), in a secure environment to generate new knowledge together, and effective knowledge holders help the process "trust" environment. Employing a professional facilitator ("facilitation") for workshops is an important point, especially in cases where there is conflict or controversy (Reed et al., 2014), a facilitator who needs to be skilled enough to respond to evolving needs and priorities of those involved ("flexibility").

4.3. Content analysis

In content analysis, the factors "lucidity" and "selection" were highlighted, considered unanimous as to their importance as seen in theory. The comments show that there is no way to co-create without participation, dialogue, interaction and even place participation as a condition for sustainable project development. Complementarily, they suggest that to be successful in the co-creative process for sustainability it is necessary to have goodwill, from the connection and the relationship between the participants to the engagement and that the level of involvement can increase from the development of the process and can be leveraged with the facilitator's work.

The most evident correlation occurs between the knowledge and the similar capacity among the participants for the dialogue. When assessing the capacity factor, respondents cite the importance of including participants to allow a full assessment of the problem and any determinants of knowledge. At the same time, they associate the factors "knowledge" and "selection", especially regarding the need to include diverse participants, considering that this multidisciplinarity generates knowledge. It is concluded, therefore, that "capacity" can not overlap with "selection", impacting on the diversity of actors, considering this multidisciplinarity could be impaired if priority was given to similar capacity for dialogue, but rather that "Selection" is prioritized for the sake of "knowledge".

From the point of view of the content analysis made from

Table 4
Spearman's correlation between the factors.

Id	Factors	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
F1	Lucidity	1																			
F2	Selection	0.1709	1																		
F3	Knowledge	0.1096	0.2238	1																	
F4	Relevance	0.1805	0.0655	0.2340	1																
F5	Interest	0.1777	0.0124	0.1863	0.2367	1															
F6	Legitimacy	0.1030	0.2022	0.1905	0.2920	0.4401	1														
F7	Scenario	0.1952	0.0074	0.1312	0.2298	0.2217	0.2665	1													
F8	Resources	0.1853	0.2276	0.1958	0.2490	−0.0055	0.2090	0.2820	1												
F9	Risk	0.1608	0.2121	0.3025	0.2730	0.0006	0.2088	0.3361	0.4130	1											
F10	Capacity	0.0983	0.0640	0.1762	0.0346	0.0799	0.1528	0.2146	0.3722	0.2325	1										
F11	Trust	0.1812	0.1382	0.1455	0.1774	0.2664	0.3168	0.2556	0.2431	0.2543	0.2377	1									
F12	Facilitation	0.1066	0.2519	0.2834	0.0459	0.0988	0.1215	0.0906	0.2106	0.2983	0.1086	0.3427	1								
F13	Participation	0.1325	0.0940	0.1682	0.3792	0.3074	0.3402	0.2556	0.3232	0.3605	0.0914	0.3688	0.3350	1							
F14	Balance	0.1923	0.0450	0.2579	0.2705	0.2384	0.2485	0.3837	0.1767	0.2144	0.1752	0.2115	0.1278	0.3508	1						
F15	Engagement	0.1999	0.0508	0.1084	0.2634	0.3422	0.2512	0.3185	0.1711	0.1523	0.2110	0.2473	0.2672	0.3414	0.4023	1					
F16	Flexibility	0.0739	0.0029	0.0317	0.0853	0.2188	0.2320	0.3988	0.2705	0.1424	0.1705	0.3664	0.1509	0.3037	0.2648	0.3404	1				
F17	Experimentation	0.1390	0.0094	0.1291	−0.0679	0.0457	0.0794	0.3476	0.1621	0.1264	0.1123	0.0431	0.1564	0.2195	0.3017	0.1019	0.1665	1			
F18	Result	0.3524	−0.0040	0.1744	0.2475	0.2030	0.0470	0.2707	0.2547	0.3108	0.0363	0.0835	0.2656	0.2006	0.1581	0.2635	0.2603	0.2106	1		
F19	Propagation	0.2118	0.1800	0.1421	0.2275	0.2558	0.3463	0.2347	0.2551	0.1756	0.1667	0.2394	0.2531	0.3305	0.3408	0.3234	0.2967	0.2305	0.1748	1	
F20	Follow up	0.1279	0.0361	0.2185	0.1404	0.2467	0.2455	0.1842	0.3142	0.3006	0.1741	0.2262	0.2968	0.3175	0.3758	0.2788	0.3086	0.1457	0.4226	0.4559	1

survey's open responses, five factors were spontaneously quoted as relevant by the respondents in ten or more citations: “trust” (18 citations), “selection” (12 citations), “knowledge” (11 citations), “lucidity” (10 citations) and “resources” (10 citations).

5. Conceptual model of co-creation for sustainability

To construct a conceptual model for the sustainability co-creation, it was observed that it would be necessary to include in the same framework the relevant co-creation' factors and methodologies in a project timeline. From the content analysis performed, the comments regarding project management and process management were considered. Batterham et al. (2014) recommends that organizations co-create and refine interventions using the PDCA (Plan-Do-Check-Act) cycles and Mauser et al. (2013) proposes a co-creation process in three key stages: design, production and dissemination. In the model proposed in this research, a similar method to the PDCA was used, and an additional stage was inserted, understood as fundamental for the co-creative process from the content analysis: the resignification. Given that the co-creative process is part of a problem or opportunity observed by one or more individuals, as it involves more audiences, such a problem or opportunity needs to be analyzed from the perspective of all those involved. To this end, there are numerous co-creative methodologies that insert that moment in your process. In this way, the proposed model was divided into: preparation, resignification, solution, test and dissemination.

The factors were also grouped in the items of the General Systems Theory. Von Bertalanffy (1975) defined systems as a set of interrelated elements with a common goal. In this way, the proposed model highlights the relevant factors related to the common objective (purpose) and groups the other factors from the role of each to the system (input, processing and output). As identified by Von Bertalanffy (1975), interaction generates feedbacks that create new properties that may be beneficial or harmful. The co-creative process is an open system, that is, a system that interacts with the environment, which performs constant exchanges, self-regulated, capable of growth, development and adaptation. Being therefore a highly complex system, having its environment in permanent interrelation, it would be easier to analyze it by dividing it into smaller subsystems. In this way, the proposed model also presents co-creative techniques indicative for each phase of the process. Each technique is, in fact, a subsystem that, recombined as a whole, allows for a broad, flexible yet targeted vision for the success of co-creative activity for sustainability. Von Bertalanffy (1975) also indicates that systems to be sustainable must bring clarity to their objective, be governed by feedback and be able to adapt, which are considered in the proposed model.

The SDGs are considered as starting point of the model and are represented schematically by the three dimensions of the TBL, since the co-creative process must start from an intention and a purpose. On the basis of the model is the indication of the stage for co-creation of value (co-creation and coproduction), based on an adaptation of the theoretical model of co-creation of value of De Morais and Santos (2015). Finally, the arrows indicate a process of continuity, feedback or beginning of a new cycle. The beginning of a new cycle indicates that, with the existence of results of the process, these results impact the environment in which the stakeholders are inserted and impact a new and relevant sustainable development goal that generates a new purpose and, therefore, a new cycle. By inserting the TBL, the phases of the process, the system items, the key factors and the methodologies of co-creation, we have, finally, the proposed model of Co-creation towards Sustainability (Fig. 3). The caption of the model is shown in Fig. 4.

By analyzing the proposed model it is possible to identify which

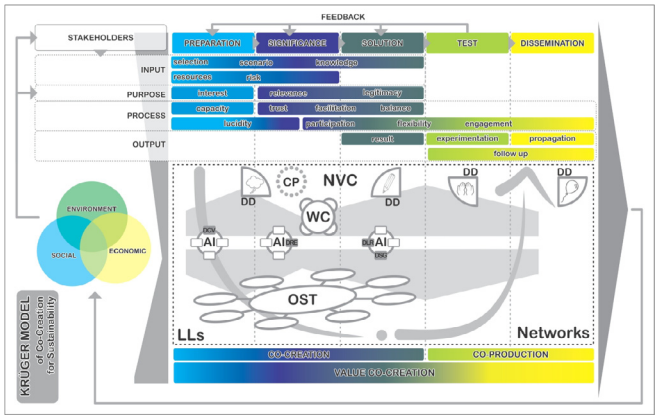

Fig. 3. Model of value co-creation towards sustainability (Krüger Model).

	Triple Botton Line	IA	Discovery Stage Appreciative Inquiry
CP	Circle Process	IA	Dream Stage Appreciative Inquiry
	U Theory	IA	Design and Deliver Stages Appreciative Inquiry
OST	Open Space Technology	DD	Dreaming Dragon Dreaming
Networks	Networks	DD	Planning Dragon Dreaming
NVC	Nonviolent Communication	DD	Doing Dragon Dreaming
LLs	Living Labs	DD	Celebrating Dragon Dreaming
	Design Thinking	WC	World Café

Fig. 4. Caption of the proposed model.

key factors and co-creative methodologies are essential in each phase of the process. Thus the model can be used to guide private organizations, public, third sector and non-formal organizations in the application of co-creation aligned with the concept of sustainability. The five phases of the model are discussed in detail below:

5.1. Preparation

The Preparation consists of the initial phase, in which, from a "referential" (a person, a group, an institution), it is observed a problem or opportunity for SD. In the DT process, the Preparation phase is equivalent to the inspiration phase (in particular the phases of understanding and observation), that is, circumstance of the problem and/or opportunity that motivates the search for solutions and change (Brown et al., 2008). At this stage of the process, the first key factor that stands out is the "selection". From that moment an initiative is generated by the search of other relevant actors. In the content analysis it was observed that it is important to involve connoisseurs in the theme and impacted by the theme in question and that the formation of a multidisciplinary group is fundamental to bring multiple visions to the dialogue.

OST indicates voluntary self-selection (Owen, 2003), but relevant actors may not volunteer because they were not sufficiently motivated to do so. In this way, it is natural for the key factor "interest" to appear at the same time of "selection", since one directly impacts the other. In the content analysis of the survey, it was observed that people's interest, needs and values impact on the motivation for the process, as well as the unknown individual interest can impair the understanding of the behavior of the participants.

In addition, at this stage it is important to assess the "capacity" for stakeholder dialogue with each other. De Vente et al. (2016) state that although the participation of heterogeneous groups is important, in some cases the process needs to be done in parts, such as the participation of the public power at a different time, since such a figure could intimidate the participation of other audiences. CPs identify this issue very clearly. Power permeates human interactions in personal, community, and public life, and these dynamics need to be examined (Pranis and Boyes-Watson, 2011). In the model, the preparation phase is the equivalent of knowing and building relationships.

At this phase it is necessary to assess whether it is preferable to do the process in smaller groups at the outset or whether there is still a process of building capacity or generating a climate of trust among the public. Capacity building consists of developing the necessary skills and other aspects so that "referrals" and/or process facilitators can deal with the differences between stakeholders and avoid exclusion or non-engagement (ACCOUNTABILITY, 2011, p. 32). Therefore, the key factor "balance" is so relevant. As the whole process of the model starts from problem vision or opportunity of a "referential" towards a purpose, the critical factor "lucidity" is fundamental in all phases from the outset.

Theory U presents several techniques of immersion, in the Listening process, such as: Dialogue Interview, Interview with Stakeholders and Sensing Journeys. To this set of tools, Theory U calls Co-Sensing. In DT we have the Preliminary Immersion as phase that brings techniques such as: Re-framing, Exploratory Research and Desk Research. DD uses tools such as "deep listening", or *Pinakarri*, which is intended to promote a true and transparent dialogue. This listening also facilitates "charismatic communication," or NVC. In AI this phase is known as "Discovery", when identification of the stakeholders (those with acquired right or have a high impact on the organization), the creation of the captivating appreciative question and the guide of interviews, collection and organizing the data, conducting the interviews and extracting meaning from the research data. This phase also consists in predicting "resources" for the process, another relevant factor. The premise inherent in any project, the previous analysis of resources avoids abandonment in the middle of the process, especially in the co-creative process that places, as verified in the content analysis of the Survey, the time available, or motivation for participation of the involved, as a primary resource.

5.2. Resignification

From Preparation, new actors are invited. This call must be made with lucidity of purpose. It is up to the "referential" to give the information that most directly impacts each of the guests, especially regarding the dedication in terms of time that will be required. Certain methodologies, such as OST, do not have a clear agenda, so it would be pointless or even detrimental to try to explain step by step the program (Owen, 2003), which should occur at the outset of the process. Surely, it is much more relevant that the participants know the intention and identify the relevance of the theme. In this way, the key factor "relevance" is extremely important for the Resignification phase, that is, it is fundamental to use facilitators to generate the desired climate, as well as to bring lucidity to purpose and process. At this moment the process of dialogue and multidisciplinary exchange begins. For this, the environment of trust is fundamental for participation and balance in the conversation to occur. It is in this phase that a free analysis of

preconceptions is necessary, when the problem is analyzed deeply, in order to verify whether or not its validity, its amplitude and its correlations. It should be noted that the lucidity of the procedure is especially important at the time of its implementation. Remembering that process lucidity does not mean control, since many of the methodologies have a step-by-step exactly to generate the collaborative process, free and that provokes a sense of accountability (such as OST and DD).

It is worth noting, therefore, the "trust" factor is also fundamental at this stage. In the content analysis of the survey, several comments cite the importance of goodwill, connection, and relationship between participants for engagement and empathy, which is indispensable for the co-creative process. To establish a climate of trust the NVC is an important technique. It can be used as a tool for all phases of the co-creative process, as it assists generative, judgment-free conversation. However, it is in the stages of Resignification and Solution (phases of greater exchange) that it becomes even more relevant. U Theory also helps in the process of empathy, considered the third level, the fourth being the "listening generative".

In Resignification phase preliminary information is presented, although, in complete freedom, in order to be, in fact, a reference to be reviewed. Survey content analysis indicated the importance of developing common interest. Depending on the interests of those involved and their knowledge, a new vision is built, collective, more relevant to the group. Thus, a new direction is made. Therefore, another factor is relevant: "legitimacy".

It is also possible that at this stage there is a need to involve new actors, not perceived by the "referential". Therefore, the model has a feedback arrow from Resignification for Preparation. For this reason also that the factor extends to the next phase (Solution), as well as the factor "participation". Tools or platforms for stimulating interactive and dialogic activity must be shaped around "experiences that people have lived through" (Ramaswamy and Chopra, 2014) It is therefore imperative to understand the context in which such workshops or platforms are generated and should understanding of the traditions and culture involved (Reed et al., 2014), considering that the process needs to consider the capacity of cultural and political engagement of the participants in order to allow effective transdisciplinary interaction (Steelman et al., 2015). Another relevant factor emerges: "balance".

Since voluntary self-selection is fundamental (Owen, 2003), trying to impose a certain level of unwanted involvement by the participants tends to impair their participation and may even lose their important contribution. For this reason, the proposed model presents, in a complex systemic model, several subsystems that have already produced results (co-creative methodologies), in the same environment, to be evaluated by the "referential" in order to become flexible and sufficiently adaptable. Based on this understanding, another factor emerges: "flexibility", which contributes to the participation of all relevant publics, considering that without participation there is no co-creation, as observed in the literature.

In the content analysis of the survey it is observed that the level of engagement can increase from the development of the process and can be enhanced with the work of the facilitator. CPs help in establishing dialogue in a very simple way. To do so, the members are invited to speak and listen with their hearts. The use of guiding questions and the sharing of knowledge and feelings foster empathy (Pranis and Boyes-Watson, 2011).

The use of guiding questions is common in other techniques. AI does this from the phase it calls "Discovery", but it is also used in the "Dream" phase, which in the model would be the equivalent of Resignification. In this phase of AI, the aim is to identify common themes and create a shared dream (Cooperrider et al., 2008), that is, the collective purpose of those involved.

DD uses the same terminology (dream) for this phase. The DD has a technique that, after empathy, triggers open dialogues involving questions, which reinforces the interest that each one has in the process, its relevance to the SD, and help avoid actors who have unlawful intentions in the process (DRAGON DREAMING BRASIL, 2014). The STO has a similar process. The WC technique can also assist in the process of Resignification. Simpler than OST, WC allows quick and easy access to collaborative intelligence, creating new connections (Brown, 2010).

5.3. Solution

The Resignification and Solution phase is closely linked. Most of the factors of the Resignification phase perpetuate in the Solution phase, such as: knowledge, relevance, legitimacy, trust, facilitation, balance, participation, flexibility, engagement. This is because the dynamics are very similar, although the creative dynamic may be different. The end product of the Resignification phase is the very original purpose of the "referential" now analyzed and defined by consensus by all in the form of a collective purpose. In the solution phase the product is a plan. In this way, another factor emerges: "result". Decisions must take into account the concerns, expectations and perceptions of all, and all outputs need to be considered in the plan (ACCOUNTABILITY, 2011).

At CPs, this stage corresponds to the stage of developing action plans, even though it is an action plan focused on the relationship between actors as final product (Pranis and Boyes-Watson, 2011). Thus, CPs can be used more as a way to build strong links between those involved. These links can determine the value intensity applied by the process part (in the co-creation phase and in the co-production phase). In both AI and DD, the Solution phase is called 'planning'. The DD suggests realizing the action plan in the form of a *Karabirrdt*, a 'spider web' diagram, a collaborative planning tool that resembles a board game that connects a set of individual tasks in a system complex of tasks and activities. Besides being able to observe the progress of each individual task, it is possible to perceive the impact of the parts of something much bigger (DRAGON DREAMING BRASIL, 2014). The Solution phase must meet the purpose identified in Resignification. If this does not happen, the group should reassess the solution found and reconstruct or even evaluate if there are new elements to go back to previous phases (feedback), since it may be necessary to include new actors in the process, then return to the Preparation phase or perhaps need only resignify the issue. In U-theory, the solution may emerge from a process they call Prototyping. The process of Prototyping includes three steps (Co-Sensing, Co-Inspiring and Co-Creating), being a possible tool (methodology) for the search of a collective solution from an intention. In DT there is the same understanding: prototyping as a creative process to reach a solution. This phase in the DT corresponds to that of Ideation and can include tools like brainstorm, paper prototype and interfaces, storyboards, functional mockups, stopmotion videos and staging (SCHOOL DESIGN THINKING, 2017).

5.4. Test

The Test phase consists of the phase in which, on a smaller scale, the solution is tested, indicating the need to pay attention to the "experimentation" factor. This is when the co-productive process begins. It should be noted that the co-creative process is an open system and, according to De Morais and Santos (2015), co-production and co-creation are independent variables and for both cases, combined or separately, there may be co-created. Thus, what determines the co-created value is the degree of integration and depth among the actors.

In the content analysis of the survey there were those who understood that “experimentation” is outside the scope of the co-creative process. Apparently, in analyzing co-creation in a more simplistic sense (without considering coproduction), there is such confusion. The proposed model, therefore, clarifies this in its base and indicates that, it is not necessary to develop all its steps or subsystems to be co-creation, but presents the complete system so that the “referential” knows and applies what is necessary, allowing total flexibility.

It is possible that new actors present themselves in the Test phase, since the solution created may require suppliers of a certain resource for their implementation, for example. For this reason, the “participation”, “flexibility” and “engagement” assumptions continue to exist at this stage. Therefore, it is necessary to include follow-up, especially with the inclusion of new actors. Adjustments may be required as the prototype comes to life, and may even indicate feedback in some cases. The co-creative methodologies indicate phase to test their solutions. The DT calls “implementation”, that is, business model and results verification for new project (Brown et al., 2008). In the DD, the Test phase corresponds to the “Perform” phase. In the same way that the model indicates experimentation on a smaller scale for testing, the DD indicates acting locally, although the Dream can start from a global question (DRAGON DREAMING BRASIL, 2014). The U Theory also brings the prototyping phase and suggests forming a core team for each prototype. It also indicates, if necessary, bringing in new people to complement existing skills. Networks can help throughout the co-creation process: from social network monitoring to insight into a particular topic, to testing for acceptance of a particular solution. Like the networks, LL is not a co-creative methodology in itself and can use other methodologies of approach of experimentation (Schaffers et al., 2011a,b), so it can be a relevant structure, especially in the phase of Test, considering that they have the “realism” (to carry out the activities of innovation in a realistic, natural and real way) as one of its key points and the prototyping as important phase, realized from the appreciation of opportunities, the development of the prototype proper and evaluation of its usability (Stahlbröst and Holst, 2012; Robles, 2015). In this way, the model does not place the LL or the Networks in a specific phase, but involving the entire methodological ecosystem.

5.5. Dissemination

Co-creating communication materials with those involved increases the likelihood that other people will facilitate learning and can extend the reach beyond the project duration (Reed et al., 2014) and the use of networking technology can extend the scope of work to other parties stakeholders (Evans et al., 2015). A collaborative methodology can be an effective short-term intervention, and such changes need to be consolidated for sustainable and long-term programs (Knight, 2012a). Because of this, the Dissemination phase of information presents itself as fundamental in co-creative processes that have a SD-oriented purpose. In this way, it is important to have as phase factor, the “propagation”.

Finally, the publication of the knowledge acquired in accessible language, usable for different audiences, leads to new questions initiating a new transdisciplinary work cycle (Mauser et al., 2013). For this reason, the proposed model brings the indication of a new cycle, from the dissemination, into the SDGs, being a supply for a new process.

6. Conclusions

Based on a mixed methods approach, the present work resulted in a proposal of a conceptual model of co-creation for sustainability, involving relevant factors and methodologies for the success of the co-creative activity for the engagement of stakeholders and contribution to sustainable development. This model was developed after an exploratory qualitative-quantitative research, through the confrontation between different perspectives, of the revised theory, of the experts' perception through the empirical study and the direct observation of the authors.

From the theoretical point of view, the research contributes to the literature on SD and to approaches of value co-creation, organizational sustainability - through the holistic and systemic view of Systems Theory - and CSR, based on Theory of Stakeholders, adopting a different perspective from previous studies, comparing co-creative methodologies and focusing on the role of organizations. The findings of this study have several important implications for the theory of co-creation of value. First, this is one of the first studies that empirically tests virtual communities - made up of public experts on the issues of co-creation and sustainability - as to their perception of the main themes, co-creative methodologies and relevant factors. In addition, the model is interdisciplinary and seeks to meet the needs of multiple stakeholders and the sustainability tripod, or TBL, in an integrated way. The novelty of the Krüger Model is also observed by composing, in the same method, several categories of information that are interrelated, making it complete, with a holistic methodology of co-creation, that integrates different concepts that are usually studied as substitutes and not complementary. These categories are: relevant factors, groups of themes related to SD, relationship with stakeholders and the integration of co-creative methodologies.

From a practical point of view, this model can help organizations of any nature, formal or otherwise, delimited or not (it can start from the integration of some individuals of the society), to seek solutions for sustainable development as it presents itself as a complete driver for activity. Examples of full applicability would be the development of a social project in a specific community or the implementation of a Living Lab. Managers, leaders and decision makers of organizations can use the model in integrating different management approaches, sharing key and common characteristics, to create an own model that converges the strengths of different methodologies of co-creation and seeks to align the perspectives of different stakeholders by equitably sharing the value created together through collaboration and innovation for the transition to SD. In practical terms, companies will be able to use the model to develop projects based on the prioritization raised by their materiality matrix (themes that are really important to the company's business and value creation) or prioritization based on sensitive issues identified in the process of collecting its sustainability report. In fact, the model can even be used for the company to constitute its matrix of materiality. In analyzing the use of co-creation as a mechanism for stakeholder engagement and contributing to sustainable development, it was possible to conclude the high stakeholder engagement when they are involved in identifying problems and building solutions collectively. It was possible to verify, therefore, that the level of engagement increases as the decision is shared.

This model, in the form of a guide, allowed not only the consolidation of all aspects relevant to this process for that purpose, but also the distribution of the possible practices already known and consecrated, such as DT, AI and CPs. Thus, the model does not present itself as a new method to be followed, but a guide that gathers most of the recommendations already indicated in the literature or in the practices of the organizations, in order to facilitate the dissemination of the technique, the exchange of experiences and the methodologies for a theme as complex and necessary as sustainability. The model does not necessarily have to be applied in its entirety, and can be easily applied in a nonlinear process, but

in an open system. Managers, for example, can use the model to identify a collective consciousness of a particular group and, in developing a plan of action, move to a less democratic and more one-way mechanism. To implement the Krüger Model of Sustainability within a company, it is recommended that managers develop activities that stimulate dialogue in a balanced manner, using techniques and facilitators so that the power conferred by the organizational hierarchy does not negatively impact participation.

In this way, the proposed Model of Co-creation for Sustainability presents in a visually practical way the relevant factors, which, in addition to being identified in the literature, were validated in the Survey. Therefore, it seeks to fill the research gap that addresses co-creation for sustainability. The Stakeholders Theory, which underlies the SR, seems to be also the basis of co-creative processes. In this way, it is possible to conclude that the present study aims to contribute to the meeting of these two subjects, becoming innovative for such convergence.

As in all studies, this research also faced some limitations that set the stage for further research. The first limitation is related to the use of a single database for bibliometrics (Scopus); the second, due to a single survey and the non-probabilistic nature of the sample. Although no geographic region has been established for the Survey, the use of the Internet and social networks as the gateway for the response collectors, it is possible to determine the accessibility limitation and the algorithm for the operation of the timeline. such social networks. These collectors, conducted in English and Portuguese, also conferred a greater number of respondents of Brazilian origin, considering the author 's nationality, a more active and well - known presence in Brazilian communities. As a consequence, it is not possible to generalize the results to different economies or social or environmental contexts.

As a suggestion for further research is recommended to apply the proposed model in multiple scenarios or case studies, considering different institutions and organizations, and to conduct a systematic literature review, considering many databases as well as to apply other web surveys with bigger samples as a way of expanding the study. Finally, it is also important to intensify studies in co-production process and to incorporate other techniques as a way of enriching methods of co-creation of value.

Appendix A. Questionnaire

1. What country do you live in?
2. Considering that co-creation is the joint verification of problems and solutions to generate shared value, answer: Have you ever participated in any co-creative process?

( ) Yes
( ) No
( ) I don't know how to answer

3. Understanding that Sustainable Development is the development that meet the needs of the present, without compromising the ability of future generations to meet their own needs and refers to the interdependence of social, economic and environmental objectives, answer: Have you participated in one or more co-creative processes to contribute in any way to sustainable development?

( ) Yes
( ) No
( ) I don't know how to answer

Choose one case of co-creative process that you have participated that had as its objective a theme related to sustainable development. Answer the questions below about this specific case:

4. In your perception, the specific objective of such a co-creative process …

( ) has been fully achieved
( ) was partially achieved
( ) has not been achieved
( ) I don't know how to answer

5a You replied that the purpose of the co-creative process was fully achieved. In a nutshell, in your perception, what were the critical success factors of the process?
5b You replied that the purpose of the co-creative process was partially achieved. In a nutshell, in your perception, what was lacking in the process for the goal to have been fully achieved?
5c You replied that the purpose of the co-creative process has not been achieved. In a nutshell, in your perception, why did not the process bring results?

6. In the event you have used one or more methodology, tool or platform in the co-creative process you have participated, please indicate below (multiple choice):

( ) Design Thinking
( ) Appreciative Inquiry
( ) Dragon Dreaming
( ) World Café
( ) Theory U tools
( ) Living Lab
( ) Nonviolent Communication
( ) Virtual communities or networks
( ) Circle Process
( ) Other (please cite or comment about the process)

7. In your opinion, can co-creative processes contribute to sustainable development?

( ) Yes
( ) No
( ) I have no opinion about it

8. In your opinion, what is the relevance of each of the items below for the success of co-creative processes aimed at sustainable development?

SELECTION: Choice of participants made in a non-random way, but from the materiality, influence and diversity.

( ) Irrelevant ( ) Little Relevant ( ) Neutral or not sure ( ) Relevant or ( ) Very Relevant.

If you wish, please comment:
KNOWLEDGE: Inclusion of participants who are reference in the theme and/or complete assessment of the problem, its impacts, related behavioral and environmental conditions and any known determinants.

( ) Irrelevant ( ) Little Relevant ( ) Neutral or not sure ( ) Relevant or ( ) Very Relevant\

If you wish, please comment:
LUCIDITY: Purpose and process clearly understood among those involved.

( ) Irrelevant ( ) Little Relevant ( ) Neutral or not sure ( ) Relevant or ( ) Very Relevant.

If you wish, please comment:

RELEVANCE: Recognition of the relevance of the theme by participants for sustainable development.

( ) Irrelevant ( ) Little Relevant ( ) Neutral or not sure ( ) Relevant or ( ) Very Relevant.

If you wish, please comment:

INTEREST: Identification of the interests of those involved in the process.

( ) Irrelevant ( ) Little Relevant ( ) Neutral or not sure ( ) Relevant or ( ) Very Relevant.

If you wish, please comment:

LEGITIMACY: Interests of participants aligned with the purpose of the activity.

( ) Irrelevant ( ) Little Relevant ( ) Neutral or not sure ( ) Relevant or ( ) Very Relevant.

If you wish, please comment:

SCENARIO: Knowledge of participants' needs and situation and/or mapping of interactions between them.

( ) Irrelevant ( ) Little Relevant ( ) Neutral or not sure ( ) Relevant or ( ) Very Relevant.

If you wish, please comment:

RESOURCES: Survey of resources needed for the activity (financial, time, human, among others).

( ) Irrelevant ( ) Little Relevant ( ) Neutral or not sure ( ) Relevant or ( ) Very Relevant.

If you wish, please comment:

RISK: Risk analysis of involvement, ethical implications, transdisciplinary friction and political processes.

( ) Irrelevant ( ) Little Relevant ( ) Neutral or not sure ( ) Relevant or ( ) Very Relevant.

If you wish, please comment:

CAPACITY: Similar capacity between the participants for the dialogue (for example, there are no concept or linguistic barriers).

( ) Irrelevant ( ) Little Relevant ( ) Neutral or not sure ( ) Relevant or ( ) Very Relevant.

If you wish, please comment:

TRUST: Establish an environment of trust, empathy and goodwill among the participants, which may include initial involvement, mobilization and awareness activities.

( ) Irrelevant ( ) Little Relevant ( ) Neutral or not sure ( ) Relevant or ( ) Very Relevant.

If you wish, please comment:

FACILITATION: Use of facilitators who are trained for the co-creative process, motivators and with their defined roles and responsibilities.

( ) Irrelevant ( ) Little Relevant ( ) Neutral or not sure ( ) Relevant or ( ) Very Relevant.

If you wish, please comment:

PARTICIPATION: Interactive and dialogical activity, offering tools or platforms (face-to-face or virtual).

( ) Irrelevant ( ) Little Relevant ( ) Neutral or not sure ( ) Relevant or ( ) Very Relevant.

If you wish, please comment:

BALANCE: Fair interaction process, with balanced participation among the participants.

( ) Irrelevant ( ) Little Relevant ( ) Neutral or not sure ( ) Relevant or ( ) Very Relevant.

If you wish, please comment:

ENGAGEMENT: Method with level of involvement adequate to the participants' expectation.

( ) Irrelevant ( ) Little Relevant ( ) Neutral or not sure ( ) Relevant or ( ) Very Relevant.

If you wish, please comment:

FLEXIBILITY: Methodology that allows adaptation when the needs and priorities of the participants evolve.

( ) Irrelevant ( ) Little Relevant ( ) Neutral or not sure ( ) Relevant or ( ) Very Relevant.

If you wish, please comment:

EXPERIMENTATION: Prototyping or environment for experimentation of co-creative products.

( ) Irrelevant ( ) Little Relevant ( ) Neutral or not sure ( ) Relevant or ( ) Very Relevant.

If you wish, please comment:

RESULTS: Execution of a plan of action to achieve the objectives and to bring results to society.

( ) Irrelevant ( ) Little Relevant ( ) Neutral or not sure ( ) Relevant or ( ) Very Relevant.

If you wish, please comment:

PROPAGATION: Communication of results, maintenance of the dialogue and tools to expand the spread of information to other levels.

( ) Irrelevant ( ) Little Relevant ( ) Neutral or not sure ( ) Relevant or ( ) Very Relevant.

If you wish, please comment:

FOLLOW-UP: Constant evaluation of the action plan, monitoring and study of future activities.

( ) Irrelevant ( ) Little Relevant ( ) Neutral or not sure ( ) Relevant or ( ) Very Relevant.

If you wish, please comment:

Have you missed any critical success factors for co-creative processes geared to sustainable development? Contribute to your point of view below:

If you have any comments about this survey, feel free to fill in the

field below. Surely, this will enrich the work and the content available to all.

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