Co-creating Inter- and Transdisciplinary Knowledge for Sustainability: First Insights for the Cosmetic Industry from a Service & Systems View

Multi-disciplinary approaches in service research; The Viable Systems Approach (VSA).

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ABSTRACT

Purpose – Inter- and transdisciplinarity are key issues of sustainability. Co-creation approaches are required to integrate the knowledge produced inside and outside multiple disciplinary domains. This work aims to discuss the basis of a theoretical framework of reference for the practice of knowledge co-creation, in order to boost dialogue among and beyond the different disciplines that contribute to sustainability using the cosmetic industry as a real case example.

Design/Methodology/Approach – Drawing on the main contributions of literature on inter- and transdisciplinarity issues in sustainability research, we integrated the outcomes of service and systems research about knowledge co-creation to advance the research on knowledge creation for sustainability. The problems of inter- and transdisciplinarity are considered as expressions of sustainability complexity; thus, possible reference models and approaches to knowledge co-creation are illustrated and supported by practical examples derived from the cosmetic industry.

Findings – The results of this study offer interesting insights for a general reflection about the importance for addressing the theoretical and practical problems posed by the multidimensional nature of sustainability and the need to co-create knowledge in multidisciplinary and transdisciplinary contexts, involving science, policy and industry actors. The way different-minded actors can dialogue to co-create knowledge for sustainability is discussed according to the systems thinking view, highlighting the leading role of science.

Research Limitations/Implications – This paper is the outcome of a preliminary study whose aim was to outline the key issues of sustainability research and the possible contribution of service and systems research. Deeper analysis and further discussion based on empirical research are required to advance further the study.

Originality/Value – The present paper represents one of the first attempts to investigate the contribution of

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service and systems research to the inter- and trans-disciplinary issues of knowledge co-creation for sustainability. The originality of this study also lies upon the adoption of a similar approach in cosmetic industry. This preliminary study offers interesting insights in terms of the importance that an open and constructive dialogue among and beyond the disciplines that interact in a specific industry domain, such as cosmetics, can have on the sustainability of its companies and their contribution to the challenge of sustainability.

Keywords: *Sustainability, Interdisciplinarity, Transdisciplinarity, Knowledge co-creation, Cosmetic industry.*

Conceptual paper

1. Introduction

In the last decades, sustainability has gained momentum in several research domains; thus, the lively interest of scholars and the flourishing research on sustainability led to define a quite distinctive discipline, the "sustainability science" (Kates et al., 2001; Komiyama and Takeuchi, 2006; Kajikawa et al., 2014). Even though this advancement, sustainability still remains a vague concept, lacking of semantic clarity and characterized by somewhat different definitions as well as context-specific understandings (Purvis et al., 2018). Sustainability research is an inherently complex field to which different scholar and practitioners can contribute in preserving natural environment, social justice and economic efficiency (Clark and Dickson 2003). Sustainability can actually be considered a meta-discipline (Mihelcic et al. 2003), because it aims to go beyond the boundaries that traditionally separate economics, environmental science, climate science, sociology, behavioural and policy studies and many other disciplines (Xu et al., 2015). Therefore, sustainability research, coupling the movements aimed at harnessing science and technology for facing sustainability issues, focuses "on the dynamic interactions between nature and society, with equal attention to how social change shapes the environment and how environmental change shapes society" (Clark and Disckinson, 2003, p. 8055). Going beyond the distinction between the german and the wider meanings of transdisciplinarity, this study has been based upon Nicolescu's definition of transdisciplinarity, according to which it is a *space for synthesis across, between and beyond disciplines* (Nicolescu, 2002, 2006, 2014). Such a synthesis makes possible to create a knowledge useful to link the theory to the problem solving. Therefore, this knowledge has to be co-created through the interactions between different subjects (or actors) belonging to epistemologically different settings, who should be open to go beyond the traditional realm of science to address real problems (Gallopin et al., 2001; Steelman et al., 2015). Subsequently, transdisciplinarity calls for 1) challenging the complexity of problems and the different way they are perceived, 2) linking abstract and case-specific knowledge, and 3) practices able to promote the common good (Hadorn, 2006). In this perspective, transdisciplinary research is essential in addressing sustainability challenges (Barreteau et al., 2016; Bieluch et al., 2017), being able to go beyond the traditional reductionist approaches to embrace more holistic ones, built upon the melting, among others, of social and natural sciences and the humanities (Haider et al., 2018). Currently, even though the growing inter- and transdisciplinary collaborations pointing to face sustainability issue (Kates 2011; Ness 2013), empirical approaches are still scarce.

Sustainability has come to the fore in the cosmetic industry in the earliest years of the XXI century from some studies (Pereira et al., 2012; Shaota, 2014) which reported the toxicity of some ingredients (e.g. fragrances, UV filters, etc.) used in a number of daily cosmetics (Secchi et al., 2016). This focused the attention of different scholars, practitioners, institutions and even citizens not only on sustainability and safety of cosmetic products themselves, but also on sustainability of the whole cosmetics' supply chain, from raw materials selections to product packaging and delivery (Sahota, 2014; Cosmetics Europe - The Personal Care Association, 2017).

Advancing research outcomes of the Viable System Approach (*vSa*) (Barile 2009; Golinelli, 2010; Barile and Saviano, 2011) and applying the Triple Helix of Sustainability (Barile et al., 2017; Barile and Saviano, 2018; Farioli et al., 2018; Scalia et al., 2018; Saviano et al., 2019) to cosmetic industry, this study aims to better understand the importance of multi-actors' interactions for the co-creation of a transdisciplinary knowledge for sustainability, having as an example context a specific, complex and multifaceted industry such as cosmetics. In this way, it will contribute to develop a more holistic approach to sustainability challenges (Hadorn et al., 2008), able to join general elements with context's peculiarities (Rittel and Webber, 1973; Farioli et al., 2018).

The next sections are organized as follows: in the second section, the inner complexity of sustainability will be discussed, introducing the concept of transdisciplinarity in sustainability research. The Triple Helix of Sustainability and its possible application to cosmetic industry will be illustrated in the third section, while the last conclusive section will present some interesting implications, paving the way for further research.

2. Theoretical background

2.1 The inner complexity of sustainability

Sustainability is a wicked concept (Glavic and Lukman, 2007; Pope et al. 2017), characterized by a wide-ranging of theoretical and operative insights (Maletic et al., 2014; Wiek and Lang, 2016) that together with a potential uncertainty contribute to its inner complexity (Tainter, 2006; Miller et al., 2014).

It is worth notice that complexity generally refers to the lack of unique or well-known solutions (Barile and Saviano, 2018), but in the current society, where technic and technological knowledge is widely available, it is mainly due to inability as well as to lack of interest in managing it (Barile et al., 2018). Moreover, when it relates to sustainability, complexity needs for further and holistic approaches, in order to put in practice those cognitive, structural and political changes that can shape a fertile context for supporting individuals and organizations' learning and adaptation, essential for achieving long-term results (Barile et al., 2013; Saviano et al., 2017; Palumbo et al., 2017; Quattrociocchi et al., 2018). Thus, "It is on the context that attention must be focused in order to ascertain how sustainability, which is a multi-dimensional and multi-perspective expectation to comply with, can be achieved" (Saviano et al., 2018, p.3450). It follows that sustainability has to handle those complex issues rising from knotty and unbalanced social interactions, in which decision-making has to manage at social, economic and environmental level. In a similar vein, the Nobel Prize winner Elinor Ostrom stated, "Understanding of the processes that lead to improvements in or deterioration of natural resources is limited, because scientific disciplines use different concepts and languages to describe and explain complex social-ecological systems (SESs). […] Scientific knowledge is needed to enhance efforts to sustain SESs, but the ecological and social sciences have developed independently and do not combine easily" (2009, p. 419).

Drawing on Ostrom, sustainability complexity mainly lies upon socio-ecological and socio-technical systems, which perform as *Complex Adaptive Systems* (CAS) (Folke et al., 2002; Rammel et al., 2007) or as "systems that involve many components that adapt or learn as they interact" (Holland, 2006, p. 1) often in non-linear ways and that usually achieve unpredictable outcomes. Therefore, assuming a systems perspective, sustainability complexity can be considered as due to the interconnections and the interactions occurring between the two afore-mentioned systems, which can change the three foundational spheres of sustainability, environment, society and economy (Elkington, 1997). In fact, even though their substantial differences, socio-ecological and socio-technical systems have some similarities and convergent interests, these should be addressed assuming an approach able to "transcend a singular disciplinary viewpoint and to allow for the consideration of different perspectives and types of knowledge" (Wals and Rodela, 2014, p.1). Sustainability is currently approached following vertical paths of knowledge specialization, which still constrain the integration among different disciplines and the development of a wide knowledge able to represent the inner unity of reality and sharable at scientific, institutional and operational level (Van Kerkoff, 2014). In the following section, the potential of a transdisciplinary approach to knowledge creation for sustainability will be discussed.

2.2 Moving towards a transdisciplinary knowledge to face the complexity of sustainability

Being traditional approaches and ways of thinking able to solve just discrete problems and too narrow to grasp so many important relationships and issues (Bennett et al., 2009; Siebert, 2011) at the core of sustainability, more holistic approaches are still need. Thus, the emergent Sustainability Science is paving the way to go beyond the traditional vertical paths of knowledge creation developed within single scientific domains. In this vein, Takeuchi et al. (2017) maintained that a step forward the definition of an open field of shared knowledge in which "fragmented academic disciplines have become merged to create a new, holistic dimension, with the aim of creating the core of sustainability science" (p. 850) was taken.

Sustainability science represents an emergent and interdisciplinary field of inquiry, aimed at proposing effective responses to challenge the rising complexity due to the global change and its socio-economic effects (Komiyama

and Takeuchi, 2006; Orecchini et al., 2012; Wiek et al., 2012; Cornell et al., 2013). Thus, this discipline aims to address the afore-mentioned changes mainly linking knowledge to action (Clark and Dickson, 2003; Komiyama and Takeuchi, 2006; Orecchini et al., 2011; Komiyama et al. 2011; Wiek et al., 2012; Cornell et al., 2013; Manifesto of IASS retrievable at www.scienzasostenibilita.org). To this end, sustainability science research has promoted the integration of scientific and non-scientific knowledge, "providing a platform for co-creation that can be a reference for other scientific and professional community" (Saviano et al., 2019). This implies the need for more effective paths of knowledge creation, sharing and exchange (Miller et al., 2014) able to go beyond the traditional division among disciplinary silos (Becher and Trowler, 1989), scholars, practitioners and citizens (Hadorn et al., 2008). In sum, to address the inner complexity of sustainability an interdisciplinary and above all a transdisciplinary approach to knowledge is necessary "to transcend a singular disciplinary viewpoint and to allow for the consideration of different perspectives and types of knowledge" (Wals and Rodela, 2014, p.1). Thus, this approach can boost the dialog among different disciplines and, in so doing, create an integrated knowledge for advancing sustainability. However, to be effective, transdisciplinary research has to be deeply connected with the specific context and the institutional setting in which sustainability issues take place (Marsden and Farioli, 2015). This implies a circular process of knowledge co-creation, open to the participation of different subjects/actors – experts or newcomers – willing to merge scientific and experiential knowledge and to boost a process of mutual learning (Lang et al., 2012; Sala et al., 2013). Therefore, transdisciplinarity boosts the participative creation or the co-creation of a "socially robust knowledge", which can advance sustainability science and its practice (Scholz and Steiner, 2015). This is due to the inherently knowledge intensive nature of sustainability, which still remains concerned about actors apparent inability to connect what they know with more sustainable practices and outcomes (van Kerkoff, 2014). More in details, the main actors involved in sustainable development – science, policy and industry – are still reluctant to collaborate for a sustainable development especially co-creating knowledge and effectively linking it to action (Saviano et al., 2019). It follows that a transdisciplinary approach to knowledge co-creation for sustainability calls for a greater attention to the context and to the institutional setting in which sustainability issues originate. Thus, it is the context with its values and common perceptions that triggers processes of knowledge co-creation (Iandolo et al., 2018), which – merging scientific and experiential knowledge – boost actors (e.g. researchers, practitioners, citizens, etc.) mutual learning and their disposition towards change (Lang et al. 2012; Sala et al. 2013; Marsden and Farioli 2015). However, further effort in this area of investigation is warranted to address unsolved questions related to way to engage a wider number of actors in the co-creation of always-new knowledge for sustainability.

2.3 A sustainability helix model for transdisciplinary knowledge co-creation

Drawing on need for co-creating a transdisciplinary knowledge for sustainability and, in particular, for cosmetics sustainability, a further exploitation of the Triple Helix model (Leydesdorff and Etzkowitz, 1996; Etzkowitz and Leydesdorff, 1998; Etzkowitz and Zhou, 2017) has been applied, the so-called Sustainability Helix model (Barile et al., 2017; Barile and Saviano, 2018; Farioli et al., 2018; Scalia et al., 2018).

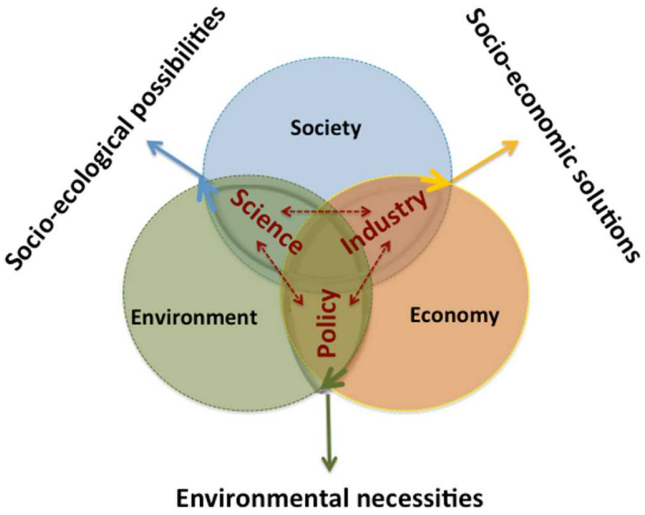
Focusing on sustainability challenges (Barile et al. 2013, 2014), the Viable Systems Approach (*VSA*) research (Golinelli, 2000; Golinelli, 2010; Barile, 2009; Barile et al., 2012; Barile and Saviano, 2018) combined the Triple Helix model with the traditional Elkington's framework of the Triple Bottom Line (1997), in order to integrate societal and natural dimensions into the inspiring model without adding new blades.

The Triple Helix of Sustainability model offers a new reading of the traditional helix, considered as the institutional mechanism that drives the interactions occurring between the environmental, social and economic dimensions of sustainability and which policy, science and industry action are intended (Saviano et al., 2014; Barile et al., 2017; Barile and Saviano, 2018). Therefore, as depicted in Fig.1, the movement of the helix depicts the interactions occurring between the three actors that mainly contribute to the sustainable development. These are: 1) policy, which trough governments' action can understand *environmental necessities* (e.g. the constrains to the indiscriminate use of environmental resources), 2) science, which trough universities' action shapes *socio-ecological possibilities* (e.g. what knowledge progress let to do to address necessities, needs and wants) and 3) industry, which offers specific *socio-economic solutions* (e.g. specific realistic possibilities) (Barile et al., 2018).

Advancing the Triple Helix model, the Triple Helix of Sustainability addressed the criticism of the inspiring model for being too theoretical and, therefore, far from the real world (Viale and Pozzali, 2010; Amir and

Nugroho, 2013). In so doing, it went back to the general schemes that inspired the model, identifying the principles or the simple rule at the core of its functioning (Barile and Saviano, 2018). This was possible focusing on the "structure-system" paradigm (Barile and Saviano, 2011), which let to approach complex phenomena shifting the focus of the analysis from structural components to functioning dynamics, that is shifting from the relations to the interactions occurring between the three different-minded actors. Therefore, interactions, especially when intended to knowledge creation, should be open to the participation of different actors and, consequently, of different disciplines and domains (Haider et al., 2018). In other words, this calls for a transdisciplinary and co-creational approach to knowledge for sustainability (Barreteau et al., 2016; Brondizio et al., 2016). Thus, knowledge rises from multi-actors interactions, who usually belong to different epistemological domains, but are willing to share and combine their resources, going beyond the boundaries that traditionally separate the disciplines they belong to (Gallopin et al., 2001).

Figure 1: The Triple Helix of Sustainability



Source: Adapted from Saviano et al., 2019, www.asvsa.org

In this direction, the Triple Helix of Sustainability let to consider the interactions occurring in a transdisciplinary context where the key actors (university/academy, policy/government and industry) offer their knowledge contribution (Saviano et al., 2019). This led to consider environment, society and economy as the contexts that inspire actors' conduct and behaviour, enhancing collaborative interactions, notwithstanding the barriers that traditionally separate their scientific, institutional or social domains.

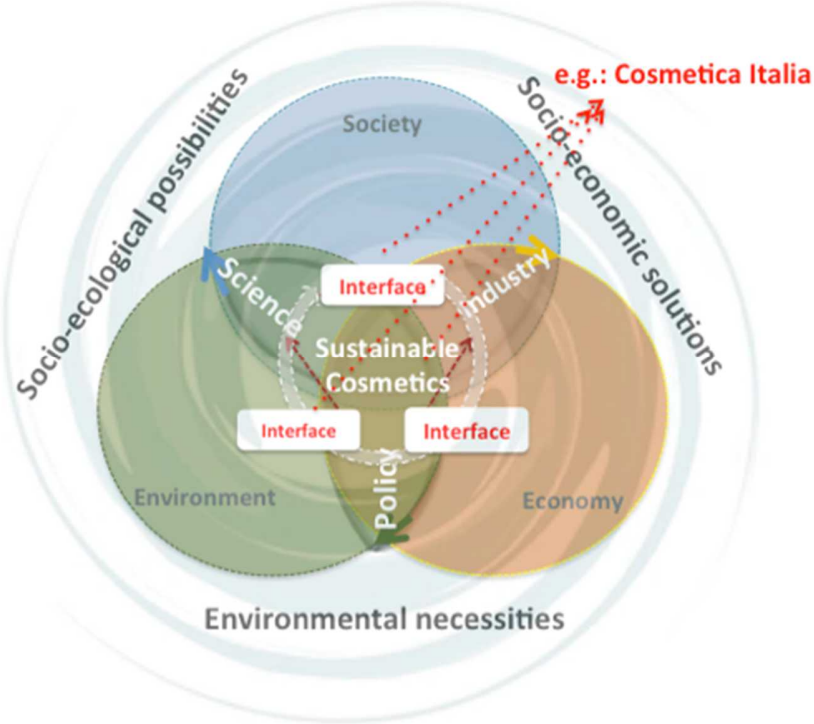
3. The Triple Helix of Sustainability for co-creating transdisciplinary knowledge: first insights for the cosmetic industry

Cosmetic industry represents a suitable domain for the application of the Triple Helix of Sustainability model and, in so doing, for better understanding how science, policy and industry's participation to the co-creation of transdisciplinary knowledge for sustainability can be boosted. Thus, the afore-mentioned actors – performing as "interfaces" and coupling their institutional functions with the disposition towards hybrid processes – can address environmental *necessities*, define socio-ecological *possibilities* and offer socio-economic *solutions* (Saviano et al., 2019). Applying the Triple Helix of Sustainability model to cosmetics, a better understanding of the role that science, policy and industry can play for the sustainability of this industry is possible. In particular, science plays a pivotal role in facing sustainability challenges. In fact, acting as an interface for the interaction occurring between society and environment, it offers that specialized and vertical knowledge fundamental to change and/or innovate products and processes, in order to make them even more environmental friendly and, at

the same time, as complying as possible with consumers needs and wants.
Science acts as interface also in the interaction occurring within the cosmetic industry, inspiring and driving the whole product life cycle and, therefore, the way raw materials and ingredients are selected, products are developed and delivered, in order to reduce their negative impact on society and environment. Finally, science should also act as interface in the interactions occurring between policy and industry, making them as strong as possible (Saviano and Caputo, 2013; Saviano et al., 2017; 2019a). Examples of the mediating role that science plays in terms of knowledge co-creation for cosmetics' sustainability are provided hereafter.
The Department of Pharmacy of the University of Salerno is promoting several initiatives of collaboration with the cosmetic industry, having established a strong collaboration with the Association Cosmetica Italia. This sheds lights on the role that science play in boosting the transition of the cosmetic industry towards the development of sustainable solutions (https://www.cosmeticaitalia.it/education/formazione-scientifica/master-e-corsi-di-perfezionamento-in-cosmetologia/attivita-di-ricerca-00006/).
The Bocconi University of Milan developed in partnership with the association Cosmetica Italia a project – named "Sustainability in companies" – aimed at involving the companies belonging to this specific sector in learning and innovative initiatives for enhancing their awareness and competences in terms of products and processes' sustainability. The project supported cosmetic companies offering them a specialist training, a support for the development of innovative activities and, together with local government of the Lombardia Region, the enactment of the environmental footprint (https://www.cosmeticaitalia.it/circolari/dettaglio/Progetto-Sostenibilita-in-Azienda-2019/).
The University of Venice Ca' Foscari, active in the development of sustainable hi-tech cosmetics, created an innovative start-up (*VeNice*). This company – acting as a University spinoff – approached in a sustainable way the selection of ingredients and raw materials, such as active substances retrievable from natural scraps, which were used for their innovative and sustainable cosmetics. In so doing, this company used also a specific technology, developed at Ca' Foscari University, which allows the production of cosmetics able to release in a controlled and gradual way active substances (https://www.unive.it/pag/14024/?tx_news_pi1%5Bnews%5D=5418&tx_news_pi1%5Bcontroller%5D=News&tx_news_pi1%5Baction%5D=detail&cHash=621881d1a45eef3a529449bbad3f58ca).
What is relevant in these case examples is the fundamental 'interface' role that some actors (such as Cosmetica Italia) play in boosting the occurrence of boundary-crossing interactions between the sustainability key players.
Even though the interface role that representative actors of this industry, such as Cosmetica Italia, play in the interactions occurring between industry and society and also between industry and policy, a potentially more central role can emerge, engaging a Science-Policy-Industry shared action for sustainable cosmetics, as depicted in the following model (Fig. 2). The core element of the proposed model stems from the original Triple Helix model and it roots on the hybridization of roles that different actors play for achieving common goals.
Focusing on policy, it can act as a relevant interface in the interactions occurring between environment and economy, driving and regulating them, for example, through incentives, policies, regulations and laws. The role of this actor is fundamental also in society-environment and society-economy interactions offering, "a 'regulatory' knowledge that aims to correctly inform behaviours" (Saviano et al., 2019, p.11). More in details, policy, through the action of government, defines those regulations and laws that drive and support socio-economic life. An interesting example of this regulatory action in cosmetic industry is the UE resolution of September 2018 defined "European Strategy for plastic in circular economy", which bans the use of micro plastics in cosmetics' formulation starting from the next 2020. Moreover, European Parliament has started a diplomatic initiative pointing to worldwide prohibit cosmetics' test on animals, while in EU countries the sale of product tested on animals is prohibited since 2013.
The role that industry plays for sustainability is essential. In fact, this actor is changing its focus, moving it from the mere economic interests towards a shared and long-lasting socio-economic wellbeing. In this sense, an expressive example comes from L'Oréal, which launched the sustainability-oriented program "Sharing Beauty with All", aimed at making by 2020 the 100% of its products able to offer real environmental and/or social advantages (http://www.loreal.it/media/comunicati-stampa/2013/oct/lor%C3%A9al-annuncia-i-nuovi-obiettivi-di-sostenibilit%C3%A0-per-il-2020-sharing-beauty-with-all). To this end, the group defined some specific goals, such as the reduction of 60% of environmental impact due to corporate processes, the enhancement of employees and communities' well-being (e.g. ensuring a health insurance, financial protection and a long-life

learning program to each employee), the participation of all strategic suppliers to the corporate sustainability program by 2020 and the development of learning and cooperation programs dedicated to local communities.

Figure 2: The co-creation of transdisciplinary knowledge for sustainability



Source: Adapted from Saviano et al., 2019b, www.asvsa.org.

Finally, even though society is not formally included as actor in the Triple Helix of Sustainability model, it nevertheless plays a fundamental (and often crucial) role in shaping the right context for boosting the transition towards and enhancing a true sustainable development. Thus, it activates the drivers at the core of political, social and economic actions; in other words, it paves the way for a general engagement and commitment toward sustainability (Saviano et al., 2019).

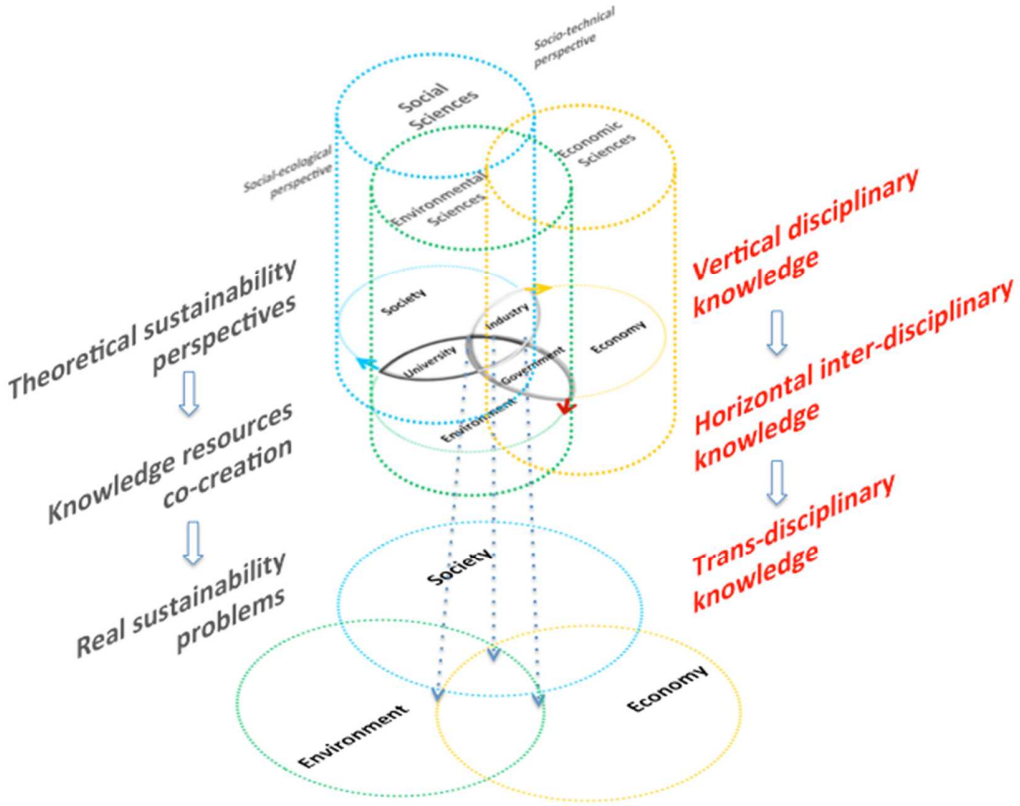
The further exploitation of the Triple Helix of Sustainability focused on "social" and "system" dimensions, typical of social-ecological systems and socio-technical systems (Saviano et al., 2019), trying to advance the understanding of the social dimension (Dillard et al., 2009; Dempsey et al., 2011) and, in particular, its importance for sustainability (Takeuchi et al., 2017), even though their integration remains a challenging issue. It worth noting that if on the one hand the main aim of socio-technical systems is making socio-economic context as smarter as possible; on the other, social-ecological systems aim at making our planet more sustainable. However, both of them are intended to enhance the collaboration of science, policy and industry for sustainability, which – assuming the *VSA* perspective – can be considered a good way for generating the required consonance between the two domains that make systems and their actors willing to integrate their resources for co-creating a new transdisciplinary knowledge for sustainability (see Fig. 3).

The inner complexity and the variety of sustainability can be approached embracing the holistic perspective of systems thinking, which let to understand its overall dynamics. Thus, due to its unitary approach to reality, systems thinking can provide a knowledge that can led to go beyond the boundaries that traditionally separate disciplines within sciences and beyond sciences. Thus, it indicates general principles and interpretation schemes able to catch and explain the inner systemic nature of any entity and phenomenon (Barile and Saviano 2011; Barile et al. 2016; Saviano et al., 2017).

In the light of the above, also in a complex domain such as sustainable cosmetics, systems thinking can offer to key actors (science/university, policy/government and industry) a sharable knowledge, in which the general

principles and schemes of systems thinking boost the integration of the three main dimensions of sustainability (environment, society, and economy). Moreover, according to the *VSA*, the existence of shared values and priorities (Barile et al., 2012) can enhance actors' disposition to share their resources for co-creating a transdisciplinary knowledge context for solving sustainability problems (Arnold, 2017; Saviano et al., 2018). In this sense, society plays a pivotal role, because its shared culture can boost bottom-up actions inside and outside the boundaries that separate disciplines within and beyond sciences.

Figure 3: The co-creation of transdisciplinary knowledge for sustainability



Source: Elaboration on Saviano et al., 2019b, www.asvsa.org

4. Implications and final remarks

Drawing on the need for addressing the growing complexity of current socio-economic scenarios, companies as well as cosmetic companies call for brand new managerial approaches able to merge specialized knowledge with practical not specialized nor scientific capabilities and skills (Hadorn et al, 2008; Miller et al., 2014).

Starting from these considerations, the study has been focused on the importance that the assumption of transdisciplinary approaches can have in co-creating knowledge for addressing the inner complexity of sustainability issues. More in details, approaching knowledge creation according to a co-creation logic implies the assumption of models and frameworks able to boost the interaction between actors (individuals, companies, institutions, etc.) belonging to different and sometimes separated scientific, professional or even social domains, who share their resources triggering a process of continuous learning (Vargo et al., 2008).

Therefore, the analysis has been conducted applying the Triple Helix of Sustainability (Barile et al., 2017; Farioli et al., 2018; Saviano et al., 2019) as a reference model for the cosmetic industry, which is characterized by extremely different and challenging sustainability issues. Thus, the implemented model led to better understand the importance of scientists, practitioners, institutions and even citizens' engagement in co-creating

transdisciplinary knowledge for addressing the environmental, social and economic issues that affect the sustainability of the cosmetic industry. This led also to highlight the leading role of science and the fundamental interface role that several hybrid organizations can play, as in the case of cosmetic industry. In so doing, this study offers some insights that pave the way for new science-led government and managerial approaches that root on sustainability centrality for cosmetics' policy and business agenda (Secchi et al., 2016). However, it worth noting that the path towards the sustainability of cosmetic industry implies the recognition of the complexity of sustainability as well as of the need for an integrated Science-Policy-Industry approach, as the Triple Helix of Sustainability suggested. Thus, further research is needed for boosting the disposition of different-minded actors to go beyond the traditional boundaries that separate, on the one hand, disciplines within science (Golinelli, 2015) and, on the other, science from society (Saviano et al., 2019). This is a step that has to be necessarily taken to be effectively engaged in the co-creation of transdisciplinary knowledge for sustainability.

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