Visualizing the connection and the alignment between business models in a circular economy. A circular framework based on the RCOV model[1]

ST-AIMS 6 : Méthodes et Approches Créatives et Critiques de l'Apprentissage et de la formation au Management

Boldrini, Jean-Claude

jean-claude.boldrini@univ-nantes.fr

Antheaume, Nicolas

nicolas.antheaume@univ-nantes.fr

IAE Nantes - Economie & Management / LEMNA, Université de Nantes

Résumé :

L'économie circulaire, basée sur des flux en boucles fermées, est une approche prometteuse pour lutter contre l'épuisement des ressources non renouvelables et la prolifération des déchets. Des modèles d'affaires innovants peuvent soutenir la transition vers l'économie circulaire. Cet article propose, à partir du modèle RCOV (Demil & Lecocq, 2010), un nouveau cadre visuel pour aider les parties prenantes, dans des organisations engagées dans la transition vers l'économie circulaire, à concevoir, connecter, articuler, aligner et évaluer de manière progressive, collective et dynamique leurs modèles d'affaires circulaires. Notre modèle est une contribution théorique à la littérature sur les modèles d'affaires circulaires. En tant qu'outil pédagogique, il peut guider les gestionnaires dans la mise en pratique des principes de l'économie circulaire et aider les étudiants à les comprendre.

Mots-clés : modèles d'affaires circulaires, économie circulaire, modèles d'affaires

[1] Depuis la date de soumission de cette communication à l'AIMS, fin janvier, les travaux relatifs à cette recherche ont été poursuivis notamment avec des expérimentations sur des cas. Une version enrichie et complétée par des expérimentations a été soumise, fin mars, à un numéro spécial du *Journal of Cleaner Production*.

Abstract:

The circular economy, based on closed-loop flows, is a promising approach to tackle non-renewable resource depletion and waste proliferation. Innovative business models can support the transition towards a circular economy. This paper proposes an innovative visual framework, based on the RCOV business model (Demil & Lecocq, 2010), in order to help stakeholders involved in organizations committed to the transition towards a circular economy to progressively, collectively and dynamically design, connect, articulate, align, and assess their circular business models. Our framework is a theoretical contribution to the literature on circular business models. As a pedagogical tool, it can guide managers in implementing circular economy principles and help students understand them.

Keywords: circular business model, circular economy, business model, sustainability

---

Visualizing the connection and the alignment between business models in a circular economy. A circular framework based on the RCOV model

INTRODUCTION

The projects of transition towards a circular economy, associated with *ad hoc* business models, are recent schemes of interfirm R&D partnerships (Hagedoorn, 2002), or of open innovation (Chesbrough & Schwartz, 2007). As such, they have a potential to reflect the profound ongoing changes in strategic management. The prevailing linear economic model, based on the principle "take-make-dispose" (Ghisellini et al., 2016; Merli et al., 2018) is no longer sustainable as continuous exponential economic and population growth is not possible when planet Earth's resources are limited. The concept of circular economy (CE) is viewed as a strategy to overcome the linear economy pattern and to tackle environmental degradation, pollution problems, waste proliferation and resource scarcity (Su et al., 2013; Lieder & Rashid, 2016). The core principle of CE is closing (circular) the loop of material flows in order to maintain the value of products, materials and resources as long as possible in the economy, to increase the efficiency of their use, to extent resource life, or to reintroduce waste as nutrients in these loops (Ghisellini et al., 2016; Lieder & Rashid, 2016). However, compared to the pressing needs for change, not much has been accomplished so far in implementing the concept of circular economy (Planing, 2015).

A growing body of literature dedicated to CE emphasizes the importance of business models (BMs) (Lieder& Rashid, 2016; Kirchherr et al., 2017; Merli et al., 2018). Unfortunately, their design, in sustainable innovations, and their role in the transition remain unexplored (Boons & Lüdeke-Freund, 2013; Genovese et al., 2017; Bocken et al., 2018). The following challenges have been identified. In CE, re-designing business ecosystems is to create value for all stakeholders and to balance the self-interests of involved actors and sustainability impacts (Antikainen & Valkokari, 2016). Despite this, few CE BM authors deal with value creation (Murray et al., 2017; Kalmykova et al., 2018) and even less with value proposition and value capture. As CE promotes high value material cycles (Ghisellini et al., 2016), waste should no longer be considered as a "junk resource" (Warnier et al., 2013) without value but as a resource that is reintroduced in the production process thanks to reverse loops. Despite this,

the word "waste" remains the most used term in the literature far ahead of "nutrient" (Ghisellini et al., 2016; Lieder & Rashid, 2016; Murray et al., 2017). The BM literature in CE is largely focused on focal firms (Palo & Tähtinen, 2013) and most of the studies have mainly aimed at understanding how sustainable or circular business models can address Triple Bottom Line (TBL) (environment, economy and society) issues (Elkington, 1997; Gallo et al., 2018). The literature however lacks an in-depth understanding of how stakeholder' collaboration leads to the development of innovative networked business models (Palo & Tähtinen, 2013; Gallo et al., 2018). Very little is known about the dynamics and processes of how networked organizations progressively and collectively connect, articulate, align, fit and assess (circular) BMs (Chesbrough & Schwartz, 2007; Palo & Tähtinen, 2013; Lieder et Rashid, 2016; Ghisellini et al., 2016; Blomsma & Brennan, 2017).

More research is necessary because there is no shared and suitable framework to support BM innovation and to outline how firms should adapt their BMs to CE (Planing, 2015; Urbinati et al., 2017; Bocken et al., 2018). This explains that circular BMs are barely mentioned in the CE literature (Geissdoerfer et al., 2017; Kirchherr et al., 2017; Merli et al., 2018).

Boundary objects (Star & Griesemer, 1989; Doganova & Eyquem-Renault, 2009) and visual representations (Maire & Liarte, 2018) support the cognitive functions for BM initiation, ideation, and integration (Täuscher & Abdelkafi, 2017). Unfortunately, "little work sheds light on tools which may support the creative conceptual phase of innovating BM towards organizational sustainability" (Joyce & Paquin, 2016, p. 1475).

The contribution of this paper is a proposal for an innovative visual framework, based on the RCOV model (Demil & Lecocq, 2010). Its aim is to help stakeholders involved in networked organizations to develop circular business models and also to help teach the concept of circular business model. Section 1 of this article describes the methodology we used to develop such an artifact. Section 2 presents how a meta-literature review on CE and a literature review on BMs helped us build a first version of this artifact. Section 3 describes our framework and builds its theoretical foundations. The last section discusses the model and concludes.

1. METHODOLOGY

Our aim is to propose an artifact to help organizations in their quest for circular BMs. This artifact would have to represent, through an innovative visual framework, the dynamics and

processes of how networked organizations progressively and collectively connect, articulate, align, fit and assess value through (circular) business models. This objective implied two steps. The first one was: (i) to identify the conceptual building blocks of a circular BM, (ii) to review proposals in the literature in order to connect these buildings blocks, (iii) to identify gaps in terms of connection and alignment between the blocks that can make up a circular BM, and (iv) to propose a visual prototype which is robust theoretically speaking and overcomes the gaps. The second step was to organize workshops in order to test and improve the prototype, using case studies of existing organizations which had recently developed circular-economy-based activities with the authors.

The literature was reviewed with three issues in mind. First, there are so many articles on CE that it is impossible to review them all (table 1). To identify the key concepts, contradictions and gaps, we preferred a meta-review of CE literature.

Table 1. Circular economy: a very abundant literature to process.

Such concepts as "circular economy" have reached the stage where reviews of literature are now being published. This implies many definitions and proposals from which to choose from and, potentially, a challenge in identifying the gaps. For example, a Google Scholar search carried out on July 4/7/18 yielded 1 080 000 results, including citations and patents, and 860 000 without the latter two, when typing "circular economy" and looking for its occurrence in the title, or abstract, or keywords. When looking for the occurrence of "circular economy" in the title AND the abstract AND the keywords, Google Scholar yields 744 occurrences and Business Source Complete 133 occurrences. This is why we choose a meta-review of literature for the concepts associated to CE.

Second, as recommended by Kirchherr et al. (2017), we chose to manually check the relevance of the keywords. Common words such as design, economic, system, level are interesting to us as keywords only in the context of CE and often manual verification was needed to count only the relevant occurrences. Fifteen reviews of literature were finally selected and analyzed. They are listed in table 2.

Table 2. A list of reviews of literature related to the circular economy.

Authors	Contributions
Su et al, 2013	Review of concept, practices and assessment of CE, identification of underlying problems and challenges.
Ghisellini et al., 2016	CE origins, characteristics and perspectives, main principles, decoupling.
Lieder & Rashid, 2016	CE is not new, comprehensive review, implementation strategy using top-down and bottom-up approach in a current manner, practical implementation strategy, joint support of all stakeholders, regeneration.
Blosma & Brennan, 2017	CE is not new, emergence of concept, umbrella concept.

Geissdoerfer et al., 2017	Similarities and differences between CE and sustainability, both concepts remain ambiguous.
Heshmati, 2017	Presentation of CE concepts, introduces current practices and discusses standards for assessment, provides key CE indicators, identify underlying problems and challenges
Kirchherr et al., 2017	Identification of 114 definitions, with different meanings.
Murray et al., 2017	Origins, CE conceptualization, tensions and limitations.
Winans et al., 2017	History of CE, implementation critical examination.
Homrich et al., 2018	Point out the lack of consensus on terminologies and definitions, identify 2 main clusters: (i) ecoparks and industrial symbiosis, (ii) supply chains, material closed loops and business models.
Kalmykova et al., 2018	CE strategies, state of the art in CE implementation.
Korhonen et al,, 2018a	CE concept is superficial and unorganized, critical analysis, 6 challenges, contribution to scientific research on CE.
Korhonen et al,, 2018b	Critical discussion of CE concept, analysis of previous literature.
Merli et al., 2018	Exploration of state of the art, main practices.
Prieto-Sandoval et al., 2018	Proposes a consensus on the basic notions, highlights the relations of CE with eco-innovations

Third, this CE meta-review was crossed with a review of literature on BM innovation, sustainable BMs and circular BMs in order to design a first prototype. The idea was to test the possibility of fitting together CE and BM concepts. For example, reverse supply chain refers to using existing transport flows, to organize the return of materials from customers to suppliers. We tested existing BMs to check their ability to include and visualize these reverse supply chain concepts. The end result was a prototype of a new circular BM which represented the best possible fit between the two literatures and which addressed the identified gaps.

Finally, the prototype was presented until now to 5 groups of Masters' degree students in Business Administration and in Economics. The students were first introduced to CE and circular BMs. They were then given a presentation of the artifact. After this introduction, we provided them with one of the two case studies of real CE businesses which the authors had worked on in a recent past (table 3).

Table 3. Case studies submitted to students for prototyping

Case 1: *Stations Services* collects scrap material and production refuse from local companies and sells it at a low price to private people, home improvers, artists, cultural institutions and non-profit organizations. *Le Carré Bouge* is a non-profit organization of upcycling artists who only use scrap materials. Connecting *Stations Services* with *Le Carré Bouge* creates a circular BM that involves two interdependent parties.

Case 2: SMART (Sustainability, Material, Agreement, Recycling, Together) is an inter-organizational R&D project that connects together a manufacturer of agricultural plastic films with vegetable farmers and their partners. The aim of the project is to conceive a new and local business relationship in which farmers hand over the used films to the manufacturer, who "isocycles" and delivers them back to the farmers.

The students were asked to use the case study and to modelize a circular BM using the literature-based prototype provided to them as a template. They were divided into groups and given half a day to carry out the work, following which they had to hand over their proposal of connection, alignment and visualization. Depending on the students' level, their number, their background, different pedagogical protocols were experimented (Bocken et al., 2018). The current prototype which is a result of these experiments is presented in section 3.

In as such our methodology presents three characteristics. First, it is not an empirical study but a process aimed at designing an artifact. Thus, we take inspiration from research in the field of design (Romme, 2003). Second, the process also aims at helping the participants make sense of circularity putting researchers and practitioners as well as students on an equal level of involvement. Third, by this coproduction of sense and through the use of graphic tools, our work presents similarities with artful enquiry methods which rely on the use of photographs drawings and other artistic creations as a way to coproduce meaning (Barry, 1996) and with how strategy making relies on visual aids such as PowerPoint presentations to negotiate the sense of strategy (Kaplan, 2011).

2. LITERATURE REVIEWS

This section starts with a synthesis of 15 literature reviews on CE and then moves on to a literature review on BM innovation as well as sustainable and circular BMs. Finally, it makes proposals to connect these literatures.

2.1. CIRCULAR ECONOMY

CE is characterized by a wide span in terms of research topics, scope of the study and diversity of actors concerned (Blomsma & Brennan, 2017; Korhonen et al., 2018b; Merli et al., 2018). There are disagreements on how to define CE but not on its means and goals (Korhonen et al., 2018b). Its main objectives are to reduce the production-consumption of

virgin material and energy inputs, and to reduce waste and emissions outputs thanks to cyclical flows of materials and energy in closed-loop (Geissdoerfer et al., 2017; Blomsma & Brennan, 2017; Murray et al., 2017). Feedback or reverse loops of reuse and recycle allow managing material, energy and waste in order to extend their productive life, to minimize the input of natural non-renewable virgin resources and to reduce waste outputs (Antikanen & Valkokari, 2016; Blomsma & Brennan, 2017). Most of the authors have a lifecycle approach to retain the quality and value of the product or material, and to reduce environmental impacts (Ghisellini et al., 2016; Lieder & Rashid, 2016; Korhonen et al., 2018a). Homrich et al. (2018) consider that CE requires reforming the whole production-consumption system and for Merli et al. (2018), its final goal is to redefine the entire socio-economic system. Our review will be organized around the four relevant components necessary to establish the concept of CE according to Prieto-Sandoval et al. (2018, p. 610): "1) the recirculation of resources and energy, the minimization of resources demand, and the recovery of value from waste, 2) a multi-level approach, 3) its importance as a path to achieve sustainable development, and 4) its close relationship with the way society innovates."

2.1.1. Resources recirculation, minimization of demand and waste value recovery

The concepts of closed-loops and of turning waste into a resource to increase their use efficiency are the most frequently quoted in the CE literature (Geissdoerfer et al., 2017; Homrich et al., 2018; Su et al., 2013). In fact, as cycles and loops have neither beginning nor end, a true economy of loops should theoretically generate no waste (Stahel, 2005). By closing the material loops, resources can be kept and reused in the production-distribution-consumption system, and generate more value for a longer period (Lieder and Rashid, 2016; Urbinati et al., 2017). In CE, the closed-loops consist of two supply chains: a forward supply chain and a reverse one in which a product recovered from the user re-enters the forward chain to be reprocessed into a new usable product (Antikanen & Valkokari, 2016; French & LaForge, 2006). Reverse supply chain management is of utmost importance for product recovery (Ene & Öztürk, 2014). A reverse supply chain can either be a closed-loop reverse supply chain or an open-loop one. In the first case, products or materials are generally returned to the original producers. In the second case, products are recovered by firms other than the original producers (Gou et al. 2008). Wells & Seitz (2005) demonstrated that closed-loop supply chains are at the heart of exploring novel BMs and transitioning towards sustainable business. Five main resource flow loops can be distinguished: closing, slowing,

narrowing, intensifying and dematerializing (Bocken et al., 2016; Geissdoerfer et al., 2018; Stahel, 2005). Infinite circulation of resources in closed-loops is not possible due to losses and leaks in the industrial processes, to dispersive uses and to the laws of thermodynamics (Genovese et al., 2017; Georgescu-Roegen, 1971). The role of product end-of-life operations is central for CE (Merli et al., 2018). They are often described in R-typologies. The 3R principles (Reduction, Reuse, Recycle) are the most mentioned in the literature (Ghisellini et al., 2016; Su et al., 2013). Some authors (Kalmykova et al., 2018; Kirchherr et al., 2017; Winans et al., 2017) report on wider R-typologies found in the literature (4, 5, 6 or even 9R-typologies): Reduce, Reuse, Recycle, Recover, Refuse, Repair, Refurbish, Remanufacture, Repurpose, Redesign, Refuse, Rethink. In all the typologies the R practices are ranked. Despite national or European regulations, only few contributions address the issue of ranking waste management solutions (Ghisellini et al., 2016; Kalmykova et al., 2018; Kirchherr et al., 2017). Rather than ranking R principles, the CE literature seems more concerned with recycling. However, not all waste materials are recyclable and none are indefinitely recyclable due to losses, leakages and entropy law. Furthermore, increased recycling does not reduce the flow of material and energy through the economy. It just reduces waste volumes (Stahel, 2005) and delays resource depletion by a couple of decades only (Grosse, 2010).

2.1.2. Multilevel approach

The multilevel approach concerns the CE levels of analysis as well as the starting point of the transition (top-down versus bottom-up). As CE should lead to changing the whole business, the transition needs to occur, ideally simultaneously, at three systemic levels (Antikainen & Valkokari, 2016). The macro level concerns the activities that aim at reorienting the industrial structure of the entire economy towards sustainable production and consumption (Ghisellini et al., 2016; Su et al., 2013). The meso level describes the inter-firm ecosystem within geographic proximity which is designed to promote regional and environment friendly development. The micro level focuses on the activities of single firms, to minimize environmental impacts, and on consumers (Ghisellini et al., 2016; Su et al., 2013). Two approaches are possible to turn a linear economy into a circular one: a top-down approach by public institutions based on a national effort, legislation, policy implementation, support infrastructure, and a bottom-up approach by industry characterized by single firm effort, product design, supply chain management, collaborative BMs (Lieder & Rashid, 2016). In order to succeed in CE implementation, concurrent top-down and bottom-up approaches are

required to maintain the interests of all stakeholders. Indeed, the stakeholders' diverging motivations need to be aligned (Lieder & Rashid, 2016; Winans et al., 2017). Social awareness and new BMs are the main triggers for initiating the convergence between top-down and bottom-up movements (Lieder & Rashid, 2016).

2.1.3. A path to achieve sustainable development

The fact that resources are finite and have to be managed carefully to keep them for future generations fits well with the concept of sustainable development. It is why CE can be considered either as a concept to supersede sustainable development or to operationalize it (Kirchherr et al., 2017; Merli et al., 2018). If CE should adopt a holistic view on the three dimensions of sustainable development (economic, environmental, social), it is observed that most authors focus on the economic and environmental performance improvements (Geissdoerfer et al., 2017; Homrich et al., 2018). The social dimension, in terms of human stakeholders, human well-being, and human rights is virtually silent (Murray et al., 2017) and the institutional, legal and cultural implications are often under-considered. This prevents having a comprehensive approach for transitioning towards CE (Geissdoerfer et al., 2017; Homrich et al., 2018; Merli et al., 2018).

2.1.4. CE and the way society innovates

CE is related to the way society innovates (Prieto-Sandoval et al., 2018). In the context of a wide system of stakeholders or even a global society, CE can be defined as a production-consumption system. Long-term sustainability is linked with sustainable consumption practices and culture (Korhonen et al., 2018a, 2018b; Murray, 2017).

To conclude, even though CE represents the most advanced shift to sustainability it is not yet a panacea (Prieto-Sandoval et al., 2018). As long as growth is integrated in the model, it will be subject to numerous rebound effects (Zink & Geyer, 2017). The CE literature could contribute to recent research in strategic management that seeks to offer new perspectives in ecosystems management and to provide a BM thinking for business ecosystems (Möller & Halinen, 2017; Demil et al., 2018). In business ecosystems seen as configurations of activity defined by a value proposition, the critical strategic challenge is to align interdependent partners around this focal value proposition, despite the acknowledged tensions (Adner, 2017).

2.2. BUSINESS MODELS INNOVATION TOWARDS SUSTAINABILITY AND CIRCULARITY

This section addresses the key questions of BM innovation to incorporate CE concepts and presents the main notions related to sustainable and circular BMs.

2.2.1. BM innovation to support CE

A BM can be defined as a template of how an organization creates, delivers and captures value (Osterwalder & Pigneur, 2010; Teece, 2010; Zott & Amit, 2010). "Several ontological frameworks" (Linder & Willander, 2015) are used to describe more accurately its rationale. Bohnsack et al. (2014) distinguish three main components – i.e. value proposition, value network, and revenue/cost model. In their RCOV framework, Demil and Lecocq (2010) also assume that a BM can be described with three core components: its resources and competences (R&C), its organizational structure (O) and its propositions for value delivery (V). To link BMs with sustainable innovation, Boons et al. (2013) use four elements: value proposition, supply (or value) chain, customer interface, and financial model. Osterwalder and Pigneur's business model Canvas (2010) is built from nine blocks: value proposition, key activities, key resources, key partners, customer segments, customer relationships, distribution channels, costs structure and revenue streams. A BM may be seen as an "activity system", that is to say "a system of interdependent activities that transcends the focal firm and spans its boundaries" (Zott & Amit, 2010, p. 216). Even if they represent the viewpoint of just one organization they can potentially disrupt entire industries, because they connect multiple actors, mediate between the production and the consumption side and support the introduction of novel technologies into the market (Bidmon & Knab, 2018). This is why BM development is widely considered a cornerstone for CE transition (Lewandowski, 2016). BM innovation has two main questions to tackle in a context of CE transition: (i) how to innovate BMs in order to change the dominant logic of the firm when the environments become more global, fast paced and when the whole business ecosystem and its dynamics are changing (Antikanen & Valkokari, 2016; Bocken et al., 2018) and (ii) how to overcome conflicts in objectives, in contradictory demands between economic, social and environmental concerns, to achieve sustainability on a large-scale (Heshmati, 2017).

To address these questions, BMs dedicated to CE transition should have, as in all ecosystems in moving environments, three main characteristics: (i) dynamism to adapt to the transition, (ii) adaptability to complex networks, and (iii) capability to connect and align themselves with

the BMs of stakeholders. A too static perspective in BM design and use hinders identifying the most effective strategies in terms of business sustainability (Cosenz & Noto, 2018). BM innovation requires an incremental, transformational and ongoing process to address change and focus on innovation (Antikanen & Valkokari, 2016; Zott & Amit, 2010). The RCOV framework (Demil & Lecocq, 2010) explicitly looks at creating dynamic interactions between and within its core components. The 'dynamic consistency' labels the firm's capability to build and sustain its performance while its BM changes all the time. As a BM cannot be fully anticipated, it needs progressive refinements *via* significant trial and error, experiments and adaptation *ex post* (Achtenhagen et al., 2013; Chesbrough, 2010; Doganova & Eyquem-Renault, 2009). Simulation can be a valuable substitute when real experimentation is too costly to discover how complex systems work (Cosenz & Noto, 2018). As a BM is not firm-focused, but rather network-, or market-focused, its dynamics is determined by the impact on companies of the changes in the network and *vice versa* (Ferreira et al., 2013; Jabłoński, 2015).

In an activity system perspective (Zott & Amit, 2010), BMs are closely intertwined with each other and their design involves the weaving together of key components of the activity system (Bidmon & Knab, 2018; Rong et al., 2018). Relevant stakeholders to sustainable or circular BMs can be either internal actors in a company, in a value chain or in an extended value chain (Boons & Lüdeke-Freund, 2013; Manninen et al., 2018). Value is co-created among all these actors with complementary resources across the renewed value network configurations (Bohnsack et al., 2014; Ferreira et al., 2013). Networked BM development refers to the continuous process where one BM element influences other elements, in a net of actors, and where two levels should be considered (the firm and net levels) (Palo & Tähtinen, 2013). Associative Sustainability BMs are those which are deeply grounded in associative behaviors and partnerships to create value with a TBL dimension and address pressing sustainability challenges (Gallo et al., 2018). Inter-organizational sustainability management in these BMs includes product design for multiple life cycles, a new consumption culture, take-back strategies or reverse logistics (Korhonen et al., 2018a). These BMs are inherently complex and their actors have to adopt paradoxical strategies to overcome their tensions and contradictions (Smith et al., 2010; Tura et al., 2019; van Bommel, 2018). The integration of sustainability or circularity into these BMs further increases their complexity (Täuscher & Abdelkafi, 2017).

In CE transition, as in any partnership, firms must carefully define their business objectives for partnering and articulate their BMs to make them sufficiently compatible (Chesbrough & Schwartz, 2007; Palo & Tähtinen, 2013). A "horizontal coherence" has to be found between the core components of each BM (Demil & Lecocq, 2010; Joyce & Paquin, 2016). In CE, there is a triple fit challenge: (i) between value proposition and customer segments, (ii) between costs structure and revenue streams, (iii) between changes inside a company towards more circularity and adaption factors (Lewandowski, 2016). The external fit of BMs addresses the appropriateness of the configuration given external environmental conditions (Doganova & Eyquem-Renault, 2009). The focus is on the interaction and relationships between all parties because when one firm changes its BM, the others change too (Bidmon & Knab, 2018; Ferreira et al., 2013). In sustainable or circular BMs further fit challenges appear.

2.2.2. Sustainable business models

BMs supporting sustainability may be labeled either as BMs for sustainability (BMfSs) (Schaltegger et al., 2012), sustainability BMs (Stubbs & Cocklin, 2008), or sustainable BMs (Bocken et al., 2014; Boons & Lüdeke-Freund., 2013). Regardless of the term in use they are notoriously complex because they all: (i) have to use both a system and a firm-level perspective, (ii) incorporate a TBL approach in their value proposition and their logic of value creation, delivery and capture, (iii) consider, with a pro-active management, a wide range of stakeholder interests, including environment and society, and (iv) adopt a long term perspective (Boons & Lüdeke-Freund, 2013; Bocken et al., 2014, 2018; Geissdoerfer et al., 2018; Stubbs and Cocklin, 2008). Several authors extended the BM canvas (Osterwalder & Pigneur, 2010) to develop new frameworks of sustainable BMs. Antikainen and Valkokairi (2016) added components of business level system, for multilevel analysis, and sustainability impact, for continuous iteration with sustainability evaluation. Joyce and Paquin (2016) elaborated a Triple Layered Business Model Canvas (TLBMC) which extends the original business model canvas by adding two layers: an environmental layer based on a lifecycle perspective and a social layer based on a stakeholder perspective. Bocken et al. (2018) designed a sustainable BM canvas encompassing the stakeholders in the entire system with a 3P (People, Planet Profit) value proposition.

2.2.3. Circular business models

Sustainable and circular BMs are closely related literature streams and authors consider that circular BMs are a class of generic strategy for sustainable BMs (Antikainen & Valkokari, 2016; Geissdoerfer et al., 2018). Linder and Willander (2015, p. 183) define a circular BM *"as a business model in which the conceptual logic for value creation is based on utilizing economic value retained in products after use, in the production of new offerings. Thus, a circular BM implies a return flow to the producer from users, though there can be intermediaries between the two parties. The term circular BM therefore overlaps with the concept of closed-loop supply chains.*" Therefore, the value creation logic is designed to improve resource efficiency through contributing to extending useful life of products and parts (Nuβholz, 2017). More, Geissdoerfer et al. (2018) assume that the best sustainability performance is achieved in a circular BM if all its elements are aligned ('go circular') to support the three functions: value proposition, value creation and delivery, and value capture.

Circular BM innovations are by nature networked and require circular supply chain management which is crucial for collaboration, communication, and coordination within complex networks of interdependent but independent actors/stakeholders (Antikainen & Valkokari, 2016; Bocken et al., 2014). Supply chain management has to fit with slowing and closing resource cycles (Bocken et al., 2016). To design circular BM frameworks most of the authors chose, as for sustainable BMs, to draw on the canvas developed by Osterwalder and Pigneur (2010) due to its worldwide recognition. For example, Lewandowki (2016) added to this framework a "take-back system" block and an "adoption factors" component and pointed the triple fit challenge. Circular BMs have also to fit with enabling factors (legislation, business risks, company's culture, team commitment, geographical proximity) (de Mattos & de Albuquerque, 2018; Lewandowki, 2016).

2.3. CONNECTING THE TWO LITERATURES

Urbinati et al. (2017) have started to connect the CE and BM literatures through a taxonomy of CE BMs based on the degree of adoption of circularity along two major dimensions: the customer value proposition and interface (the implementation of the circularity concept in proposing value to customers) and the value network (the ways through which interacting with suppliers and reorganizing internal activities take place). To progress in the knowledge of how can the two literatures enrich each other, let us now cross the meta-review of literature

on CE and the one on BM innovation as well as on sustainable and circular BMs. Table 4 summarizes the key notions to be introduced in the framework we intend to design.

Table 4. Key notions from CE and BM literature reviews.

Main concepts in the literature reviews	Authors
Closed material loops, reverse supply chains	Lieder & Rashid, 2016; Geissdoerfer et al., 2017, 2018; Homrich et al., 2018; Merli et al., 2018
Reduction of resource material consumption	Su et al., 2013; Ghisellini et al., 2016; Lieder & Rashid, 2016
Material value kept by turning waste into resource	Su et al., 2013; Geissdoerfer et al., 2017; Homrich et al., 2018 ; Antikanen & Valkokari, 2016; Linder & Willander, 2017
Resource use efficiency, product life extension	Su et al., 2013; Ghisellini et al., 2016; Lieder & Rashid, 2016; Bromsma & Brennan, 2017; Merli et al., 2018
Sustainable value, Triple Bottom Line approach	Stubbs & Cocklin, 2008; Boons & Lüdeke-Freund, 2013; Lieder & Rashid, 2016; Geissdoerfer et al., 2017; Korhonen et al., 2018a, 2018b
Main practices, R-typologies	Su et al., 2013; Ghisellini et al., 2016; Murray et al., 2017; Winans et al., 2017; Kirchherr et al., 2017 ; Kalmykova et al., 2018
Macro, meso and micro levels of analysis	Su et al., 2013; Ghisellini et al., 2016; Lieder & Rashid, 2016; Heshmati, 2017; Murray et al., 2017; Merli et al., 2018
Top-down and bottom-up approaches	Lieder & Rashid, 2016; Winans et al., 2017; Merli et al., 2018
Product lifecycle thinking and long term perspective	Ghisellini et al., 2016; Lieder & Rashid, 2016; Bromsma & Brennan, 2017; Merli et al., 2018
Wide range of stakeholders, including environment and society	Lieder & Rashid, 2016; Ghisellini et al., 2016; Geissdoerfer et al., 2017; Winans et al., 2017 ; Homrich et al., 2018
Sustainable systems of production and consumption	Lieder & Rashid, 2016; Genovese et al., 2017; Homrich et al.,2018; Merli et al., 2018
BM dynamism	Teece, 2010; Zott & Amit, 2010; Demil & Lecocq, 2010; Achtenhagen et al., 2013; Cosenz & Noto, 2013; Rong, 2018
Connection, fit and alignment between BMs in networked, associative, or circular configurations	Abdelkafi & Täuscher, 2016; Bidmon & Knab, 2018; Bocken et al., 2016, 2018; Bohnsack et al., 2014; Boons & Lüdeke-Freund, 2013; Chesbrough & Schwartz, 2007; de Mattos & de Albuquerque, 2018; Doganova & Eyquem-Renault, 2009; Ferreira et al., 2013; Gallo et al., 2018; Geissdoerfer et al., 2017; Joyce & Paquin, 2016; Lewandowski, 2016; Manninen et al., 2018; Palo & Tähtinen, 2013; Rong, 2018; Stubbs & Cocklin, 2008; Täuscher & Abdelkafi, 2017; Zott & Amit, 2010
BM experimentation and simulation	Achtenhagen et al., 2013; 2017; Bocken & Antikainen, 2018; Chesbrough, 2010; Cosenz & Noto, 2018; Doganova & Eyquem-Renault, 2009

Alongside authors such as Cosenz and Noto (2018), Doganova and Eyquem-Renault (2009), we consider that strategy tools such as BMs are of particular relevance because, as boundary objects (Star & Griesemer, 1989), they develop coherence across intersecting heterogeneous social worlds. Thanks to their standardized forms "[b]oundary objects are both adaptable to different viewpoints and robust enough to maintain identity across them" (Star & Griesemer, 1989, p. 387). BM visual representations are essential to support innovation. Visualizations facilitate communication among teams and between an organization and its external stakeholders, enhance the collaboration effectiveness and enable knowledge sharing

(Täuscher & Abdelkafi, 2017). Material or energy loops as well as flows of money or information are also more understandable when graphically represented. However user-friendly visual representations may give the wrong impression that modeling is a simple and quick process (Cosenz & Noto, 2018).

Our conclusion is that existing proposals for sustainable and circular BMs contain two shortcomings. The first one is that these proposals are based on enriching existing blocks to an existing model and adding new ones. However, these additions never connect with the initial model. For example when Osterwalder and Pigneur (2010, p. 265) propose to add two bricks (social and environmental costs and benefits), they just provide an opportunity to list items but not to visualize how these are connected and interact with the existing bricks and with those of other BMs. The second one is that a circular BM cannot be conceived just at the level of one organization. A circular BM must help visualize the BMs of several organizations and provide guidance to connect them with each other to create circularity and shared value. Not one of the proposals we reviewed investigated this necessity. In the following section, we build on these gaps and on the key notions of table 4, as well as on the potential of boundary objects, and we propose a framework for a new circular BM.

3. LAYING THE FOUNDATIONS OF A NEW CIRCULAR BUSINESS MODEL

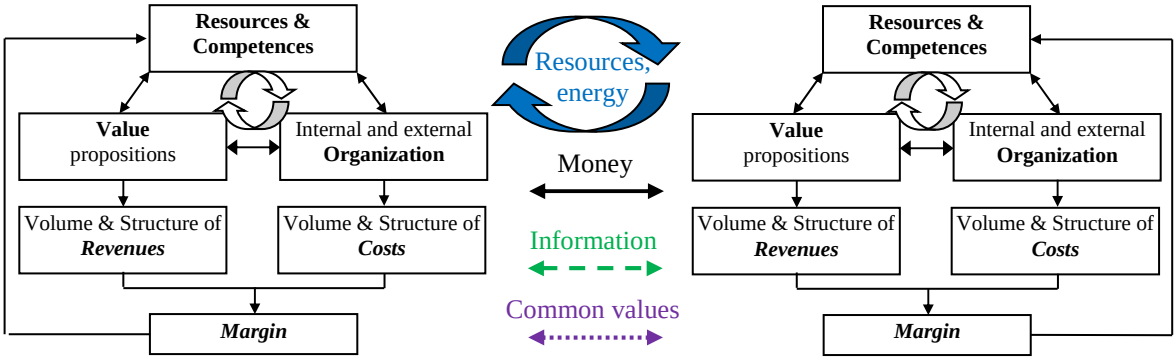
Our study explores how BM innovation can support the implementation of circular strategies (Nuβholz, 2017). Unlike the majority of CE implementation studies (85 %) we will not concentrate on macro or micro level analysis but on meso and supply chain levels (Merli et al., 2018) because it is at this level that we can connect together the BMs of the stakeholders involved in developing a CE project. Instead of designing a totally new framework, we chose to build on existing knowledge and extend an existing framework while trying to solve the theoretical gaps identified in the CE and BM literatures (Klang et al., 2014).

3.1. INTRODUCTION TO THE VISUAL FRAMEWORK

Most of the present sustainable or circular BMs are built upon Osterwalder & Pigneur' canvas (2010): Antikainen and Valkokari (2016), Lewandowski (2016), Joyce and Paquin (2016), Bocken et al. (2018). Unlike them, we chose to start from the RCOV model (Demil & Lecocq, 2010) due to its parsimony and dynamic consistency characteristics. Parsimony refers to the three of components (R&C, O, and V) in their model. The fewer of them, the easier it is

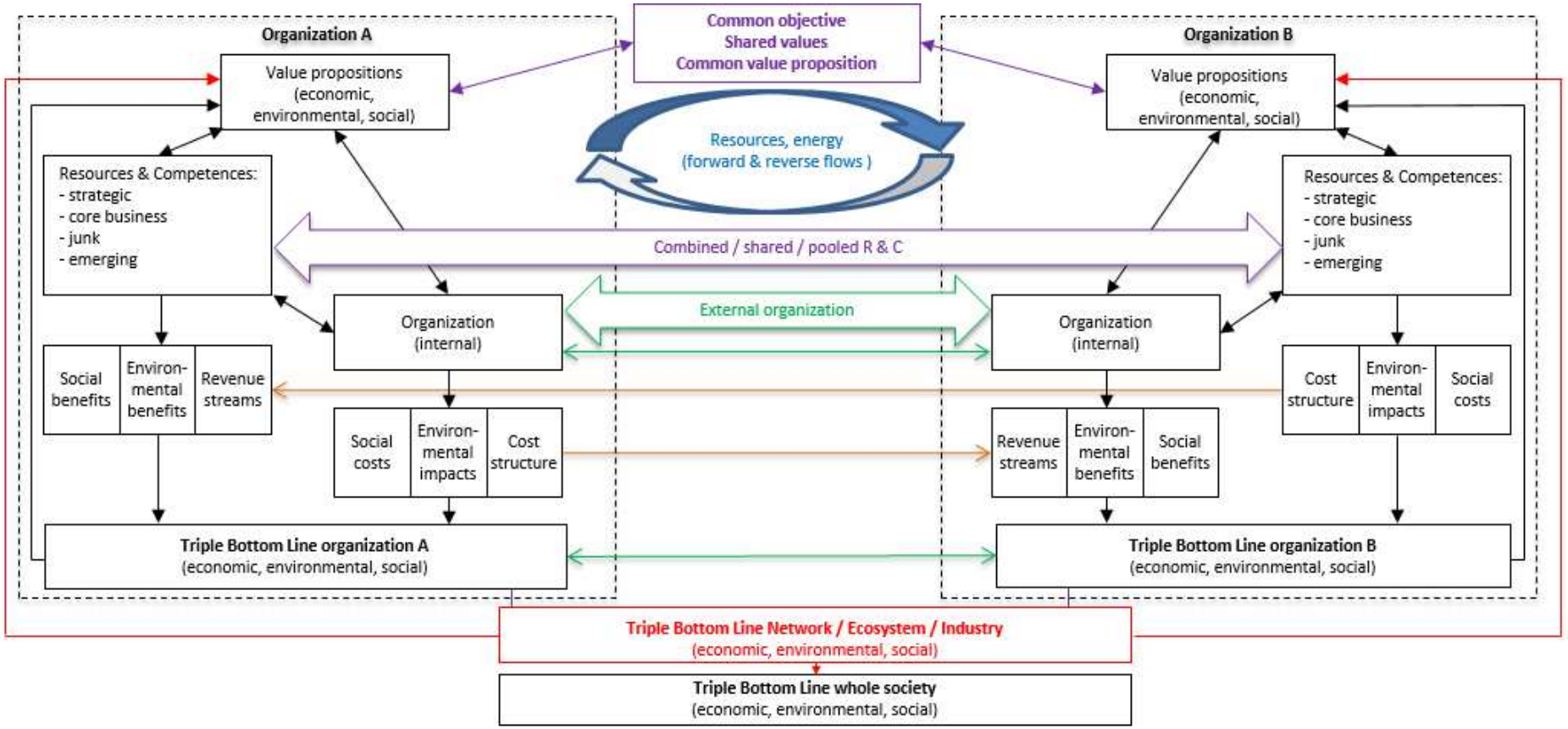
to connect together several BMs (figure 1). However the level of comprehensiveness of these three components is high as it enables to cover all the aspects of a BM.

Figure 1. A circular BM based on RCOV (Demil & Lecocq, 2010, p. 234) frameworks.



In this article, for clarity and pedagogical reasons, we will limit our study to the connection of two BMs. Boulding (1966) distinguished three important classes of inputs and outputs in systems: matter, energy, and information. Once two RCOV frameworks are placed alongside one another, it is easy to represent the flows of matter and energy, the money, as well as the exchange of information, the latter being cited “as a constraint to the success of CE initiatives” (Winans et al., 2017, p. 830). Figure 1 graphically represents the key difference between circular BMs and linear ones. It corresponds to the embeddedness of a circular strategy which alters, in the offer, material flows and other exchanges (Nuβholz, 2017; Merli et al., 2018). The major challenges in our proposal are to tackle the cognitive problem of thinking outside the dominant logic and to connect and align individual firm-level BMs with one another (Täuscher & Abdelkafi, 2017). Testing this concept in workshops enabled to bring improvements to the literature-based prototype (figure 1) in ways that will be explained in the following pages, based on the most up-to-date version (January 2019) presented in figure 2.

Figure 2. A visual framework for circular business models in networked organizations transitioning towards circular economy.



3.2. A RCOV MODEL EXTENSION TO TURN IT CIRCULAR

To develop a circular BM it is important, as for conventional ones, to start by defining the common business purpose and objectives (Chesbrough & Schwartz, 2007). Partners should also brainstorm on their shared values and on the common value proposition which will be experimented (Bocken & Antikainen, 2018). The chronological order of the steps to generate a business model is ambiguous (Klang et al., 2014). As a result of debates during the workshops, we decided to change the order of the RCOV elements and to start with the value proposition. We consider: (i) as Lewandowski (2016) that the value proposition is the key element of a circular business model, (ii) as Bocken et al. (2018) that it is the starting point to create an offer that suits customer needs, and (iii) as Täuscher and Abdelkafi (2017) that it is a good way to achieve a faster reduction of the negative impacts on the environment.

3.2.1. Value proposition

The idea that value-focused innovative practices embody a CE philosophy by reformulating the value proposition of products and services (Merli et al., 2018) remains marginal in academic circles. In CE, the value proposition includes the societal and environmental benefits a company and its collaborative partners intend offering to its customer(s) throughout the value chain (Boons & Lüdeke-Freund, 2013; Bocken et al., 2014, 2018; Bocken & Antikainen, 2018). Before satisfying the customers, the value proposition must contribute first to preserving environmental and societal capital. The value proposition can be embedded in sustainable product-service systems (PSSs) in which the economic and competitive interest of the providers continuously seeks environmentally and socio-ethically beneficial new solutions (Vezzoli et al., 2015). In use-oriented or result-oriented PSSs (Tukker, 2004), customers are no longer the owners of the products but their users. They become the customers of services provided by companies which own the products. A value proposition based on selling services instead of selling products (functional economy) presents advantages in terms of employment and resource-efficiency (Stahel, 2005; Ghisellini et al. 2016; Urbinati et al., 2017). It could also contribute to enhancing consumer responsibility (Su et al., 2013; Ghisellini et al. 2016).

3.2.2. Resources and Competences

Existing studies often concentrate on strategic resources which are valuable, rare, inimitable and non-substitutable and provide a sustainable competitive advantage. Alongside these

resources, the extended theory of resources (Warnier et al., 2013) introduces the concepts of "ordinary resources" and "junk resources", respectively perceived as neutral or negative in terms of performance. Junk resources are widely available but are overlooked or ignored by the firms that possess them and are considered as sources of costs or as destroying value. It is the case for waste in a linear economy, but in a CE waste has a value and is no longer considered as waste but as a resource (Ghisellini et al., 2016; Lieder & Rashid, 2016). This is in line with the extended theory of resources which claims that the value of resources is not objectively given but is determined by knowledge as well as by the beliefs of managers and is constructed by them. Accordingly, a junk resource, such as waste, could create value and even be a source of competitive advantage if it leads to the emergence of new BMs within a sector (Warnier et al., 2013). A strong focus, in our model, is on how to identify, manage and valorize waste as well as how to extend their value as long as possible (reuse, secondary raw material) (Merli et al., 2018). Once resources and competencies are identified for organizations A et B (figure 2), our model invites the circular BM designers to connect them and to identify those which could be combined, shared or pulled.

3.2.3. Internal organization

Internal organization refers to the choices made for the activities undertaken inside the value chain, such as manufacturing, logistics, distribution and sales. All activities are concerned by the transition towards CE. Manufacturing activities, for example, will adopt cleaner production to reduce their environmental impacts (Su et al., 2013; Ghisellini et al., 2016). In CE, three activities are to be considered more specifically for sustainability: design, supply chain management and customer relationships. The early design stage is of upmost importance for sustainability because the choices made during this phase will have positive or negative consequences during the whole lifecycle of the product (greater reliability or higher energy consumption). Designing products for closed-loop systems is a pivotal point for its success (Moreno et al., 2016; de Mattos & de Albuquerque, 2018). Choices include materials or nutrients that are neither rare nor hazardous, design strategies for end-of-life, product longevity and life extension as well as social issues, including usability or socially responsible use and sourcing (Ghisellini et al. 2016; Moreno et al., 2016). DfX is common acronym to sum up eco-design strategies such as Design for Reuse, Disassembly, or Recycling (Moreno et al., 2016; Urbinati et al., 2017). The activities of the forward supply chain (planning, purchase of raw materials, distribution) are usually well managed. In the CE transition, firms

will have to design and manage new activities of the reverse supply chain such as return logistics, inspection and sorting of product return, recovery, remanufacturing, recycling (Ghisellini et al. 2016; Urbinati et al., 2017; Kalmykova et al., 2018). In CE, the relationships with customers are also changing. To reduce resource consumption and environmental impacts, firms tend to replace the sale of products by the sale of usage/services (Stahel, 2005; Su et al., 2013).

3.2.4. External organization

The external organization allows for coordination with stakeholders within the firm's value network (Demil & Lecocq, 2010). It needs to consider the activities performed for the focal firm outside its boundaries by partners, suppliers or customers as well as the resources and capabilities of third parties (Zott & Amit, 2010). Firms need to collaborate with key stakeholders to achieve sustainability for the system that they are part of (Stubbs & Cocklin, 2008). Designing circular BMs requires a systemic point of view centered on products (Bocken et al., 2018) and a joint effort in managing inter-organizational activities (de Mattos & de Albuquerque, 2018; Rong et al., 2018). As the supply chain is a critical unit of action for the implementation of a CE model, companies need to collaborate with stakeholders to ensure reverse logistics (de Mattos & de Albuquerque, 2018; Bocken et al., 2018). Key suppliers, for example, may provide second hand products, used goods or renewable, recyclable or biodegradable resources (Urbinati et al., 2017; Nuβholz, 2017). The supply chains have to be aligned with the principles of CE and the BM of each firm has to be aligned with those of the value chain partners to coordinate closing resource loops (Nuβholz, 2017; de Mattos & de Albuquerque, 2018). To obtain mutual benefits with other partners, companies need to share assets at multiple levels, such as material and physical resources, local infrastructures, and recycling waste (Urbinati et al., 2017). Designing a circular BM is often an exploratory process that relies upon trial and error to identify models that support value creation and appropriation for all the partners (Rong et al., 2018).

3.2.5. Volume and structure of costs and revenues

To evolve from the RCOV framework to our proposed circular BM, the volume and structure of costs and revenues components have to take the four core issues of corporate sustainability (economic, environmental, social dimensions and long-term orientation) into account (Geissdoerfer et al., 2018). CE principles lead, at the beginning, to additional costs for

companies. If any, they have to design and set up reverse closed-loops from nothing. In order to reduce material consumption and waste production, firms retain the ownership of products that are first costly to acquire and then extend their responsibility during their whole lifecycle (Ghisellini et al., 2016; Urbinati et al., 2017). Some costs may also be decreased by loss reduction, substitution of high-priced primary material with cheaper secondary raw material or avoidance of end-of-life disposal costs (Nuβholz, 2017; Urbinati et al., 2017). In circular BMs, firms are encouraged to provide products as a service to consumers, through use-oriented or result-oriented PSSs (Tukker, 2004). In this case, long term contracts (leasing, renting, sharing) with the service users may secure regular incomes (Ghisellini et al., 2016; Urbinati et al., 2017). Additional revenues can stem from repairing products, selling reused ones or recycled materials (Lewandowski, 2016; Nuβholz, 2017). In our model we have no dedicated layers for environmental and social issues such as in the Triple layered business model canvas (Joyce & Paquin, 2016). Despite this, they must be taken into account. Environmental impacts or social benefits or costs are identified and/or quantified through activities such as eco-design, life cycle assessment or social responsibility assessment. If eco-design or design for disassembly, for example, may bring about additional costs, they should be compensated by benefits such as natural resource preservation, decreased input costs, decreased environmental impacts or improved society wellbeing, although assessment is often difficult because short term decisions may only have an effect in the long term (Linder & Willander, 2015; Urbinati et al., 2017; Geissdoerfer et al., 2018). To align their BMs, in our model, organizations A and B have to exchange money and information as represented by the arrows in figure 2.

3.2.6. Firm-level and network-level Triple Bottom Line

In our model, the “margin” component in the RCOV model was renamed Triple Bottom Line (economic, environmental, and social) in line with Elkington (1997). In a project of transition towards CE, the results are co-created but all the partners do not have the same expectations and do not perceive the results or their own benefits in the same way. It is why the results have to be assessed at the level of each organization as well as at the partnership level (Ekman et al., 2016; Reypens et al., 2016). Sustainable or circular BMs encompass a firm-level perspective as well as a systems perspective (Stubbs & Cocklin, 2008). In our model, we differentiate the micro level of organizations A and B, the meso level of their network, ecosystem or industry and the macro level (cities, regions, countries or the whole society or

planet) (Heshmati, 2017; Merli et al., 2018). At the firm level, the activity system must not only create value with its partners but also claim a share of the value created (Zott & Amit, 2010). All the elements of a BM (value proposition, value creation and delivery, and value capture) have to 'go circular' to achieve optimal sustainability performance within the CE (Geissdoerfer et al., 2018). The model should show the main loops and allow managing and monitoring the performance of sustainability and circularity (Abdelkafi & Täuscher, 2016). If individual organizations can make significant progress towards achieving sustainability, ultimately organizations can only be sustainable when the whole system of which they are part is sustainable (Stubbs & Cocklin, 2008). At the system level, the Triple Bottom Line is materialized for relevant stakeholders and means increased profit, reduced environmental load and increased social well-being for the whole network, including suppliers, customers, other stakeholders, and society as a whole (Tura et al., 2019). The emphasis on the system-level is to avoid partial optimization at the firm-level (Zott & Amit, 2010). Significant improvements would be achieved in resource efficiency at the firm-level, by implementing circular strategies, but would not necessarily translate into a global reduction of resource, but on the contrary into an increase due to rebound effects at the system-level (Ghisellini et al. 2016; Nuβholz, 2017).

4. DISCUSSION / CONCLUSION

In this article we conducted a meta-review of research in the field of circular economy. We identified key concepts which we crossed with a review of literature on business models (BM innovation, sustainable BMs, circular BMs). This enabled us to identify proposals based on which we could build an artifact to visualize circular BMs, and to address major gaps we identified: lack of work on visualization, value definition mostly limited to the economic dimension, and frequent ignorance of the reverse supply chains. Above all, despite the fact that CE is based on networks and connections, there is an excessive focus on one organization and there are no tools to connect together the BMs of all organizations involved in a CE project. We also noticed that the CE literature has a potential to contribute to the BM literature in two ways. First, the idea of visualizing is present in the CE literature, for example with the depictions of closing, slowing, narrowing, intensifying and dematerializing loops (Stahel, 2005; Geissdoerfer et al., 2018). In line with recent research in management, which insists on the need to make a better use of visuals (Maire & Liarte, 2018), especially in BM

innovation (Täuscher & Abdelkafi, 2017), some suggestions stemming from CE could be applied in order to better visualize circular BMs. Second, the multilevel approach is present in the CE literature (micro, meso, macro as well as top-down and bottom-up levels) (Lieder & Raschid, 2016; Heshmati, 2017; Winans et al., 2017) and so is the need to connect the different levels. All of this points to the impossibility of apprehending the CE at the level of just one organization in a way that is disconnected from the rest of its environment. The BM literature which has the tendency to focus just on one organization should integrate the wider perspectives provided by the CE literature. To our knowledge, our circular BM is the first one to connect graphically two organizations. Reciprocally, the CE literature also has shortcomings that the literature in sustainable management can contribute to overcome. For example, the Triple Bottom Line concept (Elkington, 1997) is widely integrated in the sustainable BM literature with frequent proposals to integrate economic, environmental and social benefits. This could benefit the CE literature in which we noticed a lack of attention for the subject of integrating the three dimensions.

Our contribution builds on the above to propose a circular BM that brings a more comprehensive visualization of circularity, as the result of connections and fits between the BMs of partners involved in a CE project. It integrates the Triple Bottom Line concept in a way that enables to discuss the interactions between economic, environmental and social values in a transparent and explicit manner. This entails a more cooperative and shared approach of the global objectives of a project between actors. Indeed, there is a tendency among practitioners to view the business model as the visual arrangement of a firm's specific elements, rather than a system of causes and consequences, or transactions (Täuscher & Abdelkafi, 2017). Our contribution specifically enables this visualization as a system and not as the point of view of one organization. Furthermore, through the organization of workshops we also demonstrated the ability of our model to engage students and critically examine the medialization of circular BMs. This responds to the need for small scale experiments recommended by Bocken and Antikainen (2018) with fast-paced learning cycles, and low resource requirement. At this stage however we stayed at the level of focus groups with students and paper versions of business cases. The next step would be to test it in the context of an emerging circular economy project. This would help develop the understanding of how to conduct such experiments. In this field also theory is lacking, with few contributions in academic literature on business experiments and even fewer focusing on such experiments for sustainability (Bocken & Antikainen, 2018).

Finally, while the potential of BMs to contribute to systemic change seems undisputed, little is known about their exact role in societal transitions and the mechanisms by which they impact transition dynamics. Boons et al. (2013, p. 4) identify this gap and state that "the issue of how firms can contribute significantly to bringing about transitions has received too little attention, especially in relation to business models." In this respect, we believe that our model offers a rich potential for visualization of the dynamics of a circular economy project and data collection. Because we chose experiments as a means of applying a conceptual model, based on a review of literature, we combined design science with organizational design in order to reduce the gap between theory and practice (Romme, 2003). However, there are many avenues left to explore for future research. We will just mention a few of them. The first subject is sensemaking and sensegiving (Stigliani & Ravasi, 2012). We collected more than one hundred evaluation forms from students. A quick analysis showed that the experiment to which they contributed helped them make sense of circularity and BM concepts. To better understand the dynamics from individual to group-level sensemaking and how "representational gaps" were reduced during the experiments, we could use the interactive tool proposed by Stigliani and Ravasi (2012). We also believe there is a comparison to be made between our research design and the research of Kaplan (2011) on the role of PowerPoint presentations in strategy making. It is through visualization that a collective understanding of the situation is reached. Kaplan talked of collaboration and cartography which involve the generation and the selection of ideas under uncertainty.

ACKNOWLEDGEMENTS

This research has been carried out within the SMART project (Sustainability, Material, Agreement, Recycling, Together) and was funded by Région des Pays de la Loire (Contract N° 2013·10540). The authors would like to thank Mathilde Elie (Latitude creative) and Gaëlle Brayer (Lime) for their involvement and their helpful comments during the fieldwork as well as the students and colleagues for their participation and motivation during the experiments.

REFERENCES

Abdelkafi, N. and K. Täuscher (2016), Business models for sustainability from a system dynamics perspective, Organization & Environment, 29:1, 74-96.

Achtenhagen, L., Melin, L. and L. Naldi (2013), Dynamics of business models–strategizing, critical capabilities and activities for sustained value creation, Long Range Planning, 46:6, 427-442.

Adner, R. (2017), Ecosystem as structure: an actionable construct for strategy, Journal of Management, 43:1, 39-58.

Antikainen, M. and K. Valkokari (2016), A framework for sustainable circular business model innovation, Technology Innovation Management Review, 6:7, 1-12.

Barry, D. (1996), Artful Inquiry: A Symbolic Constructivist Approach to Social Science Research, Qualitative Inquiry, 2: 4, 411-38.

Bidmon, C. M. and S. F. Knab (2017), The three roles of business models in societal transitions: New linkages between business model and transition research, Journal of Cleaner Production, 178, 903-916.

Blomsma, F. and G. Brennan (2017), The emergence of circular economy: A new framing around prolonging resource productivity, Journal of Industrial Ecology, 21:3, 603-614.

Bocken, N. M., Short, S. W., Rana, P. and S. Evans. (2014), A literature and practice review to develop sustainable business model archetypes, Journal of Cleaner Production, 65, 42-56.

Bocken, N. M., de Pauw, I., Bakker, C. and B. van der Grinten (2016), Product design and business model strategies for a circular economy, Journal of Industrial and Production Engineering, 33:5, 308-320.

Bocken, N. M. P., Schuit, C. S. C. and C. Kraaijenhagen (2018), Experimenting with a circular business model: Lessons from eight cases, Environmental Innovation and Societal Transitions, 28, 79-95.

Bocken, N. M. and M. Antikainen (2018), Circular Business Model Experimentation: Concept and Approaches, International Conference on Sustainable Design and Manufacturing, Gold Coast (Australia), 24-26 june.

Bohnsack, R., Pinkse, J. and A. Kolk (2014), Business models for sustainable technologies: Exploring business model evolution in the case of electric vehicles, Research Policy, 43:2, 284-300.

Bolton, R. and M. Hannon (2016), Governing sustainability transitions through business model innovation: Towards a systems understanding, Research Policy, 45:9, 1731-1742.

Boons, F. and F. Lüdeke-Freund (2013), Business models for sustainable innovation: state-of-the-art and steps towards a research agenda, Journal of Cleaner Production, 45, 9-19.

Boons, F., Montalvo, C., Quist, J. and M. Wagner (2013), Sustainable innovation, business models and economic performance: an overview, Journal of Cleaner Production, 45, 1-8.

Boulding, K.E. (1966), The Economics of the Coming Spaceship Earth, in H. Jarrett (ed.), Environmental Quality in a Growing Economy, Baltimore, MD: Resources for the Future/Johns Hopkins University Press, 3-14.

Chesbrough, H. and K. Schwartz (2007), Innovating business models with co-development partnerships, Research-Technology Management, 50:1, 55-59.

Chesbrough, H. (2010), Business model innovation: opportunities and barriers, Long Range Planning, 43:2-3, 354-363.

Cosenz, F. and G. Noto (2017), A dynamic business modelling approach to design and experiment new business venture strategies, Long Range Planning, 51:1, 127-140.

de Mattos, C. A. and T. L. M. de Albuquerque (2018), Enabling Factors and Strategies for the Transition Toward a Circular Economy (CE), Sustainability, 10:12, 4628.

Demil, B. and X. Lecocq (2010), Business model evolution: in search of dynamic consistency, Long Range Planning, 43:2-3, 227-246.

Demil, B., Lecocq, X. and V. Warnier (2018). "Business model thinking", business ecosystems and platforms: the new perspective on the environment of the organization, M@n@gement, 21:4, 1213-1228.

Doganova, L. and M. Eyquem-Renault (2009), What do business models do? Innovation devices in technology entrepreneurship, Research Policy, 38:10, 1559-1570.

Ekman, P., Raggio, R. D. and S. M. Thompson (2016), Service network value co-creation: Defining the roles of the generic actor, Industrial Marketing Management, 56, 51-62.

Elkington, J. (1997), Cannibals with forks: The triple bottom line of 21st century, Oxford, UK: Capstone.

Ene, S. and N. Öztürk (2014), Open loop reverse supply chain network design, Procedia-Social and Behavioral Sciences, 109, 1110-1115.

Ferreira, F. N. H., Proença, J. F., Spencer, R. and B. Cova (2013), The transition from products to solutions: External business model fit and dynamics, Industrial Marketing Management, 42:7, 1093-1101.

French, M. L. and R. L. LaForge (2006), Closed-loop supply chains in process industries: An empirical study of producer re-use issues, Journal of Operations Management, 24:3, 271-286.

Gallo, P. J., Antolin-Lopez, R. and I. Montiel (2018), Associative Sustainable Business Models: Cases in the bean-to-bar chocolate industry, Journal of Cleaner Production, 174, 905-916.

Geissdoerfer, M., Savaget, P., Bocken, N. M. and E. J. Hultink (2017), The Circular Economy–A new sustainability paradigm?, Journal of Cleaner Production,143:1, 757-768.

Geissdoerfer, M., Morioka, S. N., de Carvalho, M. M. and S. Evans (2018), Business models and supply chains for the circular economy, Journal of Cleaner Production, 190, 712-721.

Genovese, A., Acquaye, A. A., Figueroa, A. and S. L. Koh (2017), Sustainable supply chain management and the transition towards a circular economy: Evidence and some applications, Omega, 66, 344-357.

Georgescu-Roegen, N. (1971), The Entropy Low and the Economic Process, Cambridge Mass. Harward University Press.

Ghisellini, P., Cialani, C. and S. Ulgiati (2016), A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems, Journal of Cleaner Production, 114, 11-32.

Gou, Q., Liang, L., Huang, Z. and C. Xu (2008), A joint inventory model for an open-loop reverse supply chain, International Journal of Production Economics, 116:1, 28-42.

Grosse, F. (2010), Is recycling "part of the solution"? The role of recycling in an expanding society and a world of finite resources, S.A.P.I.EN.S, 3 (i).

Hagedoorn, J. (2002), Inter-firm R&D partnerships: an overview of major trends and patterns since 1960, Research Policy, 31:4, 477-492.

Heshmati, A. (2017), A Review of the Circular Economy and its Implementation, International Journal of Green Economics, 11:3-4, 251-288.

Homrich, A. S., Galvão, G., Abadia, L. G. and M. M. Carvalho (2017), The Circular Economy Umbrella: Trends and Gaps on Integrating Pathways, Journal of Cleaner Production, 175, 525-543.

Jabłoński, A. (2015), Network dynamics and business model dynamics in improving a company's performance, International Journal of Economics, 3:1, 1-10.

Joyce, A. and R. L. Paquin (2016), The triple layered business model canvas: A tool to design more sustainable business models, Journal of Cleaner Production, 135, 1474-1486.

Kalmykova, Y., Sadagopan, M. and L. Rosado (2018), Circular economy–From review of theories and practices to development of implementation tools, Resources, Conservation and Recycling, 35, 190-201.

Kaplan, S. (2011), Strategy and PowerPoint: An inquiry into the epistemic culture and machinery of strategy making, Organization Science, 22, 320-346.

Kirchherr, J., Reike, D. and M. Hekkert (2017), Conceptualizing the circular economy: An analysis of 114 definitions, Resources, Conservation and Recycling, 127, 221-232.

Klang, D., Wallnöfer, M. and F. Hacklin (2014), The business model paradox: A systematic review and exploration of antecedents, International Journal of Management Reviews, 16:4, 454-478.

Korhonen, J., Honkasalo, A. and J. Seppälä (2018a), Circular economy: the concept and its limitations, Ecological economics, 143, 37-46.

Korhonen, J., Nuur, C., Feldmann A. and S. E. Birkie (2018b), Circular economy as an essentially contested concept, Journal of Cleaner Production, 175, 544-552.

Lewandowski, M. (2016), Designing the business models for circular economy—Towards the conceptual framework, Sustainability, 8:1, 43.

Lieder, M. and A. Rashid (2016), Towards circular economy implementation: a comprehensive review in context of manufacturing industry, Journal of Cleaner Production, 115, 36-51.

Linder, M. and M. Williander (2015), Circular business model innovation: inherent uncertainties, Business Strategy and the Environment, 26:2, 182-196.

Maire, S. and S. Liarte (2018), Building on visuals: Taking stock and moving ahead, M@n@gement, 21:4, 1405-1423.

Manninen, K., Koskela, S., Antikainen, R., Bocken, N., Dahlbo, H. and A. Aminoff (2018), Do circular economy business models capture intended environmental value propositions?, Journal of Cleaner Production, 171, 413-422.

Merli, R., Preziosi, M. and A. Acampora (2018),. How do scholars approach the circular economy? A systematic literature review, Journal of Cleaner Production, 178, 703-722.

Möller, K. and A. Halinen (2017), Managing business and innovation networks - from strategic nets to business fields and ecosystems, Industrial Marketing Management, 67, 5-22.

Moreno, M., De los Rios, C., Rowe, Z. and F. Charnley (2016), A Conceptual Framework for Circular Design, Sustainability, 8, 937.

Murray, A., Skene, K. and K. Haynes (2017), The circular economy: an interdisciplinary exploration of the concept and application in a global context, Journal of Business Ethics, 140:3, 369-380.

Nußholz, J. L. (2017), Circular Business Models: Defining a Concept and Framing an Emerging Research Field, Sustainability, 9:10, 1810.

Osterwalder, A. and Y. Pigneur (2010), Business model generation: a handbook for visionaries, game changers, and challengers, John Wiley & Sons.

Palo, T. and J. Tähtinen (2013), Networked business model development for emerging technology-based services, Industrial Marketing Management, 42:5, 773-782.

Planing, P. (2015), Business model innovation in a circular economy reasons for non-acceptance of circular business models, Open Journal of Business Model Innovation, 1, 11.

Prieto-Sandoval, V., Jaca, C. and M. Ormazabal (2018), Towards a consensus on the circular economy, Journal of Cleaner Production, 179, 605-615.

Reypens, C., Lievens, A. and V. Blazevic (2016), Leveraging value in multi-stakeholder innovation networks: A process framework for value co-creation and capture, Industrial Marketing Management, 56, 40-50.

Romme, A. G. L. (2003), Making a difference: Organization as design, Organization science, 14(5), 558-573.

Rong, K., Patton, D. and W. Chen (2018), Business models dynamics and business ecosystems in the emerging 3D printing industry, Technological Forecasting & Social Change, 134, 234-245.

Schaltegger, S., Lüdeke-Freund, F. and E. G. Hansen, (2012), Business cases for sustainability: the role of business model innovation for corporate sustainability, International Journal of Innovation & Sustainable Development, 6:2, 95-119.

Smith, W. K., Binns, A. and M. L. Tushman (2010), Complex business models: Managing strategic paradoxes simultaneously, Long Range Planning, 43:2-3, 448-461.

Stahel, W. R. (2005), The Functional Economy: Cultural and Organizational Change, International Journal of Performability Engineering, 1:2, 121-130.

Star, S. L. and J. R. Griesemer (1989), Institutional ecology, translations' and boundary objects: Amateurs and professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39, Social Studies of Science, 19:3, 387-420.

Stigliani, I. and D. Ravasi (2012), Organizing Thoughts and Connecting Brains: Material and the Transition from Individual to group-level Prospective Sensemaking, Academy of Management Journal, 55: 5, 1232-1259.

Stubbs, W. and C. Cocklin (2008), Conceptualizing a “sustainability business model”, Organization & Environment, 21:2, 103-127.

Su, B., Heshmati, A., Geng, Y. and X. Yu (2013), A review of the circular economy in China: moving from rhetoric to implementation, Journal of Cleaner Production, 42, 215-227.

Täuscher, K. and N. Abdelkafi (2017), Visual tools for business model innovation: Recommendations from a cognitive perspective, Creativity and Innovation Management, 26:2, 160-174.

Teece, D. J. (2010), Business models, business strategy and innovation, Long Range Planning, 43:2-3, 172-194.

Tukker, A. (2004), Eight types of product–service system: eight ways to sustainability? Experiences from SusProNet, Business Strategy and the Environment, 13:4, 246-260.

Tura, N., Keränen, J. and S. Patala (2019), The darker side of sustainability: Tensions from sustainable business practices in business networks, Industrial Marketing Management, 77, 221-231.

Urbinati, A., Chiaroni, D. and V. Chiesa (2017), Towards a new taxonomy of circular economy business models, Journal of Cleaner Production, 168, 487-498.

van Bommel, K. (2018), Managing tensions in sustainable business models: Exploring instrumental and integrative strategies, Journal of Cleaner Production, 196, 829-841.

Vezzoli, C., Ceschin, F., Diehl, J. C. and C. Kohtala (2015), New design challenges to widely implement 'Sustainable Product–Service Systems', Journal of Cleaner Production, 97, 1-12.

Warnier, V., Weppe, X. and X. Lecocq (2013), Extending resource-based theory: considering strategic, ordinary and junk resources, Management Decision, 51:7, 1359-1379.

Wells, P. and M. Seitz (2005), Business models and closed-loop supply chains: A typology. Suppl. Chain Manag. Int. J., 10, 249–251.

Winans, K., Kendall, A. and H. Deng (2017), The history and current applications of the circular economy concept. Renewable and Sustainable Energy Reviews, 68, 825-833.

Zink, T. and R. Geyer (2017), Circular economy rebound, Journal of Industrial Ecology, 21:3, 593-602.

Zott, C. and R. Amit (2010), Business model design: an activity system perspective, Long Range Planning, 43:2-3, 216-226.