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# The role of KIBS and consultancy in the emergence of Circular Oriented Innovation

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ABSTRACT

This paper analyses the role of consultancy services in the transition towards a Circular Economy (CE). To this aim, the paper brings together two different strands, the emergence of a new Circular Economy paradigm as a complex innovation process which faces many barriers and the innovative role of Knowledge Intensive Business Services (KIBS). Among KIBS, consultancy services are widely recognized in the field of innovation systems as a necessary agent for the adoption and diffusion of innovation by other agents. Circular-Oriented Innovation (COI) involves major changes, sometimes including new technologies and in most cases requiring the reorganization of value chains and the collaboration of different actors. This paper conducts a qualitative research focused on CE-related consultancy services provided by four pioneering companies in Spain. The paper sheds light on the functions developed by consultancy firms and discusses the main drivers and barriers towards COI. The findings suggest that KIBS may play an important role in the dissemination of the CE paradigm. Firstly, providing and managing knowledge to promote COI in their client's companies; secondly, through the strategic formation of networks and alliances with other key stakeholders, which are key for the practical implementation of CE; and finally, by disseminating the ideas and principles of the CE in the system and across the society. By means of their functions, we conclude that consultancy services may help to lower some of the barriers that are usually addressed by companies, and that revolve around the lack of knowledge and the associated uncertainty.



## 1. Introduction

The growing awareness of the scarcity of non-renewable resources and the consequences of the enormous generation of waste requires structural and radical changes in the current linear patterns of production and consumption. The Circular Economy (CE) is emerging as a specific paradigm to address those issues and, consequently, the new advocated paradigm is becoming a driver of change for companies and public organisations. The transition to the CE paradigm requires a complex innovation process within firms, value chains and the whole economic ecosystem. Recently, Circular Oriented Innovation (COI) has been defined as "the coordinated activities that integrate CE goals, principles and recovery strategies into technical and market-based innovations, such that the circular products and services that are brought to market purposively maintain product integrity and value capture potential across the full life-cycle" (Brown et al., 2019, p. 3). The COI process interacts with all levels of business strategy and involves many different types of innovations (products, process, business models, system innovations) and many different stakeholders (internal to the firms and value chains and external, e.g. consultancy, research institutions, etc.). (Brown et al., 2019, 2020).

As an emerging field of research, an increasing amount of papers, reports and case studies with an applied orientation, by both academics (management, engineering, planning, etc.) and practitioners and consultants, is contributing to define the CE and the related strategies (Kirchherr et al., 2017). In fact, a relevant role in the formalisation and operationalization of the CE principles and instruments has been played by major global consultancy firms such as McKinsey, Accenture, and Deloitte along with many other specialized organisations such as CradletoCradle, Ellen MacArthur Foundation, etc. All of them have launched their own programmes for the CE and have contributed to disseminating the concept

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among institutions, policy-makers and businesses. The emphasis is particularly placed on technology innovation and business model innovations needed to take advantage of the opportunities of the new paradigm (Achterberg et al., 2016; Antikainen et al., 2016; Bocken et al., 2016; Bocken et al., 2014; 2018; EMF, 2013; Lacy et al., 2014; Urbinati et al., 2017). Moreover, several papers on the matter reveal the existence of numerous barriers to circular business models and circular oriented innovation (Diaz, Bastein and Tukker, 2019). One important way to overcome some 'hard' and 'soft' obstacles is the collaboration among different agents in order to afford the increasingly complex and systemic changes entailed by COI (Brown et al., 2019).

The collaboration needs lead us to analyse the specific role played by Knowledge Intensive Business Services (KIBS) and specifically, by consultancy services, in the transition towards the CE. One of the most common ways of acquiring and operationalizing the knowledge needed for business change is to purchase services, which has led to the development of a growing and diversified sector of KIBS. KIBS have a growing importance in knowledge management and perform a wide range of functions, from intermediation to co-creation of innovations (Bessant and Bush, 2000; Boden and Miles, 2000; Gallouj and Savona, 2008; Miles, 2005; Shearmur and Doloreux, 2013; 2019; Vence and Trigo, 2009). Although literature on innovation for CE is growing, there is no specific publication on the role of consulting firms in supporting clients who want to adopt COI.

This research aims to contribute to the literature on the role played by KIBS in the transition towards the CE. The hypothesis of this paper is that KIBS and specialized consulting contribute to the diffusion of COI and in doing so they help to lower persistent obstacles faced by companies. The focus is on specialist consultancy services which provide their clients with strategic information and expertise concerned with the implementation of COI. Thus, the specific objectives of this paper are: first, to analyse the functions performed by consultancy firms in support of CE and second, to discuss the main drivers and barriers towards COI identified by consultancy firms when they deal with their clients. Consultancy firms provide professional advice to other organisations, in some cases operationalizing existing knowledge and in other cases creating its own knowledge and innovations. Therefore, the latter objective seeks to identify which functions they perform as an agent in the transition towards a CE, as managers and creators of knowledge, and as drivers of innovation in the business environment.

The paper is organised as follows. In the second section we review the literature concerning the drivers and barriers towards the CE. In the third section, we make an overview of KIBS roles in innovation. In the fourth section we briefly explain the methodology and then we present and discuss the main results. Finally, we draw some conclusions.

## 2. Drivers and barriers to Circular Oriented Innovation (COI)

In this paper, Circular Oriented Innovation (COI) is defined as any innovation aimed to create value based on the CE principles, i.e., reducing the extraction of virgin resources, minimising the generation of waste and prolonging products' life by providing the greatest possible utility of goods, their parts and components for as long as possible. In this sense, and based on previous literature (Brown et al., 2019; 2020; Geissdoerfer et al., 2017; Linder and Williander, 2017) we assume COI is developed building upon strategies of sustainable sourcing or procurement (use of renewable, recyclable and recycled resources), use of co-products as inputs, closed-loops and industrial ecology, repair, reconditioning and remanufacturing of products, product-service systems (leasing, shared use, pay-per-use, performance), recycling and upcycling. The implementation of COI ranges from small changes in products and services to the complete replacement of old practices and the entire reconfiguration of value chains (Brown et al., 2019, 2020).

The CE promises to bring new business opportunities, new jobs, cost savings, innovation and improvements in the competitiveness of companies, industries and countries (Circle Economy, 2018; EMF et al., 2015; European Commission, 2015). However, the deeply embedded logic of the linear economy, together with a broad array of factors, is hindering the transition towards the CE paradigm, as shown by a growing body of recent literature. Innovation of business models is seen as a key enabler for CE. Business models may channel innovative products and services, and they can also transform the way to produce and deliver more circular products and services. A meta-analysis of published cases (Diaz et al., 2019) highlights the existence of institutional, organisational, market, behavioural and technological barriers. The different obstacles vary depending on the nature of the changes in the business models, their more or less disruptive nature, and the different types of innovations adopted. Even more, the barriers seem to be specific to each case and company. Tura et al. (2019) develop a framework of seven main categories of drivers and barriers, including environmental, economic, social, institutional, technological and informational, supply chain and organizational factors. One key insight is the significance of individual barriers and drivers, which are highly context specific. This points out to the importance of considering that the sector, context, and business environments are relevant attributes that affect the implementation of CE business models (CEBM).

Moreover, based on 43 case studies of 31 Dutch companies, Vermunt et al. (2019) consider the barriers that affect the implementation of four different types of CEBM (circular supplies, resource recovery, product life extension and product-as-a-service). They set a framework that includes internal barriers (financial, organizational, knowledge and technology) and external (supply chain, market, and hard and soft institutional) to the firm environment. The main findings are in line with the results of Tura et al. (2019), as barriers related to the external firm environment are found to be major in all four types of CEBM, while many internal barriers also appear to be connected to an external obstacle. The relative importance of each obstacle depends much on the specific CEBM.

Govindan and Hasanic (2018) conduct the largest and the most recent systematic literature review on drivers, barriers and practices that influence CE from a supply chain perspective. On that basis, they develop a multi-perspective framework that classifies 13 motivational drivers 34 practices and 39 barriers according to internal/external environments and related to one or more stakeholders, namely government, organisation, supplier, consumer, and society. Barriers are categorized into eight groups, including economic, technological, knowledge and skills, management, circular economy framework, culture and social, and market issues. A previous study (Masi et al., 2017) conducted a systematic literature review from a meso perspective. Integrating different types of supply chains in the CE can bring many benefits (drivers are identified as resource efficiency gains that increase competitiveness, new value streams through utilization of by-products and waste, avoiding regulative costs of environmental pollution and waste, brand reputation and right-to operate in global markets, improved brand reputation with consumers, increased business resiliency and reduced risks) but numerous challenges remain.

The largest part of the literature dealing with CE drivers, barriers and enablers, focuses on specific industries, business models and products. For example, on textile and apparel activities (Fischer and Pascucci, 2017; Jia et al., 2020), on sustainable plastic management

(Dijkstra et al., 2020); on the Finnish mining industry (Kinnunen and Kaksonen, 2019); on EoL management of PV (Salim et al., 2019). Finally, a growing body of literature has analysed barriers and enabling factors that specifically affect small and medium enterprises (SMEs). Rizos et al. (2016) identify as the main barriers to implementing CE strategies in European SMEs the absence of funding and the lack of support from clients and suppliers. Ormazábal et al. (2016) find that the main motivations for implementing circular actions in SMEs are not related to environmental awareness, but rather to improving brand image and reducing costs, while one of the main obstacles is the lack of public support. They also distinguish between hard barriers, such as lack of resources, time and long-term vision, and barriers related to the human factor, such as poor leadership and uninterested consumers. Other studies carried out on the Flash Eurobarometer 441 survey (García-Quevedo et al., 2020) distinguish obstacles faced by SMEs into revealed barriers, which pose a difficulty that can be overcome with time (e.g., adapting to the existing regulation, absence of human resources), and deterring or insurmountable barriers, such as lack of experience in new technologies and change of long-term mindset.

The literature reviewed allows acknowledging that barriers towards COI are case and business specific. In other words, differences among industries, types of value chains, firms, products and services, require specific knowledge and ad-hoc support to implement COI projects. In this sense, Tura et al. (2019) state that lowering barriers calls for collaborative actions, sharing of resources and knowledge between academia, business and government. Moreover, the resources and capacities of companies to create, absorb and assimilate new technology inputs or new business models are often absent or underdeveloped in companies, especially in small and medium-sized ones, which even do not know the benefits of the CE (Bessant and Bush, 2000; Lessard, 2014; Ormazabal et al., 2016). Therefore, diffusion of guidelines and support aid by different institutions and organisations is required to support the large implementation of CE. In this paper we aim at analysing the role of KIBS in lowering barriers to COI and promoting its adoption and dissemination. Our hypothesis is that problem-solving consultancy is driven by the specific needs and circumstances of agents interested in implementing COI.

## 3. The role of consulting services-KIBS in the innovation process

Knowledge Intensive Business Services (KIBS) are services that rely heavily on professional knowledge, are primary sources of information and knowledge (reports, training consultancy, etc.), or use their knowledge to produce intermediate services for their clients' processes (e.g. communication and IT services) (Boden and Miles, 2000). The role of KIBS as knowledge providers was first emphasized by Bessant and Rush (1995) and Bessant and Bush (2000). Moreover, a great part of the earlier literature focused on characterizing the relationship of KIBS with innovation emphasizing their role as *intermediaries* in the innovation system (den Hertog and Bilderbeek, 2000; Howells, 2006); later, more attention was paid to their role as *innovators* and as *drivers of innovation* for third parties (D'Antone and Santos, 2016; den Hertog, 2000; Larsen, 2000; Miles, 2005; Shearmur and Doloreux, 2013; Trigo and Vence, 2012; Vence and González-López, 2009; Vence and Trigo, 2009). In this sense, KIBS have capability to combine, in a new unique body of knowledge, codified scientific and technical knowledge with tacit knowledge based on extensive experience, which is key to "help other organisations deal with problems for which external sources of knowledge are required" (Miles, 2005, p. 39).

In his seminal paper Howells (2006) develops the concept of KIBS as innovation intermediaries. Intermediation activities include provision of information on potential collaborators; brokering a transaction between two or more parties; acting as a mediator between agencies or organisations that are already collaborating; and helping to find advice, funding and support for the innovation outcomes of such collaborations (Howells, 2006, p. 720). The number and diversity of intermediation innovation functions widens along the innovation value chain because both intermediaries and their clients discover new needs and requirements for their intermediary roles.

Howells (2006) classifies the relationship between KIBS and innovation in view of the role of intermediaries, distinguishing three main groups. First, *technology diffusion and transfer studies* consider KIBS as agents of change, with great influence on the speed of diffusion and take-off of new products adoption in households and companies. In this sense, their functions focus on the dissemination of information and affect the rate of adoption of an innovation in the community. Second, in *innovation systems and networks studies*, these service agents help to adapt specialized solutions in the market to the needs of individual users; they link actors within a technological system, establish and transform relationships into a network or innovation system; they also initiate change in scientific networks in localized configuration and set links between the policy level and the operational level, as an 'ecology' of influences on other agents in the system. Third, the literature on *service and innovation firms* considers the facilitation of innovative change, often in a hidden way, in the firms that hire KIBS. Also at the system level, professional service firms, especially knowledge-based ones, have a prominent role as intermediaries in the innovation system or as innovation bridges for other manufacturing or service firms.

The subsequent literature goes beyond the paradigm of intermediation and provides new ideas and evidence of the active role of KIBS in innovation, both through their own innovation and collaboration with other KIBS and with agents from the most diverse industries (D'Antone and Santos, 2016; Shearmur and Doloreux, 2013; 2019; Trigo and Vence, 2012; Vence and González-López, 2009; Vence and Trigo, 2009). These studies highlight the internal diversity of KIBS and their active role in the innovation process. Many KIBS companies develop knowledge and innovations that they incorporate into their activity and, many of them develop innovations for their clients (in some cases as practitioners inside the company for a while). In this paper we assume, following Shearmur and Doloreux (2019), that the intermediation role of KIBS refers to conducting knowledge, information and know-how between the external environment and the agents that implement COI.

Among the wide variety of KIBS, consulting services perform specific functions in the innovation process (Bessant and Rush, 1995): direct transfer of expert and specialized knowledge, which has already been assimilated by the consultants; sharing experiences, by taking experiences and ideas from one place or context to others; intermediation of alliances, providing users with a single point of contact through which to access a wide range of specialized services; and diagnostic role, helping users to articulate and define their specific innovation needs. In a more detailed manner, different roles may be played by consultants according to the needs of the clients. Consultants articulate specific needs and select appropriate technology options; assist in the identification of needs, selection, training and development of human resources; support the financial dimension through the evaluation of projects and the development of business cases; contribute to identifying, developing and implementing the client communication strategy; perform functions of education, information and communication,

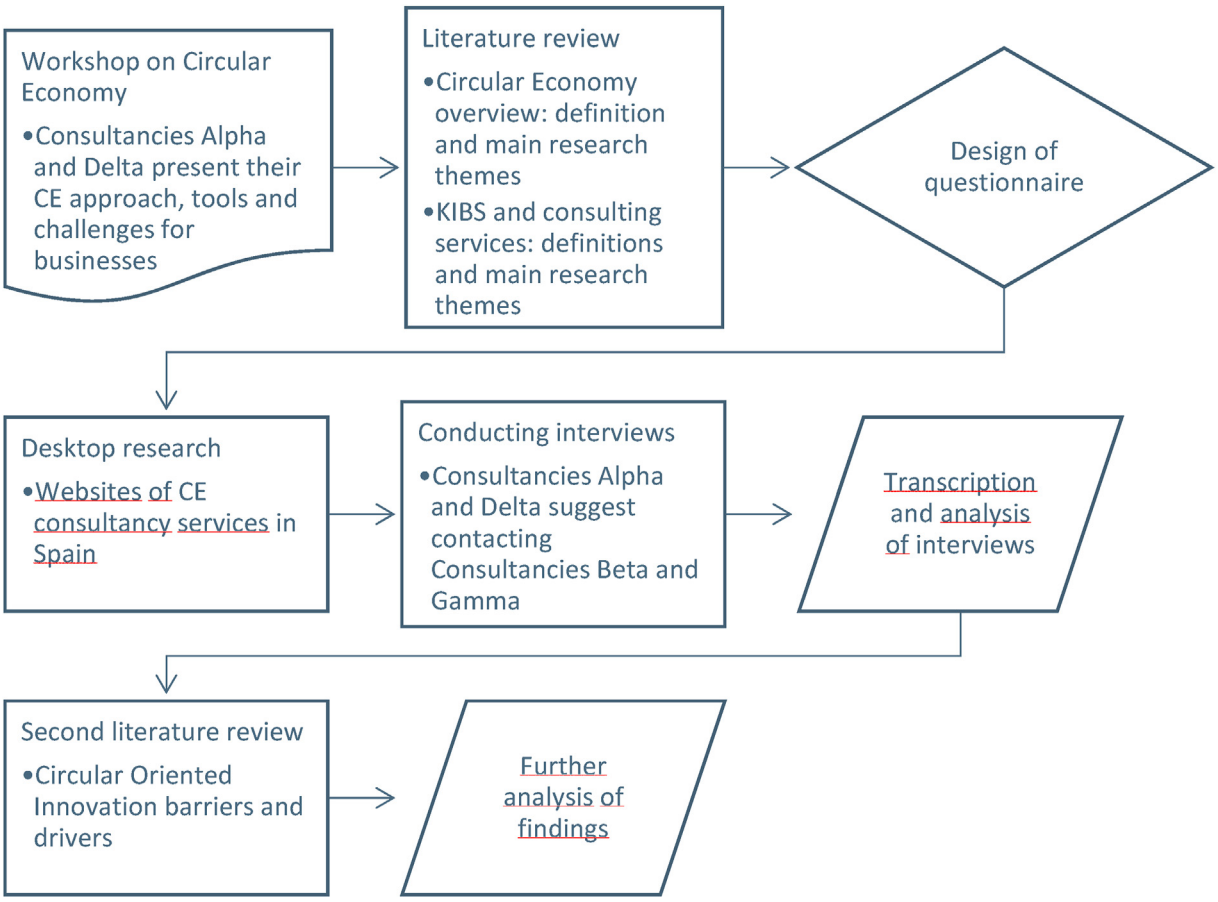


**Fig. 1.** Research flowchart.

locating key sources of new knowledge and building links with the external knowledge system; and, finally, also intervene with their services in the management of projects, external resources, training of skills and organizational development itself.

In seminal papers about the nature and typology of innovation in services, Gallouj and colleagues (2008; 1997) attribute to the cognitive nature of consultancy services the development of 'ad-hoc innovations'; i.e., the creation of a new solution to a particular problem posed by a given client, and commonly framed in a new field of expertise. Moreover, another interesting recent research line focuses on value co-creation processes and determinants between KIBS and their clients (Aarikka-Stenroos and Jaakkola, 2012; Desyllas et al., 2018; Kohtamäki and Partanen, 2016). The interactions between the two organisations —consultancy and clients, in the purchasing process of consultancy services, the role played by the different agents involved in the purchasing process and the content (information, knowledge, or capacity development) exchanged in the interaction, will affect the scope of innovation (D'Antone and Santos, 2016).

## 4. Methodology

This paper is based on a qualitative research strategy (Fig. 1). Specifically, the research builds on in-depth interviews with four consultancy firms specialized in advising and implementing COI in Spain, as well as desk research focused on information available on their websites. The selection of the companies to be interviewed was based on a workshop for Circular Economy organised by Icede research group at the University of Santiago de Compostela (USC) in March 2017 with the aim of knowing pioneering experiences of CE in Spain. The participation in the workshop of two consultancy companies (Consultancies Alpha and Delta in Table 1) allowed the consecutive identification of one more company and an independent consultant.[1] The interviews took place during September 2017 and were based on a semi-structured questionnaire (see Annex I). The interviews were recorded, and their content was transcribed. The transcriptions of interviews with Consultancies Beta and Gamma were reviewed by the consultants and additional clarifications were made.

The main characteristics of the consultancy firms analysed are shown in Table 1. It is noteworthy that all of them are small and very small companies and all of them were founded in the last decade. The motivation to implement COI consultancy services in all of them reflects a conviction with the Circular Economy paradigm and principles. Notwithstanding, in two of the companies, the identification of a market opportunity is also a driving factor for the start-up of the company. The staff of the consultancy companies analysed have background and specialized knowledge in environmental and engineering sciences, which suggests a relevant aspect, since COI should consider environmental impacts along the life cycle of products and services, and CE projects may require specific, ad-hoc solutions.

[1] It is important to highlight the great explosion of consulting companies that, in just a few years, try to position themselves in the field of service business specialized in the Circular Economy. At the time of initiating this investigation, only a few agents were identified. Today, the number of KIBS claiming to offer services for CE has multiplied.

**Table 1**
Main characteristics of the analysed consultancy firms.

| | Consultancy Alpha | Consultancy Beta | Consultancy Gamma | Consultancy Delta |
|---|---|---|---|---|
| Year of foundation | 2005 | 2009 | 2009 | 2015 |
| Circular Economy motivation | Conviction with cradle-to-cradle thinking (McDonough and Braungart, 2002) | Inspiring journey & CE conviction | CE conviction and market opportunity | Market opportunity and CE conviction |
| Company size (number of employees) | 7 | 1 | 12 | 2 |
| Background (field of expertise among employees) | Engineering<br>Environmental sciences<br>Marketing & communication | Engineering | Engineering<br>Environmental sciences<br>Design<br>Business administration | Engineering<br>Environmental sciences |
| Market segments | SMEs (50%)<br>Large companies (30%)<br>Other (20%) | Universities (50%)<br>Public agencies<br>Medium and large companies | Large companies<br>Public sector<br>SMEs (10%) | SMEs (40%)<br>Business associations (40%)<br>Public sector (20%) |
| Sectors | Especial focus on construction & building | - | Major experience in agri-food, waste, and packaging | - |

Regarding market segments on which the analysed consultancy firms focus, there is a great variety, from SMEs and large companies to public institutions. This diversity is also due to the capabilities of the consultancy firms themselves and to the nature of the services, which are analysed next in the results section.

## 5. Results and discussion

The results presented and discussed below are divided into three sub-sections: first we identify the different services offered by CE consultancy firms. In the second sub-section we analyse the factors that drive and hinder circular economy projects and emphasize the role of consultancies in removing barriers. Finally, we try to find out how consultancy firms themselves build or improve their capacities to provide specialized CE services.

### 5.1. Consultancy roles and services for the Circular Economy

The consultancy firms analysed offer a wide range of services aimed at implementing COI and the CE principles. As shown in Table 2, a large part of the consultancy services has to do with gathering and managing key information, which allows a more accurate articulation of an innovation strategy. Examples are the diagnostics aimed to identify business opportunities linked to circular activities and hotspots in existing processes (detecting opportunities for taking advantage of sub-products and waste through reuse, remanufacturing and recycling), as well as accounting and optimisation of environmental costs. As a result, strategies and roadmaps for CE in organisations and territories may be developed. In this sense, the role played by consulting companies is that of providing services, which means using their own knowledge to facilitate a specific outcome in the client. This is a classical function of KIBS, as information service providers (Bessant and Rush, 1995).

Another important function is the evaluation, optimisation and, eventually certification of products and services. To provide this service, the consultancy firms acknowledge the use of internationally recognized methodologies, such as Life Cycle Assessment (LCA), Life Cycle Cost (LCC), CtoC™, as well as project 'ad-hoc' developed methodologies. Those tools are used to evaluate products, services, and value chain environmental impacts, and to identify hotspots and opportunities to implement COI. The consultancy role is focused on applying specific knowledge and tools to generate new knowledge for the client. This way, consultancies support the articulation of innovation.

The consultancy firms also offer advice for eco-design of products, services and sustainable business models. To undertake this service, the consultancy companies follow a specific methodology to conceive or re-design products and services that are technically and economically viable, socially desirable and environmentally sustainable. In this sense, Consultancy Alpha has a specific agreement with the Cradle to Cradle Products Innovation Institute, so advice is oriented towards the accomplishment of the Cradle to Cradle Certified (CtoC™) criteria. From this point of view, the role of consultancy services goes beyond providing information, since besides the use their own knowledge, they apply specific tools to help the clients to undertake innovation. The consultancy firm is more embedded in the innovation process of clients. It is worth to highlight that all the analysed consultancy firms see themselves accompanying clients in their innovation processes. They do not necessarily become integrated into projects, but they do make a very close accompaniment in the clients' journey towards circularity. Therefore, CE consultants maintain close and constant interaction during each specific project rather than selling a prescriptive service. Thus, the role of KIBS as active innovators and drivers of innovation can be highlighted, as suggested in previous literature (D'Antone and Santos, 2016; Shearmour and Doloreux, 2019; Trigo and Vence, 2012). Consultancy firms contribute to develop 'ad-hoc innovation', which refers to the creation of a new solution to a particular problem posed by a given client (Ciriaci et al., 2015; Gallouj and Savona, 2008; Gallouj and Weinstein, 1997).

Other relevant functions, specially implemented by consultancies Beta and Delta, are dissemination activities through participation in different events, inspiring talks, workshops, and conferences. All the analysed consultancies include training, aimed both at the internal staff of organisations and at specific audiences, including universities, workshops for entrepreneurs, public and private institutions, etc. Those training services contribute to the broad dissemination of CE principles across the society and different stakeholders. Therefore, the role of consultancy services goes beyond the boundaries of the client organisations to take the message and ideas of the circular economy further. As previous research has shown, KIBS have a role to play in making territories more competitive and innovative (Strambach, 2001; Vence-Deza and González-López, 2008). On the one hand, there is a diffusion of the principles of CE within the client organization, which favours the internal innovation of the organization. On the other hand, there is a diffusion to wider layers of society, contributing to the creation of a more open and receptive environment to the new paradigm. This may be of crucial importance, because, as suggested in previous literature, in order to complete the adoption process of a new paradigm —such as the CE, receptivity attributes must be in place in the external selection environment as well as in the internal environment (Cook et al., 2006).

**Table 2**
Consultancy functions and services for the Circular Economy.

| Functions and services | Examples |
|---|---|
| Prospective and diagnosis | Development of roadmaps, tools and advice for CE strategies<br>Trends and opportunities market studies |
| Eco-design (products and services) | Product and service eco-innovation<br>Material intelligence<br>Software<br>Labelling of products and processes |
| (re)Design of value chains/business models | Examination, review and evaluation of products and processes<br>Compilation of external information for sustainable chain organization<br>Use of tools for business model innovation |
| Evaluation, optimisation and certification (based on using specific methods and tools) | [a]Cradle to Cradle Certified™, Lean2Cradle, LEED, BREEAM certifications<br>Life Cycle Analysis (LCA), carbon and water footprint, eco-labelling<br>Life Cycle Costing (LCC) |
| Information | Inspiring talks<br>Workshops and seminars<br>Sectoral reports<br>Books and guides<br>Environmental communication and marketing of companies |
| Training | Conferences, seminars and workshops in universities, business schools, and in-organisations<br>Entrepreneurs' training and mentoring: CE concept, business models, methodologies, eco-design and eco-innovation |

[a] Cradle to Cradle Certified™ is a globally recognized measure of safer, more sustainable products made for the CE. Lean to Cradle is a specific methodology developed by one of the consultancy firms in collaboration with other partners to record the parameters that affect comfort and productivity of users at the workplace from a CE perspective. LEED Leadership in Energy and Environmental Design is an internationally recognized green building certification system. BREEAM® Building Research Establishment Environmental Assessment Methodology is an international technique for the certification and evaluation of a building sustainability.

### 5.2. Drivers and barriers in Circular Economy projects

The analysed consultancy firms recognise that each project aimed at adopting COI is different. They are run by different agents, they pursue diverse objectives, and they present different scope, from incremental innovations to disruptive changes, and from designing a strategy to undertake a real change. In this sense, the characteristics of the different organisations that purchase their services and their concrete objectives are determining to offer a service adjusted and adapted to their needs.

The motivations that drive CE projects and COI are also diverse. Based on their experience, consultancy companies highlight some factors that trigger innovations in this field. They are not exclusive and some of them are indeed interrelated:

- Visionary organisations, who truly believe in CE models and seek a strategic positioning in the market.
- The traction of the value chain: a specific client demand in business-to-business relationships, either as a pressure to adopt changes or as an opportunity to differentiate and gain a competitive advantage.
- Disruptive models in the industry, which provoke alterations and generate pressure on existing companies (for example, in the automobile and mobility industry); as well as the opportunity to access new market niches.
- Reduction of costs.
- Improvement of brand reputation.

The short list points out mainly to economic drivers, including internal organizational factors indicated in previous literature on CEBM (e.g. costs reduction (Govindan and Hasanagic, 2018; Masi et al., 2017; Ormazabal et al., 2016; Tura et al., 2019); brand reputation (Masi et al., 2017), and also external factors on the meso level (value chain and sectoral opportunities (Masi et al., 2017)). On the contrary, the analysed consultancy firms do not consider regulation to be a trigger of COI. In this case, they state that regulation is rather a matter of compliance and adaptation, but the efforts do not go any further. *"Regulation helps, but when you do things out of obligation, it's about compliance and little else. I think the effort should be made in education, to understand the why of regulation"*, consultancy Alpha. Moreover, they acknowledge the EU's push for the Circular Economy.

Despite the interest that different clients may have in the implementation of CE projects or in the adoption of COI, it is common to face certain obstacles. The main barriers mentioned by consultancy firms are:

- Lack of knowledge, since many organisations still do not understand well what the CE is and what the opportunity is behind the change. This is precisely a factor that highlights the importance of consulting services as active disseminators and drivers of CE. *"A fundamental part of our projects is training, many times companies consider it as useless or unnecessary and then it results as one of the most valued tasks within the project because the idea is precisely to help understand, not only the people who are carrying out a project but the whole team of the company, why it is being done and why it can be useful to organize the company in that way. I think education is fundamental"*, Consultancy Alpha.
- Lack of strategic vision: this is a generalized obstacle linked to the previous one. Most companies, especially SMEs, are motivated by solving day-to-day problems rather than introducing changes towards a paradigm that still offers a lot of uncertainty. *"Not many SMEs have a strategic vision. We offer circularity diagnostics to identify opportunities and bring about opportunities for competitive advantages. With training and information, we bring the state of the art on technologies, market competitors and regulation, and these may help to think a bit on strategy"*, Consultancy Delta.
- Uncertainty regarding the cost/revenue structure of new business models: it arises especially in companies that consider the possibility of adopting very innovative models, in which there is a lack of experience regarding the assumption of responsibilities, the management of asset ownership, and new financing schemes. In addition, companies themselves suffer

from diagnostic problems of the current cost structure, as they very rarely have internalized environmental costs, so they hardly know what the real impact on their offer is.
- Immaturity of the market: this is a major obstacle, so if demand is not perceived, companies are more reluctant to take risks and disruptively reshape their business models. Also, the fact that the main competitors in the market are not taking steps towards the CE acts as a factor that lessens interest for this type of innovation.
- Lack of knowledge in the business environment. It is an obstacle that arises due to the need of establishing new collaboration and cooperation networks for circular business models. Transaction costs, derived from market prospection and new types of contracts and agreements, emerge. The know-who is especially important to develop certain COI, based on the creation of a business ecosystem. At the same time, usually COI are affected by problems of knowing what can and cannot be done, who is responsible and who has rights over products-services along the life cycle.
- Organising new value chains: very much linked to the previous one, the need to establish new value chains and partnerships, engaging with new partners that contribute to create and deliver COI is usually found as a hurdle. *"May not be an obstacle but something that needs to be created, because it is new in many cases and because it is partly a different culture"*, consultancy Alpha.
- Legal framework: in some cases, the existing legislation itself becomes a barrier. This is the case, for example, with very specific legislation affecting waste, which impedes or does not support the use of by-products, and which makes the transportation and potential reuse of by-products more difficult. In other cases, it is the underdevelopment or the complete lack of a proper legal framework the factor that lessens CE projects.

The barriers identified by the analysed consulting companies are conditioned and limited to the CE projects they have developed along the last decade. Nevertheless, they are in line with previous literature, they are mainly organizational, technological and informational, market and institutional barriers (e.g. Diaz et al., 2019; Masi et al., 2017; Tura et al., 2019; Vermunt et al., 2019).

Consultancy Alpha adds the need to share knowledge as an obstacle in some projects. In this sense, they remark the importance of creating trust and a transparent information management scheme between different stakeholders across value chains. Consultancy Delta also highlights the need to have government and other associations support, in order to widespread information about CE public funding opportunities. The latter has also been found in the literature (Ormazabal et al., 2016).

The lack of specific competencies and skills is just considered a barrier to COI by consultancy Gamma. The other ones consider that the greatest problem resides in opening the mind to the new paradigm. It is then that the existing competencies and skills can be exploited by adapting them or looking for them externally. Other factors, on the other hand, are not considered important obstacles for COI. Specifically, only occasionally has it been found that the conflict between different business lines in the same company is a barrier. For projects led by SMEs, high initial costs are punctually mentioned as a barrier.

Each project requires an adjusted response, according to the different obstacles that affect it. It is precisely a key function of the consultancy firms in the process of supporting their clients' innovation towards the CE, to develop actions based on the management of knowledge and other assets, which allow these barriers to be diminished. Table 3 shows some of the actions taken by consultancies to address them. In general, consultancy firms mobilize their expertise and capacities to share and disseminate knowledge while making the opportunities bring about by CE more visible. These coping actions put a special emphasis on information and training activities. Systematic diagnoses of company's processes are also included, as well as sectoral analyses.

### 5.3. Building capabilities for CE service provision

Due to the novelty of the field, it is of interest to know to what extent the clients' demands for CE consultancy lead the consultancy firms to improve their own capacities and capabilities or acquire new ones. It is one of the objectives of recent literature on KIBS, to identify how these specialized services businesses are also users of other KIBS and hire external services (Shearmur and Doloreux, 2019). Table 4 summarizes the main actions carried out by KIBS analysed in this research. Specifically, all the consultancies indicate their regular participation in international R&D projects, in collaboration with other partners (High Education Institutions, research centres, industry associations, other KIBS), which allows them to actively involve and be up to date with the latest advances in CE (new methodologies, tools, guidelines, initiatives, innovations and solutions). In addition, the consultancy firms carry out internal training activities and promote self-training of own employees, with the aim of guaranteeing their permanent learning and acquisition of abilities and skills.

A crucial capability of the consultancy companies is their investment of time and efforts in the creation of networks and alliances with other organisations. *"It is all about that with the CE, to build networks and ecosystems, we are delighted working at international level with companies. We have indeed created formal alliances for specific projects, highly successful at the level of knowledge sharing and project implementation"*, consultancy Alpha. This is because circular projects increasingly require the collaboration of specific companies and organisations across different countries. In some cases, the existence of a network is a matter of exchanging necessary knowledge, because COI requires interdisciplinarity. *"The consultants' own way of 'doing business', given that COI requires managing multifaceted data from different sources. (…) It is necessary to have a transversal training. I do continuous training in myself, I am always researching, studying the reports, talking to other experts, and trying to understand things. Obviously, I have my collaborators, my network of contacts"*, Consultancy Beta. Consultancies indicate that responding satisfactorily to the needs of specific know-how and of centralizing the dispersed knowledge that is necessary to articulate the needs for COI is the key. In addition, networks and alliances are created in the own process of seeking new business opportunities by the consultancy firms.

Likewise, consultancy firms need to invest in and adapt the necessary analysis tools to provide services to their clients, such as diagnostic models and specific software to obtain relevant information for decision making, e.g., that related to measuring and certifying environmental impacts and performance of products and services (LCA, CtoC™, etc.). As mentioned above, consultancies analysed in this paper take an accompanying role, rather than offering a prescriptive service. The research conducted does not allow to accurately identify how value created in the interaction process contributes to innovation in consultancy firms. However, activities undertaken to improve their capabilities do suggest that there is an ongoing process of learning.

## 6. Conclusions

In this paper, a qualitative analysis of the role of consultancy services in the creation, mediation of knowledge and support for Circular Oriented Innovation has been carried out. The main

**Table 3**
Consultancy actions focused on lowering barriers to COI.

| Barriers | Coping actions |
|---|---|
| Lack of knowledge | • Training in the organisation<br>• Workshops and inspiring talks |
| Inmature market and lack of knowledge in the business environment | • Sectoral studies |
| Lack of strategic vision | • Internal training in the organisation<br>• Circularity diagnostics, information and workshops |
| Uncertainty about the revenue and cost structure of new business models | • Support through business model redesign and collaboration with financial advisors<br>• Real environmental cost analysis studies |
| Legal framework | • Search for mechanisms that afford the adaptation to existing regulatory framework |
| High upfront investment | • Search for funding opportunities |

**Table 4**
Acquisition and improvement of capabilities for the Circular Economy.

| Capabilities | Examples |
|---|---|
| R&D | Collaboration with universities and other research centres in international R&D projects |
| Development/recruitment of human resources | Ongoing training of human resources |
| Development/adaptation of tools for service delivery | Tools/basic models for business model analysis and innovation<br>Software for monitoring and indicators calculation |
| Networking/alliances with other organisations | Considered crucial for the CE and one of the most important strengths of the consulting firms.<br>The consultancies own business strategy |
| Others | Proficiency in data and information management tools and platforms |

conclusion is that KIBS and consultancy services could play an important role in the diffusion of the new CE paradigm and in fostering COI among their clients. The analysis carried out in this paper is exploratory because we are in a very early stage in the transition towards a CE, and just a few organisations have adopted disruptive changes. Anyway, our findings show that specialized consultancy services perform key functions as intermediaries in the transfer and dissemination of CE: firstly, by identifying the circular business opportunities and acting as innovation drivers for companies that become their clients; secondly, by managing the complex and diverse knowledge entailed by the heterogeneous and multifaceted innovation of the clients' business models and, thirdly, by supporting the dissemination of CE ideas across the business ecosystem and the whole society. Policy makers may consider these findings and include public and private KIBS as supportive agents in the planned transition towards the CE.

Consultants perform key functions for the clients' innovation processes by transferring specialized knowledge on the CE and its multifaceted dimensions. To this end, consultancies rely not only on its own knowledge, but also on their capacity to bring together knowledge from different agents of the system, through its active participation in R&D networks and collaborative projects. The clients get access to this knowledge and learn through the specific consultancy functions, e.g., through specific diagnoses, strategies and formulation of innovation plans. The consultancy firms also emphasize their effort and investment in creating networks in order to reinforce its knowledge capacities and to screening new ongoing initiatives and experiences. In line with their own marketing strategy and search for market opportunities, consultancy businesses act as disseminators of the potential opportunities brought about by the CE. These alliances provide new value for its consultancy services and bring new examples of innovations that could be implemented by the clients. The relevance of this strategic networking is twofold when dealing with COI, because of the novel nature of the knowledge required and, especially, the need to collaborate with different stakeholders to develop circular business models.

Our results confirm several drivers and barriers to COI, in line with other previous studies. Organisations developing COI move fundamentally for economic reasons, costs reduction, supply chain demand and market niche, while also due to top management conviction and improvement of brand reputation. The main referred barriers are external, which evidences the almost non-existent influential business environment (lack of knowledge, immature market, value chain organisation challenges). The legal framework has been identified as trigger for eco-innovation (Pereira and Vence, 2015), while it is still underdeveloped for circular innovations. Internal barriers are also important and are interrelated, including the lack of knowledge about the CE and the potential business opportunities; the predominant short-sighted vision in decision making (especially in SMEs) and uncertainty on the financial structure. These insights are particularly relevant for policy makers, should they address the different obstacles through targeted policies.

KIBS and consultancy services may benefit from learning and co-creation of COI with their clients. This research has not investigated the innovation processes of the KIBS from the COI projects with their customers. However, it has highlighted the different actions that they carry out to give satisfactory answers of technical and specialized knowledge to their clients. In this sense, COI-oriented consulting is presented as a promising line of business for KIBS. In the future, it would be worthwhile to investigate the co-creation of value and its appropriation by KIBS specializing in COI.

This research presents limits due to the novelty of the study of the circular economy, the recent history of the COI and the scarce number of analysed consultancies. However, it opens the way for further research. First, on the new opportunities for KIBS specialisation in the domain of circular oriented innovations, such as consultancy services related to ICT. Second, in relation to the necessary conformation and governance of new collaboration networks, deepening on trust and transparency of new business models (product stewardship and custody, new financing models). Finally, the territorial dimension of collaboration between KIBS, manufacturing and service firms, as well as public sector agents and their role in fostering CE and the sustainable regional development is something of critical interest.

## CRediT authorship contribution statement

**Ángeles Pereira:** Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft, Writing – review & editing, Visualization. **Xavier Vence:** Conceptualization, Writing – review & editing, Supervision, Project administration, Funding acquisition.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jclepro.2021.127000.

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