TRANSFORMATIVE INNOVATION POLICY INSTRUMENTS

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Doctoral candidate

Stephanie Francis Grimbert

Deusto Business School

University of Deusto

Supervisors

Dr. James R. Wilson

ORKESTRA

University of Deusto

Dr. Mikel Landabaso Álvarez

Joint Research Centre

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My dear love,

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You were skeptical at first when I told you, four years ago, we were moving to the Basque Country and that I was planning on becoming a doctor, but not the kind of doctor that cures people. Then you offered to help, and I cherish all those moments when you were hiding yourself from my computer's camera, and also when the temptation was so big that you crawled on my lap and graciously appeared on my screen. You got to know many new names and heard me talk passionately about James, Iñaki, Nekane, Josune, Asier, Carmela from the University of Deusto, as well as great colleagues from CIRCLE. When I started working on my first papers, you insisted on helping with the titles and asked what topic I was investigating, to proudly get to tell your teachers and friends that it was about innovation policy! You witnessed how enthusiastic I was when I got to know so many great researchers in the field, who generously offered me some guidance, Jacques-Olivier, Sandro, Carolina, Fredo, Andrea, Ville, Matti, Mikel.

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To Azalea from Mummy, with love.

LIST OF ACADEMIC CONTRIBUTIONS

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ABSTRACT

The “normative turn” in the academic discourse and policy practice of Science, Technology and Innovation (STI) policies, illustrated by concepts such as transformative innovation policy or mission-oriented innovation policy, was triggered by the consensus that innovation has a fundamental role to play in the transition towards sustainability. However, this normative turn has yet to translate into a concurrent epistemic (r)evolution, involving a broader range of stakeholders such as the users of policy outcomes in the design and implementation of STI policies, as suggested in the prolific literature on innovation systems. Indeed, the new generation of policy instruments proclaiming a transformative rationale in their design fail to live up to the ambition of favoring the epistemic convergence of policy-making towards transformative objectives, since they are mostly incrementally adapted and combined for their new purpose. Departing from this lack of alignment between the normative turn in STI policy, and the epistemic imperative of adapting instrumentation processes (procedural approach) for an effective implementation of transformative policies (substantive approach), this dissertation introduces the concept of ‘transformative innovation policy instruments’, explicitly recognizing users within the constellation of relevant actors for their design and implementation. They are thus defined as *‘integrating substantive and procedural effects in a user perspective of policy instruments that fosters the convergence of the normative and epistemic dimensions of transformative innovation policy goals’.* Grounded in a procedural approach to policy instruments, the findings show that the properties of complex innovation systems (emergence, interdependence and interconnectivity, co-evolution, self-organization, feedback, historicity and path-dependence) are useful to unravel the epistemic shift of transformative innovation policy instruments towards the inclusion of users.

Keywords: Complexity, Epistemic policy goal, Innovation systems, Procedural effects, Transformative innovation policy instruments, Users.

RESUMEN

El "giro normativo" en el discurso académico y en la práctica de las políticas de Ciencia, Tecnología e Innovación (CTI), ilustrado por conceptos como política de innovación transformadora o política de innovación orientada a las misiones, fue desencadenado por el consenso de que la innovación tiene un papel fundamental que desempeñar en la transición hacia la sostenibilidad. Sin embargo, este giro normativo aún no se ha traducido en una (r)evolución epistémica concurrente, que implique a un abanico más amplio de partes interesadas, como los usuarios de los resultados de las políticas, en el diseño y la aplicación de las políticas de CTI, tal y como sugiere la prolífica literatura sobre sistemas de innovación. De hecho, la nueva generación de instrumentos políticos que proclaman una lógica transformadora en su diseño no consigue estar a la altura de la ambición de favorecer la convergencia epistémica de la formulación de políticas hacia objetivos transformadores, ya que en su mayoría se adaptan y combinan de forma incremental para su nuevo propósito. Partiendo de esta falta de alineación entre el giro normativo en la política de CTI y el imperativo epistémico de adaptar los procesos de instrumentación (enfoque procedimental) para una implementación efectiva de políticas transformadoras (enfoque sustantivo), esta tesis doctoral introduce el concepto de 'instrumentos de política de innovación transformadora', reconociendo explícitamente a los usuarios dentro de la constelación de actores relevantes para su diseño e implementación. Estos instrumentos se definen como '*la integración de los efectos sustantivos y procedimentales en una perspectiva de usuario de los instrumentos políticos que fomenta la convergencia de las dimensiones normativa y epistémica de los objetivos de las políticas de innovación transformadora*'. Partiendo de un enfoque procedimental de los instrumentos políticos, los resultados de esta tesis muestran que las propiedades de los sistemas complejos de innovación (emergencia, interdependencia e interconectividad, coevolución, autoorganización, retroalimentación e historicidad) son útiles para desentrañar el cambio epistémico de los instrumentos políticos de innovación transformadora hacia la inclusión de los usuarios.

Palabras clave: Complejidad, Objetivo político epistémico, Sistemas de innovación, Efectos procedimentales, Instrumentos políticos de innovación transformadora, Usuarios.

RÉSUMÉ

Le "virage normatif" dans le discours académique et dans la mise en pratique des politiques de Science, Technologie et Innovation (STI), illustré par les concepts de politique d'innovation transformative ou de politique d'innovation axée sur les missions, a été amorcé par le consensus selon lequel l'innovation joue un rôle fondamental dans la transition vers la durabilité. Cependant, ce virage normatif n'a pas encore abouti à une (r)évolution épistémique équivalente, qui impliquerait, comme le suggère la littérature prolifique sur les systèmes d'innovation, un éventail plus large de parties prenantes dans la conception et la mise en œuvre des politiques de STI, telles que les utilisateurs des innovations résultant de ces politiques. En effet, la nouvelle génération d'instruments politiques, dotés d'une orientation transformative dans leur conception, ne parvient pas à répondre à l'ambition de favoriser la convergence épistémique des politiques de STI vers des résultats transformatifs, car ils sont principalement combinés et adaptés et de manière incrémentale à leur nouvel objectif. Partant de ce décalage entre le virage normatif des politiques de STI et l'impératif épistémique d'adapter les processus d'instrumentation (approche procédurale) pour une mise en œuvre efficace des politiques transformatives (approche substantive), cette thèse introduit le concept 'd'instruments de politique d'innovation transformative', reconnaissant explicitement les utilisateurs au sein de la constellation d'acteurs pertinents pour leur conception et leur mise en œuvre. Ils sont ainsi définis comme '*combinant des effets substantiels et procéduraux dans une perspective d'utilisateur des instruments qui favorise la convergence des dimensions normatives et épistémiques des objectifs de politique d'innovation transformative'*. Fondées sur une approche procédurale des instruments de politiques de STI, les conclusions montrent que les propriétés des systèmes complexes d'innovation (émergence, interdépendance et inter-connectivité, coévolution, auto-organisation, rétroaction, historicité et dépendance au chemin emprunté) sont utiles pour élucider l'évolution épistémique des instruments de politiques d'innovation transformative vers l'inclusion des utilisateurs.

Mots-clés: Complexité, Objectif politique épistémique, Systèmes d'innovation, Effets procéduraux, Instruments de politique d'innovation transformative, Utilisateurs.

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LIST OF ABBREVIATIONS

Abbreviation	Term
CMO	Cluster Management Organization
CPP	Circular Public Procurement
CSV	Creating Shared Value
DQA	Deductive Qualitative Approaches
PPI	Public Procurement for Innovation
R&D	Research and Development
SME	Small and Medium-sized Enterprise
STI	Science, Technology and Innovation
TIP	Transformative Innovation Policy
TIPI	Transformative Innovation Policy Instruments

Chapter 1. INTRODUCTION

1.1. Research motivation

1.1.1. Towards User Science, Technology and Innovation policy

In 1977, Richard Nelson introduced the moon-ghetto metaphor to illustrate that the inherent wickedness of grand societal challenges (e.g. the problems in the ghetto) cannot simply be solved by adopting a given technological trajectory (e.g. sending a man to the moon) (Nelson, 1977), but instead, induce contestation, complexity, and uncertainty (Wanzenböck et al., 2020). Nevertheless, the consensus that innovation has a fundamental role to play in the transition towards sustainability triggered the so-called "normative turn" in the academic discourse and policy practice of Science, Technology and Innovation (STI) policies, with the emergence of concepts such as eco-innovation policy (Kemp, 2011), transformative innovation policy (Steward, 2012), or mission-oriented innovation policy (Mazzucato, 2017).

Despite some conceptual divergences, there is remarkable unanimity concerning the necessity to involve a broader range of stakeholders in the design and implementation of contemporary STI policies, particularly users (Bengtsson and Edquist, 2022; Boon and Edler, 2018; Fagerberg, 2018; Kattel et al., 2018; Mazzucato, 2021; Smits, 2002; Schot and Steinmuller, 2018). Such a user perspective is built on the premise that being highly knowledgeable and resourceful, their active participation is a vital ingredient in successful innovation (Lundvall, 1988, 1992; von Hippel, 1988, 2005) for addressing grand challenges. Diercks et al. (2019) invoke a process of policy layering, replacement or drift (Kern and Howlett, 2009) leading to a broader comprehension of the innovation process and the bundling of societal and economic goals in policy agendas.

However, this normative turn in STI policies has yet to translate into a concurrent epistemic (r)evolution, whereby policy-making processes would incorporate an "extensive engagement process to generate a different kind of knowledge base for innovation policy action, closer to 'users' of specific policy outcomes" (Kattel and Mazzucato, 2023 p. 11). Voices are raised claiming that the directionality of STI policies is therefore likely to remain wishful thinking while business-as-usual practices persist, as evidenced by the implementation challenges derived from the multi-translation process of missions (Wittmann et al., 2021), the multi-level stakeholders involved (Wanzenböck and Frenken, 2020), or the complexity of the problem-solution space (Wanzenböck et al., 2020).

The consideration that "innovation policy is what its instruments are" (Borrás and Edquist, 2013 p. 1521) has occasioned the rise of a new generation of policy instruments (Boekholt, 2010;

Kuhlmann and Rip, 2018; OECD, 2019) proclaiming a transformative rationale in their design, but often failing to live up to their ambition (Borrás and Schwaag Serger, 2022). Where a radical epistemic shift in the design of policy instruments is deemed necessary to involve users (Howoldt and Borrás, 2023), evidence shows that incrementalism prevails in reality, with policy instruments being merely adapted and combined to address new problems (Borrás and Edquist, 2013). At the same time, much scholarly attention has been devoted to the nature of the policy instruments mix in a context of growing policy complexity and uncertainty (Borrás and Edquist, 2013; Flanagan et al., 2023; Meissner and Kergroach, 2021), or to adjusting policy instrumentation to market formation needs, in the light of the systemic failures hampering the generation and diffusion of innovations (Edler and Fagerberg, 2017; Boon et al., 2022; Howoldt and Borrás, 2023). But a gap remains in the conceptual understanding of how policy instruments could favor the epistemic convergence of policy-making towards transformative objectives, consistently with the principles of a co-evolutionary process between the suggestions of policy rationales and the actual design of policy instruments (Mytelka and Smith, 2002).

1.1.2. Defining transformative innovation policy instruments

For policy instruments to serve such an epistemic purpose requires approaching them from both a substantive and a procedural standpoint (Howlett, 2005, 2011, 2017; Capano and Howlett, 2020), in order to fully embrace their transformative potential (Grimbert et al., 2024; Grimbert and Zabala-Iturriagagoitia, 2024). Bali et al. (2021 p. 298) define procedural instruments "as those policy techniques or mechanisms designed to affect how a policy is formulated and implemented. This includes administrative processes and activities for selecting, deploying, and calibrating substantive tools". Such procedurally-oriented aspects of instruments have been neglected in the literature, with a disproportionate amount of studies devoted to their substantive effects (Capano and Howlett, 2020; Demircioglu and Vivona, 2021; Grimbert et al., 2024).

Approaching policy instruments from a procedural perspective means focusing on the effects of the instrument within the public organization, and therefore on the feedback loops which they enable for the policy-making process (Kattel and Mazzucato, 2023). However, this epistemic shift in policy instrumentation supposes targeting both analytical and capability gaps, since the widening and deepening of innovation policy during the past decades (Borrás, 2009) has tended to outpace the widening and deepening of innovation policy instruments. In particular, Howoldt and Borrás (2023 p.987-988) express concerns that despite the grand challenges R&I policy rationale suggesting to "involve civil society as new types of actors performing research and innovation; and the need to bring them closer to traditional R&I-performing actors in wider and more diverse,

constellations", there appears to be a lack of consistency with the actual design and use of policy instruments.

Departing from this lack of alignment between the normative turn in innovation policy rationale and policy instruments, and the epistemic imperative of adapting policy instrumentation for an effective implementation of transformative policies, this dissertation provides conceptual trails advancing the understanding of the possible convergence between the normative and epistemic dimensions of policy instruments. The concept of 'transformative innovation policy instruments' (TIPI) is clarified in the following section by grafting their procedural dimension to their substantive one, in particular, by explicitly recognizing users within the constellation of relevant actors for the design and implementation of TIPI.

1.2. Aim of dissertation and structure

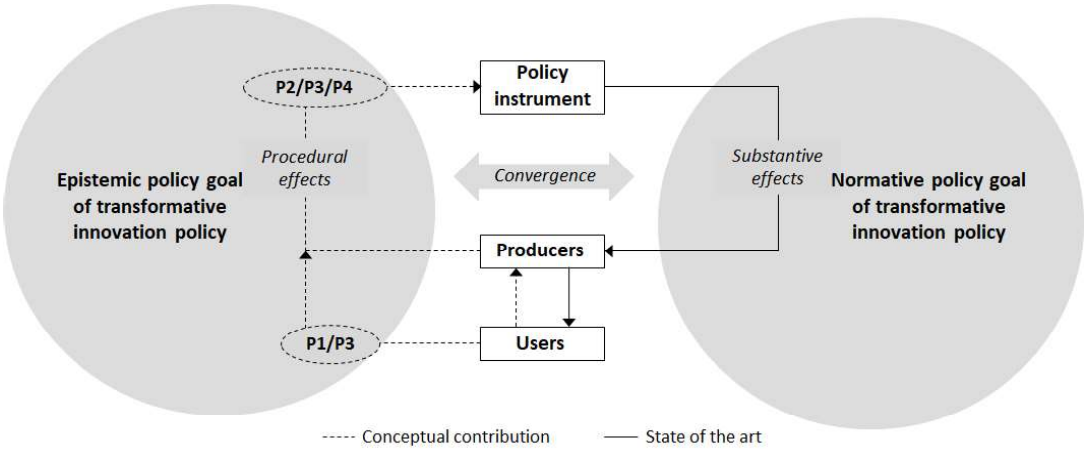
The aim of the dissertation is to define and explore the practical implementation of 'transformative innovation policy instruments' by identifying the procedural effects of involving users in their design and implementation in an overall context of complexity.

The conceptual approach of the dissertation, as illustrated below in Figure 1, is embedded in the consideration that policy instruments can contain a normative/epistemic divide. As expressed by Kattel and Mazzucato (2023 p. 9) in the context of public procurement, "the normative policy goals are expressed through the demand created via the procurement" when explicit sustainability-related criteria are used in the tenders. In turn, public procurement can also foster epistemic shifts in policy-making by institutionalizing market consultations and constant dialogue with different market stakeholders. This divide calls for attention, given the centrality of policy instruments for encouraging the necessary convergence, advocated for by the authors, between normative and epistemic policy goals.

The normative turn in innovation policy goals having expanded the realm of action for innovation policy (widening), new and more sophisticated policy instruments were introduced (deepening) (Borrás, 2009). This "widening" and "deepening" are reflected in the normative dimension of policy instruments, as for instance is the case in public procurement, with a

proliferation of different instruments targeted at grand challenges (green public procurement, sustainable public procurement, circular public procurement, socially responsible public procurement…). By adopting a procedural approach, this dissertation aims to illustrate the epistemic widening and deepening of innovation policy instruments towards the inclusion of users in their design and implementation, either directly or indirectly through the user/producer interaction, as well as the capabilities required to do so. The dissertation is built as a compendium of four papers, each addressing different dimension or the conceptual approach outlined in Figure 1.

Figure 1. Conceptual approach.



Source: Own elaboration.

In light of this conceptual approach, which was refined based on the research conducted for the dissertation, 'transformative innovation policy instruments' are defined as *'integrating substantive and procedural effects in a user perspective of policy instruments that fosters the convergence of the normative and epistemic dimensions of transformative innovation policy goals'.*

Chapter 2 exposes the conceptual framing of the dissertation. In particular, it examines the inclusion of users with the constellation of relevant actors from an innovation systems perspective, and the lessons driven from a complexity approach for identifying the properties of systemic policy instruments.

Chapter 3 explains the research strategy employed for the compendium of papers, following the logic of exploratory social science research with the use of constructivist grounded theory as a

methodological approach, as well as an overview of the academic contributions included in the dissertation.

Chapters 4, 5, 6 and 7 compile the four academic contributions published in indexed international journals, and which constitute the core of the results achieved in the research. Notably, the article entitled 'Transformative public procurement for innovation: ordinary, dynamic and functional capabilities' (here in Chapter 6), co-authored with Jon Mikel Zabala-Iturriagagoitia and Ville Valovirta, received the Babbage Industrial Innovation Policy Award from the University of Cambridge on the 27th of September 2021.

Chapter 8 sets out the procedural effects of the TIPI that have been analyzed in the four papers and offers a discussion of the implications for theory and practice.

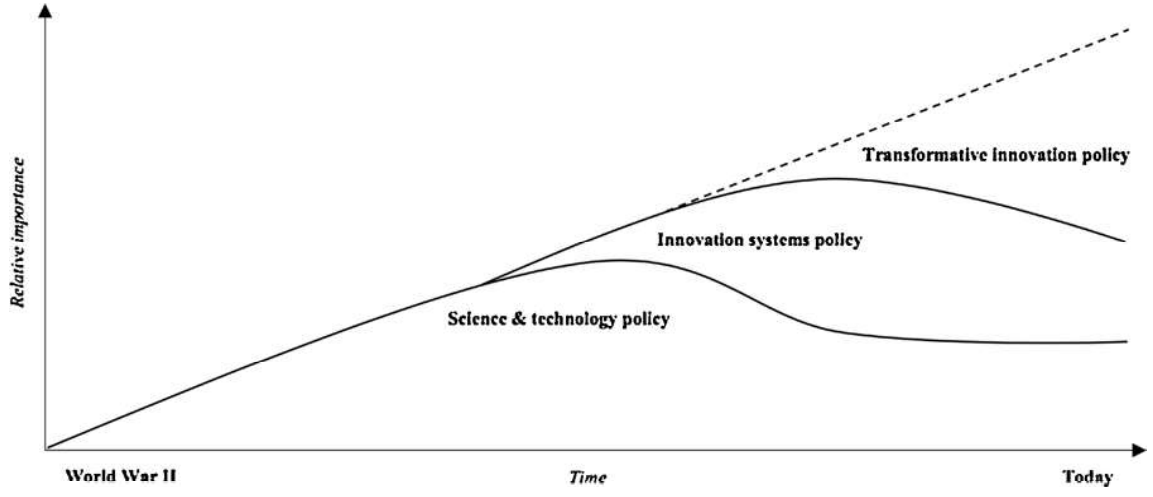
Chapter 9 concludes the dissertation by specifying its academic value, as well as its limitations and areas for further research, setting out a research agenda.

Chapter 2. CONCEPTUAL FRAMING

2.1. Users in innovation systems

As Lundvall reminds us in his "Introduction to Technological infrastructure and international competitiveness by Christopher Freeman" (2004), the 'Freeman and Aalborg' definition of national innovation systems (Freeman, 1987; Lundvall, 1985, 1992) embraces a broad view of innovation processes as non-linear and multi-causal, itself based on the definition of innovation "as a continuous cumulative process involving not only radical and incremental innovation but also the diffusion, absorption and use of innovation" (Lundvall, 2004 p. 534). However, in their seminal paper establishing "Transformative Innovation Policy" (TIP) (2018 p. 1562), Schot and Steinmuller invoke as a limitation to the innovation systems approaches the role attributed to users, merely "providing input into the knowledge production process by firms and other knowledge providers such as universities" (p. 1559). In their article, they suggest that there exist two reasonably well-established framings of innovation policy now challenged by a new framing ready to substitute for the old ones. Framing 1 appeared in the aftermath of WWII, with the assumption that State supported science and R&D would lead to innovation-led economic growth. In the 1980s, this framing was challenged by the innovation systems approach, which considered innovation as an interactive process. However, several critical voices challenge this linear view of successive STI paradigms replacing one another, and instead suggest that the three different framings need to be applied to respond to grand challenges (Fagerberg, 2018; Lundvall, 2022), in a logic of layering (Diercks et al., 2019) as depicted in Figure 2 below.

Figure 2. Consecutive layering of STI policy paradigms.



Source: Diercks et al. (2019).

In fact, this user perspective has gained momentum among innovation systems scholars. Hekkert et al. (2020 p. 77) introduce the concept of Mission-oriented Innovation System, defined as "the network of agents and set of institutions that contribute to the development and diffusion of innovative solutions with the aim to define, pursue and complete a societal mission", thereby recognizing that prioritizing and delineating pressing societal challenges is a complex process in which many actors can be involved. This type of innovation system favors demand-pull types of interactions and seeks behavioral as well as new technological solutions. A recent contribution by Bengtsson and Edquist (2022) also aims at proposing an innovation policy framework for user innovation research, embedded in the innovation systems overarching perspective. In their view, user innovation policies require an adaptation of the general innovation systems framework, by adopting an institutional rather than a linear view of the innovation process, hence shifting the activities of the innovation system accordingly. They suggest the introduction of multiple measures in combination, including a) promoting innovation-friendly regulations (e.g. easily accessible knowledge protection methods), b) encouraging producers to open up R&D activities (e.g. incentivize firms to involve consumer innovators), c) supporting user communities and forums (e.g. consumer or grassroots initiatives), d) opening up data (e.g. relevant statistics related to sustainability problems), and e) providing free education opportunities (e.g. open education courses that increase technical literacy and innovation knowledge) (Trischler et al., 2023).

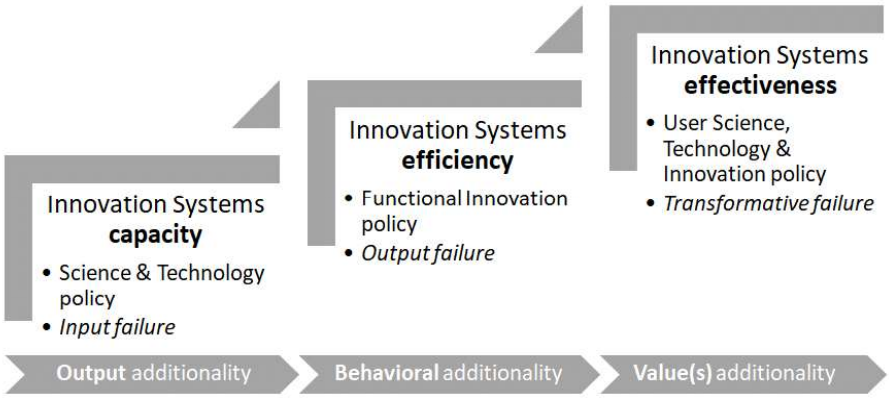
Several roles have been attributed to users in the literature, recognizing their input in the innovation process in as much as they are highly knowledgeable and resourceful (Lundvall 1988, 1992; von Hippel 1988, 2005). Fagerberg (2018 p. 1572) states that in this regard, engaging "them in the collective innovation journey towards a sustainable economic system may not only be more democratic but also more effective". One of the most exhaustive perspectives on user capacities for innovation was introduced by Schot and Steinmueller (2018 p. 1564), as "user-producers (users-entrepreneurs) actively coming up with new solutions, users-legitimators providing new visions and expectations which help shape investment decisions and policy changes, user intermediaries who broker contacts between producers and larger groups of users, user-citizens who lobby for wider system reform and user-consumers who develop new life-styles, preferences and practices". They therefore argue that users should be assisted in constructing new demands.

However, in practice, STI policy is still "driven by a strong legacy in economic, firm-centred and technology-oriented innovation" (Trischler et al., 2023 p. 2100), failing to formally include users as an innovation source (Diercks et al., 2019; Kuhlmann and Rip, 2018; Hekkert et al., 2020). The dominance of the producer-centric innovation paradigm further points that the

demand-side tends to be neglected (Boon and Edler, 2018), and that "innovation systemic approaches to transformative change have shown a failure in anticipating and learning about user needs" (Boon et al., 2022 p. 152). The paradigmatic shift required for enhancing user inclusiveness in STI policy means that new instruments have to be experimented, such as "service-design research that focuses on user experience and co-creation practices" (Kattel et al., 2018 p. 3).

In order to contextualize how the TIPI defined in this dissertation as *'integrating substantive and procedural effects in a user perspective of policy instruments that fosters the convergence of the normative and epistemic dimensions of transformative innovation policy goals'* fit within the innovation systems frame, the following conceptual framework is developed. Figure 3 adopts a similar logic to layering (Kern and Howlett, 2009) to illustrate how the dimensions of innovation systems (i.e. capacity, efficiency and effectiveness) respond to distinct failures (i.e. input, output and transformative failures) (Weber and Rohracher, 2012), and legitimize policies aimed at producing different types of additionality (Antonioli and Marzucchi, 2012; Gök and Edler, 2012).

Figure 3. The three dimensions of innovation systems.



Source: Own elaboration.

The first building block, 'Innovation Systems capacity', corresponds to the linear model according to which Science & Technology policies provide an output additionality. Maintaining mission-based Science & Technology policies serves the purpose of avoiding the "incrementalism" (Freeman, 1996 p. 36) trap inherent to the systems logic of improving existing technological trajectories. Their governance should nevertheless take the form of a stakeholder governance, whereby the public-private partnerships achieve public interest, and "governments reward value creation, not value extraction" (Mazzucato, 2021 p. 169).

The second building block, 'Innovation Systems efficiency' adopts a functional approach to the implementation of a holistic innovation policy, defined as "integrat(ing) all public actions that influence or may influence innovation processes" (Borrás and Edquist, 2019 p.39). Functional

innovation policy suggests an operationalisation, in functional terms, of innovation policy instruments - in other words ascribing them a function to be fulfilled. For example, public procurement, combined with other instruments, is essential "in order to have pervasive effects on the entire structure of production and consumption within an economy" (Soete and Arundel, 1993 p. 50), as pinpointed in the Maastricht Memorandum and later acknowledged by Freeman (1996). Functional procurement (Edquist and Zabala-Iturriagagoitia, 2021) facilitates the experimentation by the suppliers to respond to a concrete societal need through continuous dialogue with suppliers during the procurement process. Functional innovation policy therefore solicits, as in the case of public procurement, moving from a market-type of governance to a non-market trust-based one (Rokkan and Haugland, 2022), ultimately aimed at fostering organizational routines deemed necessary for promoting innovation systems' "adaptability" (Fagerberg et al., 2009 p. 442).

The third building block, 'Innovations System effectiveness', assesses the adequacy of the two previous building blocks in responding to transformative imperatives. Edified on the previous linear and systemic models of the capacity and efficiency stages, a User STI policy endogenizes the value co-creation processes of solutions to the "shortcomings of science, technology and innovation in addressing issues of sustainability and poverty or inequitable income distribution" (Schot and Steinmuller, 2018 p. 1564). The value constellation concept emerged in the strategic management literature so as to crystallize the shift from a value chain of firms to a value-creating system of different economic actors - suppliers, business partners, allies, customers - working together to co-produce value (Normann and Ramirez, 1993). At every stage of the value co-creation process, "resources of any and all value co-creators are deployed and utilized to address one or more needs of any and all value co-creators" (Amit and Han, 2017 p .231), value creation therefore originating from: a) identifying new resources/needs, b) matching resources/needs in innovative ways, and c) bridging complementary value co-creators. Using the value constellation concept as a cardinal point, the guiding principle of User STI policy is here defined as '*preserving the innovation system's access channel to the users' ongoing value(s)-creating activities'*. In this view, policy instruments establish a relationship with users, in the sense that innovation policy outcomes can be used as inputs by users to leverage their own value(s) creation. Huguenin and Jeannerat (2017), with their valuation approach to governance, stress that value creation should not merely be considered as "the result or byproduct of innovation", but as "inquiring into new values in society, translating them into social and technological solutions and making them valuable in markets" (p.625).

2.2. A complexity approach to systemic policy instruments

The previous section considers the "why" and "what" of User STI policy from an innovation systems' perspective. Further elaborating on the "how" (e.g. the nature of the policy instruments addressing transformative failures and producing value additionality) requires projecting the systems lens on the level of instrumentation. Howoldt (2024 p. 104904) expresses how "there is a growing need for policy instruments focusing on the system level rather than specific activities within the system. Systemic policy instruments draw the consequences from the observation that in innovation processes, heterogeneous actors are involved at different levels and users play an increasingly important role". Such systemic instruments in innovation policy were previously defined as fulfilling the following functions (Smits and Kuhlmann, 2004): a) managing of interfaces, b) building and organising (innovation) systems, c) providing a platform for learning and experimenting, d) providing an infrastructure for strategic intelligence, and e) stimulating demand articulation, strategy and vision development. These procedurally-oriented functions of systemic policy instruments challenge the substantive role traditionally attributed to them in terms of improving scientific or innovative performance (Howlett, 2005).

Procedurally-oriented systemic policy instruments can help avoid the pitfalls associated with the "interpretive flexibility" of policy tools (Flanagan and Uyarra, 2016 p. 179). Focusing on the processes and activities leading to the calibration of substantive tools derives from the explicit recognition that policy instruments are highly context specific, and submitted to the interpretation of different actors in the light of evolving policy and societal thinking. However, they also considerably increase instrumentation complexity (Howoldt, 2024). While complexity thinking has already widely permeated economic and innovation policy research (Balland et al., 2018, 2022; Crespi, 2016; Frenken, 2017;; Hidalgo, 2023; Kuhlmann et al., 1999; Mewes and Broekel, 2022; Russell and Smorodinskaya, 2018), the same lens has yet to be applied taking innovation policy instruments as the unit of analysis.

Complexity thinking applied to innovation systems departs from the consideration that "an innovation system is a social construct created by a biological system of humans" (Katz, 2016 p. 2), themselves being defined as complex adaptive systems (Holland, 2002). Innovation therefore stems from humans' adaptive capabilities and because of the non-linearity of the innovation process, it is considered an emergent property of complex innovation systems (Ivanova and Leydesdorff, 2014; Katz, 2016; Yilmaz, 2008). To extend complexity thinking to the policy instruments aimed at implementing a user STI policy embedded in an innovation systems perspective (i.e. transformative innovation policy instruments), this dissertation explores how

different properties attributed to complexity can be identified by examining the procedural effects of involving users in the design and implementation of innovation policy instruments.

Complexity science defines public policy as "an emergent, self-organisational, and dynamic complex system. The relations among the actors of this complex system are nonlinear and its relations with its elements and with other systems are coevolutionary" (Morçöl, 2012 p. 9), thereby challenging the views that policy-making is a rational, orderly, and linear process (Stevenson et al., 2009). In the words of Crabolu et al. (2023 p. 3), "the focus shifts towards understanding the system as a whole and the interrelationships between the system's elements, as opposed to the rationalist approach, which explains the policy process as the sum of its individual components". Along these lines, complexity science can provide an understanding of policy instruments based on the key features of complexity theory: emergence, interdependence and interconnectivity, co-evolution, self-organization, feedback, historicity and path-dependence (Morçöl, 2012).

- Emergence refers to behaviors evolving from the interaction of system components, rather than being explained as the sum of a system's parts (Mitleton-Kelly, 2003). At the level of policy instruments, the concept of emergence would imply that such behaviors resulting from local interactions and developed from the bottom-up can only be influenced rather than controlled, but that it is paramount to acknowledge their unpredictability in the sense that they "may behave in ways which don't follow from their earlier state or from individual properties of their components" (Russell and Smorodinskaya, 2018 p. 120).
- Interdependence and interconnectivity affect network effects, according to which each component of the system is impacted in a non-linear way by any other component. In other words, the higher the interdependence and interconnectivity between elements of a system, the stronger their influence on the rest of the system or on related systems (Crabolu et al., 2023). Policy instruments can display positive and negative synergistic interdependencies which can facilitate or hinder their use.
- Co-evolution builds on the previous property by emphasizing that the behavior of a component which has been positively or negatively influenced by another component, within the same system or a related one, can influence in turn that component's behavior (Mitleton-Kelly, 2015). Thus a policy instrument could bring unforeseen outcomes (Macintosh and Wilkinson, 2016), because of mechanisms facilitating or hindering its use (Crabolu et al., 2023).
- Self-organization means that systems adapt autonomously (e.g. without any external intervention or governing center) (Macintosh and Wilkinson, 2016; Mitleton-Kelly, 2015)

in order to offer a spontaneous response to the environment (Burnes, 2005). Policy instruments could therefore evolve "because of endogenous behaviours resulting from the various interactions between the elements of a system" (Crabolu et al., 2023 p. 4), instead of being the result of evidence-based policy-making processes.

- Feedback acknowledges the presence of positive and negative reflexive cycles (Russell and Smorodinskaya, 2018). As such, the dynamics within complex systems can either lead to ignoring negative feedback to maintain stability, or amplifying positive feedback to drive change (Mitleton-Kelly, 2003). Understanding the influence of different types of feedback on instrumentation is essential in a dynamic context, since the quality and quantity of feedback linkages are likely to determine the effectiveness of policy instruments.
- Historicity and path-dependence indicate that the future behavior of a system is influenced by past events (Cairney, 2012; Cairney and Geyer, 2017; Eppel, 2012; Mitleton Kelly, 2003, 2015), marking the predominance of routines. Such routines can eventually give way to new regular patterns of behavior, provided that the dynamics that encourage path-dependence are outweighed by "critical junctures" (Cairney, 2012, p. 350) pushing for radical changes. In the context of policy instruments, path-dependence may produce perfunctory behaviors, in the sense that routines prevail despite changes in policy goals.

One of the core properties of complex systems are that they display "self-similarity, or fractal-type recursions" (Russell and Smorodinskaya, 2018 p. 121). This fractal behavior of systems, derived from fractal geometry (Mandelbrot, 1982), lies in the logic that "fractal has a special kind of invariance or symmetry that relates a whole to its parts: The whole can be broken into smaller parts, each an echo of the whole" (Mandelbrot and Hudson, 2010 p. 47). Considering that systems generate similarities at any scale, this dissertation therefore unveils that the normative/epistemic divide observed at the level of innovation policy goals also applies to the level of the instruments designed for pursuing these goals. As such, the research conducted consists in exploratory theory-building, as it seeks to apply complexity science to policy instruments as the unit of analysis (Katz, 2006).

Chapter 3. RESEARCH STRATEGY

3.1. Exploratory-based constructivist grounded theory

Exploratory social science research holds emancipatory potential in the sense that it seeks to unveil new relations "that escape the disciplinary scrutiny of the established research apparatus" (Reiter, 2013 p. 13). In contrast with confirmatory social science research, it recognizes that all inquiry is tentative and that reality is, in part, socially constructed, with researchers being part of the reality that they analyze. To ensure qualitative rigor in exploratory research, a significant body of work on deductive qualitative approaches (DQA) has emerged (see for example Gilgun, 2005, 2015; Hyde, 2000; Pearse, 2019). According to Gilgun (2015 p. 14) "in DQA, the initial conceptual framework and hypotheses are preliminary. The purpose of DQA is to come up with a better theory than researchers had constructed at the outset". Induction thus becomes part of a deductively initiated research project and allows for a pressing forward of findings up to the point where the previously established theoretical framework is explained (Reiter, 2013). Such a proceeding also enables the revision of the initial framework and even the reformulation of the research question as the researcher gradually becomes familiar with all the phenomena related to the observed reality.

For exploratory social science research to achieve reliability, it should be conducted in a structured, self-aware, transparent, and honest way. In other words, the researcher gains consciousness of its own situatedness, limitation, and biased outlook, and makes sure to initiate the research project with an explicitly formulated theory, a well-developed research design, and a methodology that best addresses the needs discerned in the research design. Introduced by Glaser and Strauss (1967), grounded theory is a widely used interpretivist qualitative research method that supports exploratory research (Casula et al., 2021), a methodology grounded on observation which focuses on "the creation of emergent understanding" (O'Connor et al. 2008 p. 30). This methodological approach is built upon two key concepts: "constant comparison", in which data and theory are continuously contrasted throughout the data collection and analysis process, and "theoretical sampling", in which the theory under construction determines which data should be collected next (Suddaby, 2006). The "organic process of theory emergence" (Ibid. p. 634), which characterizes grounded theory, is thus embedded in the progressive refinement of the conceptual categories chosen for their relevance to the reality being observed, in a logic of analytical induction defined as "a double fitting or alternative shaping of both observation and explanation" (Katz, 1983 p. 134).

Following the seminal contribution of Glaser and Strauss (1967), various grounded theory approaches emerged, endowed with noteworthy differences despite a recognizable set of

resemblances that are "hallmarks of a grounded theory study" (Rieger, 2019 p. 2). The different backgrounds of Glaser and Strauss "planted the seeds of divergent directions" (Charmaz, 2009 p. 129), which eventually led to the end of their research relationship and introduced contrasted methods known as "Classic Glaserian grounded theory" and Straussian grounded theory" (Corbin and Strauss, 1990). A third approach, "Constructivist grounded theory" (Bryant and Charmaz, 2007; Charmaz, 2017) was developed under the premises that, unlike the positivist and post-positivist underpinnings of the earlier approaches to grounded theory, researchers are not separate from the research and knowledge is co-created (Charmaz, 2000), thereby assuming a subjective epistemology.

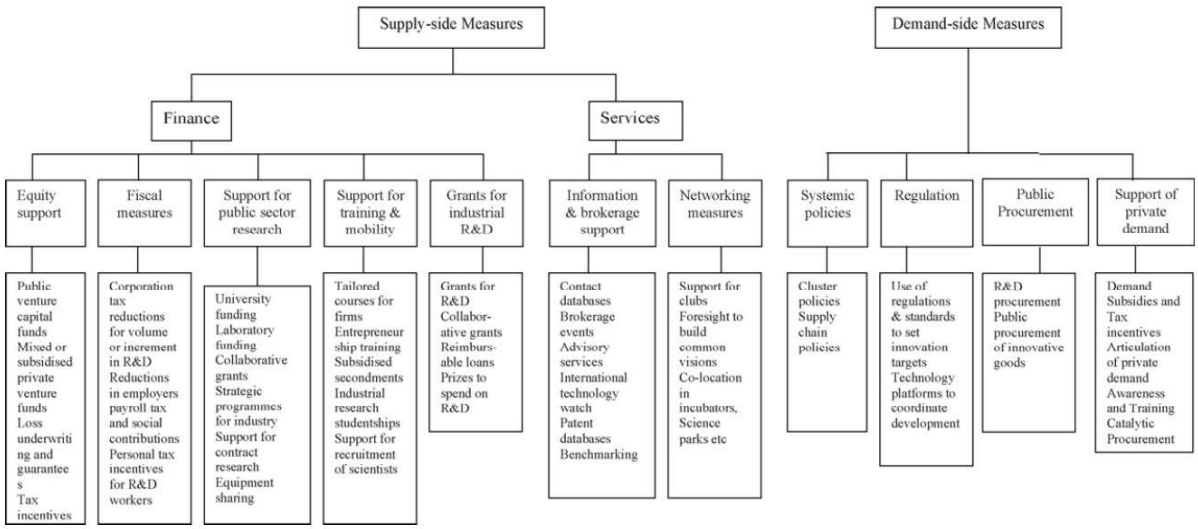
Constructivist grounded theory recognizes that the researcher's experience is valuable when interacting with participants and data (Charmaz, 2014), provided that preconceived ideas are not forced on the data. A certain level of reflexivity is thus needed on behalf for the researcher to fully reap the benefits of engaging with participants and uncovering hidden meanings and results (Charmaz, 2006). The objective of constructivist grounded theory being to offer insightful theoretical interpretations, the literature is meant to orient the researcher by developing her/his theoretical sensitivity. It is therefore "the first grounded theory approach to clearly describe inductive-abductive logic, which is the iterative process of the researcher moving back and forth between data and conceptualization, as a key part of data analysis" (Rieger, 2019 p. 8). With this logic, the researcher infers possible theoretical explanations from initial observations (inductive) before relying on theoretical sampling to gather additional data aimed at refining the initial inferences (abductive) to reach the most plausible explanation (Charmaz, 2014).

The appropriateness of constructivist grounded theory adopted in this dissertation is reinforced by the intimate knowledge of some of the co-authors with the line of theoretical research under scrutiny. This seniority has led to a selection of cases because they conveyed richness and saturation of empirical information and represented an ideal-type for the research, both theoretically and empirically (in Grimbert et al., 2023), thereby carrying the potential to unveil connecting mechanisms. It should also be noted that constructivist grounded theory belonging to exploratory research, the formulation of new ideas requires engaged dedication on behalf of the researcher through prolonged and systematic inquiry paired with reflection, formulation of tentative explanations, revisions and dialogue (Reiter, 2013). This dissertation therefore benefits from the enduring relationship of the author with the participants over several months (P1 and P3), a long-standing connection which has explicitly become part of the consequent conceptualization (Grimbert et al, 2024).

3.2. Overview of academic contributions

In 2002, Smits stated that "the growing importance of users in innovation processes and the network character of innovation demand new concepts. As a result, the innovation policies of most OECD governments shifted over the last two decades from supply-oriented (production of knowledge), via diffusion-oriented, towards far more user/demand-oriented policies" (p. 871). However, despite the growing relevance of this user-perspective, demand in innovation policy was attributed attention later than supply-side measures, which are highly differentiated (Edler and Georghiou, 2007). In an attempt to correct this unbalance in the conceptual consideration of supply-side and demand-side measures, Edler and Georghiou introduced their taxonomy of innovation policy instruments, as depicted in Figure 4. They define demand-side policy measures as "all public measures to induce innovations and/or speed up diffusion of innovations through increasing the demand for innovations, defining new functional requirement for products and services or better articulating demand" (Edler and Georghiou, 2007 p. 952).

Figure 4. Taxonomy of innovation policy instruments.



Source: Edler and Georghiou (2007 p. 953).

The dissertation relies on the taxonomy introduced by Edler and Georghiou (2007) for the choice of the innovation policy instruments retained in this research, according to their relevance as regards the involvement of users. Papers 1 and 3 explore cluster policies, as "systemic policies playing a critical role in bringing users and suppliers together" (Ibid. p. 953), while papers 2 and 4 consider Public Procurement for Innovation (PPI) "as an ice-breaker and catalyst (mobilizing) private demand through a whole set of awareness measures (and) organised discourse with users"

(Ibid. p. 959). Table 1 below introduces an overview of the different contributions included in the dissertation.

Paper 1 pushes the boundaries of cluster policy as a demand-side innovation policy instrument by deconstructing the concept of cluster identity (Staber and Sautter, 2011). It proposes that the use of trademarks by cluster management organizations (CMOs) can contribute to reinforcing 'intangible proximity', and offers the unique opportunity to create a sense of similarity among their members. It also contends that taking into consideration the reputational risks of a toxic place branding calls for the use of trademarks as new tools aimed at fostering the adaptation of cluster identity, thereby suggesting the inclusion of the whole value chain of CMOs (including users) to elaborate their branding strategy.

Paper 2 proposes a framework that reconciles the cluster and the Creating Shared Value (CSV) concepts to make the role of CMOs explicit in fostering 'collective CSV' as emergent strategy. Emergent strategies, recently coined in sustainability strategy-making as generating collaborative approaches to corporate sustainability, are introduced in the context of CMOs as allowing SMEs to align their business objectives with sustainability goals by using community relationships to access necessary resources. Collective CSV therefore strategically integrates the social dimensions of the competitive context by recognizing that CMOs can mutualize the CSV-related costs of their SME members. In doing so, the paper suggests extending the Doing-Using-Interacting mode preferentially implemented by SMEs for their innovation activities, to the meso level of the CMO, linked with CSV opportunities. It also relates to Paper 1 by outlining the intangible function of CMOs in building a collective reputation directed at users, which creates a strong incentive for SMEs to avoid exclusion by conforming to the standards set by the CMO in terms of societal commitments.

Paper 3 builds on the concept of 'Transformative PPI' previously introduced by Grimbert and Zabala-Iturriagagoitia (2023). It contends that the transformative potential of PPI, both in its outcomes and in its ability to build innovative capacity in the public sector, demands a mix of capabilities on behalf of contracting authorities. In particular, they are expected to play a lead user (von Hippel 1986) type of role in the context of grand challenges, by using direct PPI advertised with functional specifications, which poses specific functional challenges related to the inclusion of users and requires corresponding functional capabilities.

Paper 4s departs from the reflection that Circular Public Procurement (CPP), understood in the broadest sense as the procurement of new circular business models and the promotion of circular ecosystems, backs the idea of innovative solutions supporting the transition to Circular Economy. It identifies that the procedural challenges to CPP observed in the literature, which

comprise involving users in product-service systems and in functional contractual arrangements, can be addressed by well-established PPI practices.

Table 1. Overview of academic contributions.

	Paper 1	**Paper 2**	**Paper 3**	**Paper 4**
Title	Deconstructing cluster identity: place branding and trademarking by cluster organizations	Collective shared value creation as emergent strategy for cluster management organizations	Transformative public procurement for innovation: ordinary, dynamic and functional capabilities	Closing the loop without reinventing the wheel: public procurement for innovation promoting a circular economy
Research gap	The concept of cluster identity remains fuzzy, despite its centrality for clusters and for cluster management being acknowledged.	There remains a void in conceptual understanding around the specific roles that CMOs might play in overcoming the barriers faced by their SME members for CSV.	While previous research has explored the barriers to PPI from a suppliers' perspective, a gap exists as to the capabilities required on behalf of contracting authorities.	Despite the innovative character of the procurement of circular business models and the promotion of circular ecosystems, there is a paucity of research departing from innovation studies to address the challenges posed by a circular economy.
Research aims	1. Categorizing the different dimensions of proximity according to their tangible and intangible nature and defining 'intangible proximity'. 2. Exploring the roles that place branding and trademarking by cluster organizations play in the adaptation of cluster identity.	1. Capturing the capacity of CMOs to implement an ecosystem of shared value. 2. Articulating the specific roles that CMOs can play in a mutualized approach to CSV that is consistent with the needs of SMEs.	1. Conceptualizing the transformative effects of PPI according to the multiple roles played by contracting authorities in the problem-solution space. 2. Determining the different phases of the PPI cycle. 3. Identifying the capabilities that are needed on the public side to reap the full transformative benefits of PPI.	Exploiting the synergies between CPP and PPI as a more established form of public procurement for addressing grand challenges, in order to provide guidelines for contracting authorities to adopt the full scope of approaches to CPP.
Research design	Constructivist grounded theory: the conceptual framework emerges from 20 semi-structured interviews	Exploratory theoretical paper with a series of empirical illustrations capturing the	Constructivist grounded theory: the capabilities according to the phases of the PPI cycle were identified during a	Exploratory theoretical paper offering five illustrative cases of the procedural contributions of PPI

	conducted between November 2020 and October 2021 The conceptual approach is illustrated for the case of the Bordeaux wine region in France through 11 additional semi-structured interviews conducted between February and October 2021 with different regional stakeholders.	emergent strategies of CMOs in facilitating collective CSV.	Mutual Learning Exercise on PPI coordinated by the European Commission, which started in January 2017 and was concluded in March 2018.	within the context of CPP.
Main findings	- We define the concept of 'cluster identity' as both place branding and trademarking by cluster organizations, respectively anchored in a 'logic of belonging' and a 'logic of similarity', derived from the proximity literature. - We illustrate how trademarking by cluster organizations can facilitate the adaptation of cluster identity in the face of external threats.	- We define the contours of "collective CSV" that delimits the levers through which CMOs can contribute to supporting their members in addressing social alongside economic challenges - We undertake a systematic analysis of the funded INNOSUP-1 projects that were completed by 2021 to identify those that involved CMOs as a core partner and tackled issues related to CSV outcomes.	- We depict an idealized PPI cycle as a four-phase process requiring related capabilities. - We introduce functional capabilities as those 'addressing functional challenges' associated to the PPI process, according to the experiences gathered by the participants in the Mutual Learning Exercise. - We list the whole set of necessary capabilities for the management of PPI, according to their nature (i.e. ordinary, dynamic and functional) and the phase of the PPI cycle.	- We introduce well-established PPI practices (market engagement and intermediation, functional specifications, and coordinated unbundling) as an engine for circular economy innovation - We discuss the critical drivers (strategic contract management and evaluation) for moving from a substantive to a procedural approach to CPP.
Publication year	2023	2024	2024	2024
Authors	Stephanie Francis Grimbert, Jon Mikel Zabala-Iturriagagoitia, Jacques-Olivier Pesme	Stephanie Francis Grimbert, James Wilson, Xavier Amores Bravo, Alberto Pezzi	Stephanie Francis Grimbert, Jon Mikel Zabala-Iturriagagoitia, Ville Valovirta	Stephanie Francis Grimbert, Jon Mikel Zabala-Iturriagagoitia
Journal	Regional Studies	Competitiveness Review: An International Business Journal	Public Management Review	Science and Public Policy
Ranking	JCR Q1	SJR Q2	JCR Q1	JCR Q3/SJR Q2

Conferences	- Rethinking clusters (2021) - RSA Regions in Recovery Global Festival (2021) - RSA Conference (2023 Ljubljana, Slovenia)	- EU-SPRI Conference (2021) - ScAIEM Conference (2023 Kongsberg, Norway)	- EU-SPRI Conference (2022 Utrecht, The Netherlands)	- R&D Management Conference (2023 Sevilla, Spain) - CONCORDi (2023 Sevilla, Spain)

Source: Own elaboration.

Chapter 4. PAPER 1

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Deconstructing cluster identity: place branding and trademarking by cluster organizations

Stephanie Francis Grimbert[a,b], Jon Mikel Zabala-Iturriagagoitia[a,b,c] and Jacques-Olivier Pesme[d,e]

ABSTRACT

The paper defines 'cluster identity' as an intangible attribute of clusters comprised of place branding and trademarking by cluster organizations, respectively anchored in a 'logic of belonging' and a 'logic of similarity'. We expand the taxonomy of proximities and their dynamics according to their belonging/similarity logic and their tangible/intangible nature. As illustrated in the context of the Bordeaux wine region of France, we find that a prevailing logic of belonging leads to reputational inertia. We propose that trademarking by cluster organizations can facilitate the adaptation of cluster identity, thereby emphasizing its potential as an instrument for cluster managers to engage in community-building.

KEYWORDS

cluster identity; place branding; trademarks; intangible proximity; logic of belonging; logic of similarity

JEL O32, O34, O38

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1. INTRODUCTION

The widespread adoption of cluster policies, following Porter's (1990, 1998) introduction of the cluster concept, subsequently gave rise to interrogations regarding an alleged one-size-fits-all theory, unduly benefiting from its appeal to policymakers. In their seminal contribution, Martin and Sunley (2003, p. 29) offered a provocative discussion, claiming that Porter's idea displays 'the power of a successful brand', and called for deconstructing cluster theory to avoid bearing the risk of overgeneralization. Accordingly, to capture territorial specificities, a large body of the literature on clusters systematically refers to cluster identity as a key competitive factor and an antecedent to collaboration and knowledge sharing (Staber, 2010). Mirroring Martin and Sunley's approach, our paper defines the concept of cluster identity in an attempt to delineate more precisely the contours of this intangible attribute of clusters.

Cluster identity, understood as 'the shared understanding of the basic industrial, technological, social and institutional features of a cluster' (Staber & Sautter, 2011, p. 1350), is an intangible attribute of clusters since it 'is not a given due to agglomeration, but is rather shaped and sustained by individual firms' behaviour and identification with the cluster' (Zamparini & Lurati, 2012, p. 501). Cluster identity is instrumental in building a cluster's collective reputation (Tirole, 1996), which demonstrates that it has 'its own value beyond the well-known incorporeal attributes such as knowledge sharing' (Beebe et al., 2013, p. 735) and has 'mutualistic effects, by reducing transaction costs, supporting collective learning, enhancing accountability, and providing continuity over time and space' (Staber, 2010, p. 153). However, in the same way that the cluster concept was criticized for its fuzziness, the literature falls short in unpacking the concept of cluster identity, despite its centrality for clusters being acknowledged (Beebe et al., 2013; Kasabov & Sundaram, 2013; Morgulis-Yakushev & Sölvell, 2017; Pinkse et al., 2018; Staber & Sautter, 2011).

To address this gap, we discriminate clusters understood as geographical entities (i.e., geographical clusters) from cluster organizations considered as cluster policy instruments that 'operationalise the building of cooperative dynamics supporting cluster competitiveness' (Wilson, 2019, p. 376), themselves being embedded in geographical clusters. Bearing this distinction in mind, we suggest that cluster identity cannot be considered a uniform concept

CONTACT Stephanie Francis Grimbert s.grimbert@deusto.es
[a] Deusto Business School, University of Deusto, Donostia-San Sebastian, Spain
[b] CIRCLE, Lund University, Lund, Sweden
[c] South Eastern University Norway, Kongsberg, Norway
[d] Wine Research Centre, University of British Columbia, Kelowna, BC, Canada
[e] Global Wine Business Organizational Unit, Adelaide Business School, Adelaide, SA, Australia
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and should also logically find its roots in both the geographical cluster and the cluster organizations. Aligned with the topic of this special issue, which considers places as brands, promoting not only their history, culture or tourism but also their reputation and competitiveness, cluster identity navigates between legacy and adaptation. It is a coin with two sides. The first is the branding of the geographical cluster (i.e., place branding), which presents a limited ability to respond to changing consumer needs (Charters & Spielmann, 2014). The other is the trademarking by the cluster organizations, whose purpose is to build 'a vision and strategy based on consensus and trust' (Mauroner & Zorn, 2017, p. 307), offering 'a sense of shared purpose … and a coordinating device for an often-complex set of public and private actors' (Nathan et al., 2019, p. 413).

To shed new light on the rationales underlying those two dimensions of cluster identity, as well as their articulation, we rely on the literature on proximities. The long-standing tradition of agglomeration economics, based on the seminal works of Marshall (1907, 1919), stresses the role of proximity in its different forms (e.g., Audretsch, 1998; Audretsch & Feldman, 1996; Balland et al., 2015; Boschma, 2005; Torre & Rallet, 2005) for knowledge spillovers to occur within a given territory. The extant categories of proximity (geographical, institutional, organizational, social, cognitive and personal) (Boschma, 2005; Werker et al., 2016) participate in what Torre and Rallet, building on Gilly and Torre (2000), refer to as a 'logic of belonging' (when interactions stem from shared rules and behavioural routines), and a 'logic of similarity', (when interactions are facilitated by common representations) (Torre & Rallet, 2005, p. 49). Expanding on this taxonomy, we contend that an *intangible* understanding of proximities is also needed to grasp cluster identity understood as an intangible attribute of clusters. Accordingly, the *first research question* of the paper aims to categorize the different dimensions of proximity according to their tangible and intangible nature. As discussed in the section where the conceptual framework is presented, we define 'intangible proximity' as being comprised of a 'shared identity' and a 'shared vision', respectively anchored in a logic of belonging and a logic of similarity.

This primary contribution on cluster identity leads us to reflect on the mechanisms underlying its adaptation and how they can be rolled out in practice. While place branding is easily identifiable in the form, for instance, of designations of origin, the trademarking strategy of cluster organizations is less demarcated. Despite cluster managers needing to communicate the impact of their actions to various stakeholders, thereby evidencing their added value and sustaining their business models, we observe that there are uneven communication strategies among cluster organizations. In particular, the unawareness of the purpose of trademarks (Castaldi, 2018) in signalling innovations in sectors that do not require technological innovation protected by patents (Mendonça et al., 2004), is evidenced by scarce trademark registrations. We argue that trademarking by cluster organizations can play a fundamental role in strengthening the collective reputation of the cluster, by giving their members an amplified sense of similarity. This, in turn, could facilitate the adaptation of cluster identity to changing environmental circumstances (e.g., increased competition, new regulations, changes in consumer preferences, etc.). In this regard, the *second research question* guiding the paper explores the roles that place branding and trademarking by cluster organizations play in the adaptation of cluster identity.

Following constructivist grounded theory (Rieger, 2019), the aforementioned conceptual framework emerges from 20 semi-structured interviews conducted between November 2020 and October 2021. Grounded theory allows gathering and exploring data in a systematic way so as to build new theories 'grounded' on the data gathered during the research process (Charmaz, 2006). To get an objective picture of the challenges involved in cluster management as regards identity construction, we interviewed ecosystem facilitators and managers of clusters specialized in various types of industries (e.g., food, digital engineering and advanced manufacturing, health, surf industry manufacturing, furniture design and equipment, phototonic laser and electronic hyper-frequencies, information and communication technology – ICT), located in France, Denmark, Ireland, the Netherlands and Spain, together with labelling structures and policymakers in charge of innovation and territorial development policies in Spain, Portugal and Hungary. Through the analysis of these interviews, we explored the narratives used by each interviewee to conceptualize on the gaps and challenges identified by these as regards the potential of place branding and trademarking by cluster organizations, and the relationships among them.

We then illustrate the conceptual framework for the case of the Bordeaux wine region in France through 11 additional semi-structured interviews conducted between February and October 2021 with different regional stakeholders (cluster organization manager, representatives of the organizations in charge of the place branding and academia). The Bordeaux wine region has developed a compelling place branding, expressed through multiple appellations ensuring a shared identity for its members. However, the region suffers from a reputational hazard known as 'Bordeaux bashing', a tendency to snub Bordeaux wines, considering them as old-school wines failing to adapt their production processes, and considering themselves as an undisputed reference for the world. This external threat to the reputation of the region calls for its 'internal governance [to be] driven by evolving market and regulatory demands' (Patchell, 2008, p. 2380). The strategic governance of the region, well aware of these imperatives, has invested massively in research and development organizations, while maintaining conservative communication practices around the appellations (i.e., place branding). Since the multiplicity of appellations, leading to uneven returns for the wineries (Livat et al., 2019), mitigate their benefits in terms of collective reputation, we explore the potential of a trademarking strategy

led by the auxiliary wine sector cluster organization aimed at counterbalancing the inherent inertia of a place branding anchored in geographical indications, thereby reaping the full benefits of the investments undertaken to promote innovation in the cluster.

The remainder of the paper is structured as follows. The next section reviews the literature on geographical and constructed proximities and the effect of this distinction on clusters as specific place brands, before discussing intellectual property rights (IPRs) strategies of clusters. We then introduce our conceptual framework, which highlights the relevance of intangible proximity in clusters, and the role of cluster trademarks as an adaptation mechanism for cluster identity. This conceptual framework is illustrated in the Bordeaux wine region, an archetypal case of an emblematic place brand being challenged by a rapidly evolving market. Finally, we conclude the paper by discussing the theoretical contribution and the practical implications of cluster trademarks as instruments for evaluating the soft effects of cluster organizations, thereby evidencing their relevance for their members and for territories.

2. THEORETICAL BACKGROUND

2.1. Geographical and constructed proximity in territorial identity

The proximity literature, following the seminal works of the French School of Proximity in the early 1990s (Carrincazeaux et al., 2008), seeks to endogenize the space variable in economic theory (Gilly & Torre, 2000) by considering geographical proximity as one type of proximity among others, in an attempt to redefine space as a socially constructed territory (Zimmermann et al., 2022). The categorization of proximities differs across various analytical grids such as the institutionalist approach (Kirat & Lung, 1999; Talbot & Kirat, 2005), the interactionist approach (Rallet, 2002) or according to the level of granularity retained (Boschma, 2005; Werker et al., 2016). They converge in the distinction of geographical proximity from socially constructed proximities, whether institutional, organizational, social, cognitive or personal (a categorization we retain hereafter by defining constructed proximity as encompassing structural and relational non-geographical proximities).

The understanding of territories derived from the proximities literature enables unveiling the complexity of the links between geographical and constructed proximities and questioning the sources of territorial identity. Geographical proximity becomes less constrained as it is considered 'not so much an economic cause of agglomeration as a social effect of the embeddedness of economic relations in inter-individual relations' (Torre & Rallet, 2005, p. 52). Rutten adopts this relational understanding of proximity by advocating that geographical proximity should be rephrased as 'geographical dynamics' that 'shape and are shaped by social interaction' (Rutten, 2017, p. 170), making proximities context-specific (Rutten, 2020). When the space and time dimensions of geographical proximity are relaxed, as in the case of 'temporary proximity' (Torre, 2008, p. 869), constructed proximity becomes preponderant in the creation of territorial identity. Torre and Rallet (2005, p. 49) refer to a 'logic of belonging' and a 'logic of similarity' as the 'partly complementary and partly substitutable' (p. 50) underlying features of constructed proximity.

The central role played by the 'logic of belonging' and the 'logic of similarity' was already identified by Saxenian (1990, p. 98) in Silicon Valley as she stated that 'the sense of loyalty and shared commitment to technological excellence unifies the members of this industrial community'. However, cluster scholars argue that the role of constructed proximities for collaborative dynamics to appear and be sustained appears insufficiently addressed, as there is 'a gap in terms of how contemporary cluster policy relates to the social, community-centred dynamics of the territories where clusters are being supported' (Konstantynova & Wilson, 2017, p. 464). Following the seminal work of Giuliani (2007) on the formation of subgroups creating knowledge-sharing communities in clusters, recent contributions have started looking into different drivers to explain collaboration in clusters, such as status assortativity (Maghssudipour et al., 2021). In line with this research, we draw from the literature on proximities a novel perspective to illustrate the inadequacy between clusters and communities (Huber, 2009; Kasabov, 2010) and examine how perception-driven collaboration may emerge from the logics of belonging and similarity.

2.2. Clusters as specific place brands

Even though cluster studies often refer 'in some way to identity and related concepts such as shared mindset, social milieu, and sense of belonging as a central feature of such communities' (Staber, 2010, p. 153), the studies that consider cluster identity in detail are scarce (Nathan et al., 2019). They tend to approach 'clusters as specific examples of place brands' (Kasabov & Sundaram, 2013, p. 538) 'inseparably linked to the territorial area in which the cluster is located' (Mauroner & Zorn, 2017, p. 308). This conceptual and empirical similarity between place branding and cluster identity reflects the confusion operated between clusters understood as geographical entities and the cluster organizations whose purpose is to operationalize cluster policy (Wilson, 2019). Accordingly, the literature on cluster identity is situated at the junction between place branding, belonging to 'a larger family of policies that develop spatial imaginaries' (Nathan et al., 2019, p. 411) and cluster management, for which branding may 'strengthen the attraction of the cluster for investment, venture capital, skilled workers and new entrants; help to unite actors in a shared purpose and identity; often complement firms' marketing and collaborative-marketing activities' (Lundequist & Power, 2002, p. 699).

In practice, the branding of clusters is increasingly emphasized as a management tool for a successful cluster strategy. Mauroner and Zorn (2017) describe how the development of cluster identity follows similar dynamics to collective reputation (Tirole, 1996), in as much as it is

'continually formed and solidified by both, the cluster initiatives' management and the cluster members' (Mauroner & Zorn, 2017, p. 307). They must reach, through a consensus-based process, 'a widely anchored vision concerning the future of the cluster' (Lundequist & Power, 2002, p. 698), which increases the actors' identification to the cluster and hence the establishment of relationships (Mauroner & Zorn, 2017), themselves participating in the cluster identity. By creating a common sense of purpose (Staber & Sautter, 2011), the branding of clusters also reaches a second-order objective, acting as a coordination device between cluster stakeholders, 'an often-complex set of public and private actors' (Nathan et al., 2019, p. 414).

The governance of clusters understood as specific – and often contested – place brands requires 'careful management of conflict, disagreement and discord among key actors' (Kasabov & Sundaram, 2013, p. 538). If cluster identity fails to create a catalytic dynamic, the risk incurred would be a paradoxical lock-in situation emerging from the cluster identity's inability to adjust to changing conditions (Pinkse et al., 2018) because of its 'artificial and forced' nature (Mauroner & Zorn, 2017, p. 292). Cluster identity is therefore made of both enduring and malleable attributes which are shaped in collective processes over time (Staber, 2010), and should be open to 'change with circumstances within and outside the cluster' (Lundequist & Power, 2002, p. 698), for instance through the emergence of sub-identities (Pinkse et al., 2018).

2.3. Intellectual property rights of clusters

Since clusters are considered specific place brands encompassing both the branding of geographical places and of organizational entities, corresponding IPR strategies can be adopted by clusters. We acknowledge the role IPR strategies play in the competitiveness of individual firms, as evidenced by Falciola (2020) in the case of the wine industry. Since the paper focuses on cluster organizations, we focus on the role of IPR in this meso-level.

In the case of geographical branding, Geographical Indications (GIs) – and their variations such as Appellation d'Origine Contrôlée (or Protected Designations of Origin), Protected Geographical Indications and Origin-Bounded Brands for all brands that cannot be separated from their origin (Spielmann, 2014) – are archetypal IPRs which 'can be compared to a perpetual patent owned by all the producers of the demarcated region whose products comply with the specification outlined in the code of practice' (Crescenzi et al., 2022, p. 382). They 'clearly define geographic boundaries, which are typically hard to change once put into law … and also contain legally enforceable regulations about raw materials, production techniques and areas of production' (Charters et al., 2017, p. 752). Specifically, in the wine industry, the aim of appellations is to represent *terroir* and act as a collective reputation mechanism (Gergaud et al., 2017), since consumer expectations concerning the quality of wine produced by an individual winery may depend on the current or past average quality of all wines from the same vintage or region. By acting as a quality signal that allows firms to share promotion costs (Livat et al., 2019), GIs are club goods in nature (Cei et al., 2018; Torre, 2002), whose governance by 'multiple stakeholder groups with interests and agendas that may be incompatible' (Kasabov & Sundaram, 2013, p. 531) may affect its collective reputation and the adherence of firms (Menapace & Moschini, 2012; Torre, 2002).

There are several means to protect intellectual property (e.g., copyrights, trademarks, patents), each of which can be of relevance to different industries (Belderbos et al., 2022). Trademarks are well suited for the IPR strategy of cluster organizations, as part of the service sector where technological development (i.e., patenting activity) is not at the core of its competitiveness (Mendonça et al., 2004). The rationale for trademark registrations is based on the existence of information asymmetries in certain sectors, where the uncertainty related to consumption requires the customer to rely on the organization's reputation rather than on the value of its offer (Castaldi, 2018). Hence, the (few) contributions acknowledging the strategic value of trademark filing (see Castaldi, 2020, for a complete overview) have used them to develop indicators capturing organizational properties such as reputational assets, market strategies, and organizational capabilities (Flikkema et al., 2019).

At the territorial level, recent contributions highlight the overlaps between the concerns of economic geography and those of the trademarking literature. Castaldi and Mendonça (2021, p. 2022) take stock of the potential of leveraging collective trademarks for exploiting regional place-based intangibles. Trademarks can be seen as a useful complement to more traditional patent-based indicators for measuring regional innovation (Block et al., 2022), by stressing the relationship between the level of economic development and the nature of regional diversification (Iversen & Herstad, 2022). From a historical perspective, the importance of geography for trademarking emergence and diffusion opens new research avenues on the role of intangible assets in regional development, and on how this effect differs according to the level of centrality of regions, as reflected in the disparate trademarking intensities across regions (Sáiz & Zofío, 2022).

3. CONCEPTUALIZING CLUSTER IDENTITY

We propose a framework for conceptualizing cluster identity, which introduces intangible proximity and defines its constituents (i.e., 'shared identity' and 'shared vision'), and the respective roles that place branding and trademarking by cluster organizations can play in the adaptation of cluster identity.

3.1. From tangible to intangible proximity

To respond to the first research question guiding the paper, which aims at exploring how intangible proximity complements tangible proximity in clusters, we conducted 20 semi-structured interviews (45–75 min each) online and in person between November 2020 and October 2021 (see Table A1 in Appendix A in the supplemental

data online).[1] We considered ecosystem facilitators and managers of clusters specialized in various types of industries (e.g., food, digital engineering and advanced manufacturing, health, surf industry manufacturing, furniture design and equipment, phototonic laser and electronic hyper frequencies, ICT), located in France, Denmark, Ireland, the Netherlands and Spain, together with labelling structures and policymakers in charge of innovation and territorial development policies in Spain, Portugal and Hungary.[2] By relying on a different set of actors that were neither specific to a region, nor to an industry (McDermott, 2011), we aim to ground our conceptual framework in different settings, thereby proving its generalizability by building theory where little is known (Amsteus, 2014).

The interviews unveiled the need for a *logic of belonging* to a place for sustaining the interest of the members of clusters, hence building a community around common interests (interviewee #3), 'anchoring the industry to the territory' (interviewees #6, 11), and 'making themselves known to the society' (interviewee #12). Sharing knowledge goes hand in hand with 'building networks of trust and creating the perfect environment for companies to do so' (interviewee #6) and making them 'feel that they are part of something' (interviewee #8). For that matter, transparency is key (interviewees #6, 8) and requires implementing rules as well as making sure that these are respected (interviewee #8). The cluster needs to encourage 'identifying a shared ground in the diversities' (interviewee #1), and making 'clear that companies from the cluster organization need to compete among themselves, but at times also have to be mature enough to be able to collaborate' (interviewee #6). The identity of clusters benefits from external labels, considered 'as gateways to being recognized at the international level, in terms of funding, projects' (interviewee #3) and for 'creating transnational networks' (interviewees #6, 15) by acknowledging their level of professionalization (interviewees #14, 16).

Besides, cluster organizations are considered vectors for building a *logic of similarity*, the level of development of which depends on the maturity of the cluster organization. There is a consensus on the fact that 'communication, marketing and digital strategies of cluster organizations' (interviewees #3, 5, 6) serve as promotion tools 'on trade missions and fairs, in events in different countries and for the communication on the web and social media' (interviewee #6), as well as being 'a source of recognition and credibility in terms of networking' (interviewee #7). The cluster organization acts as 'the strategic voice for its members by means of conveying common values, since small and medium-sized enterprises (SMEs) do not have the resources to be continually involved in marketing strategies' (interviewees #3, 5). Timid steps have been undertaken to associate the communication of the cluster organizations with the private brands of their members (interviewees #4–8), with nascent initiatives directed to the end consumer (interviewees #9, 10, 17). One cluster manager wishes that 'more emphasis be put on the actual branding possibilities' (interviewee #4) such as trademarks, which by definition takes time (interviewee #13) and necessitates, in the early phases, 'intense discussions around the notions of identity, community, local sourcing, value chain, diversity, etc.' (interviewee #2).

Table 1 complements the categories of proximity identified by the literature (Boschma, 2005; Werker et al., 2016) with intangible proximities, discriminated according to the level of analysis (micro/meso/macro) and to their prevailing logic of belonging or logic of similarity. For each type of proximity, and building upon Balland et al. (2015) and Werker et al. (2016), we identify and define the corresponding proximity dynamics, namely the evolution of each type of proximity over time.[3] Derived from the abovementioned interviews, we introduce 'shared identity' and 'shared vision' as the two intangible proximities based respectively on a logic of belonging and a logic of similarity. From a dynamic standpoint, a shared identity becomes the 'convergence' of a 'unique set of characteristics recognized and shared by the cluster actors enabling their identification and acting as a delimitating/differentiating tool'. In turn, a shared vision evolves into the 'adherence' to a 'collective brand building process that engages the members of cluster organizations towards the expression of a common vision as a complement to their private trademarks'.

3.2. From place branding to trademarking by cluster organizations

In this section, we conceptualize the two dimensions of cluster identity, namely place branding and trademarking by cluster organizations, and we explore the roles they play in the adaptation of cluster identity so as to respond to the second research question guiding the paper. Figure 1 displays the proximities listed in the previous section, organizing them along a tangible/intangible proximity and a proximity by belonging/by similarity axis. The geographical cluster is situated at the junction of the tangible proximities, and adapts its routines, institutions, formal and informal networks to changing external factors through its cluster organizations.

The intangible expression of the geographical cluster in place branding (different types of GIs, Origin-Bounded Brands, collective trademarks, etc.) comprises both a shared identity and a shared vision, reflecting a logic of belonging and a logic of similarity. By the force of path dependence and the nature of place branding, the latter cannot be expected to follow the pace of rapidly changing external factors such as market conditions or consumer preferences, and would mostly contribute to reinforcing a shared identity. The adaptation of cluster identity, therefore, stems from the use of trademarks by cluster organizations, which are instrumental in fostering a 'shared vision'. On the one hand, a cluster trademark fulfils a similar role to a firm-level trademark, as it is suitable for responding to the various motives introduced in the taxonomy of Block et al. (2015), such as protection motives, marketing motives, and exchange motives. A cluster benefits from filing trademarks in order to secure its revenues, signal its activities, and develop valuable assets (Block

Table 1. Categories of proximity and proximity dynamics.

Level of analysis	Categories of proximity	Tangible/ intangible proximity	Proximity dynamics		Proximity by Similarity/ belonging
Macro	Institutional	Tangible ++	Institutionalization	Progressive integration in actors' behaviour of formal/informal rules and regulations imposed by specific administrative geographical territories, including cultural aspects	Similarity –
Meso/ macro	Geographical		Agglomeration	Long-term process of location and relocation decisions driven by the opportunities for knowledge networking at the local level	Belonging –
Meso	Social	Tangible + Intangible –	Decoupling	Increasingly embedded, trust-based interactions between agents in knowledge fields, professional associations or social communities in a growing network of mutual acquaintances	Belonging +
	Organizational		Integration	Rearrangement of subsidiaries, units, departments or establishments within an organizational structure sharing organizational objectives and organization-specific formal/ informal rules and regulations, including aspects of organizational culture	
Micro	Cognitive	Tangible – Intangible +	Learning	Social and interactive process requiring shared knowledge areas of expertise and experience, which will reduce the cognitive distance between partners	Similarity +
	Personal		(De)clicking	Personal character traits, behavioural patterns and enjoyment of one another's company relevant for partner selection, joint activities, output, and decisions regarding continuation	
Meso	Shared identity	Intangible ++	Convergence	Unique set of characteristics recognized and shared by the cluster actors enabling their identification and acting as a delimitating/ differentiating tool	Belonging ±
	Shared vision		Adherence	Collective brand building process that engages the members of cluster organizations towards the expression of a common vision as a complement to their private trademarks	Similarity ±

Source: Authors' own elaboration based on Boschma (2005), Balland et al. (2015) and Werker et al. (2016).

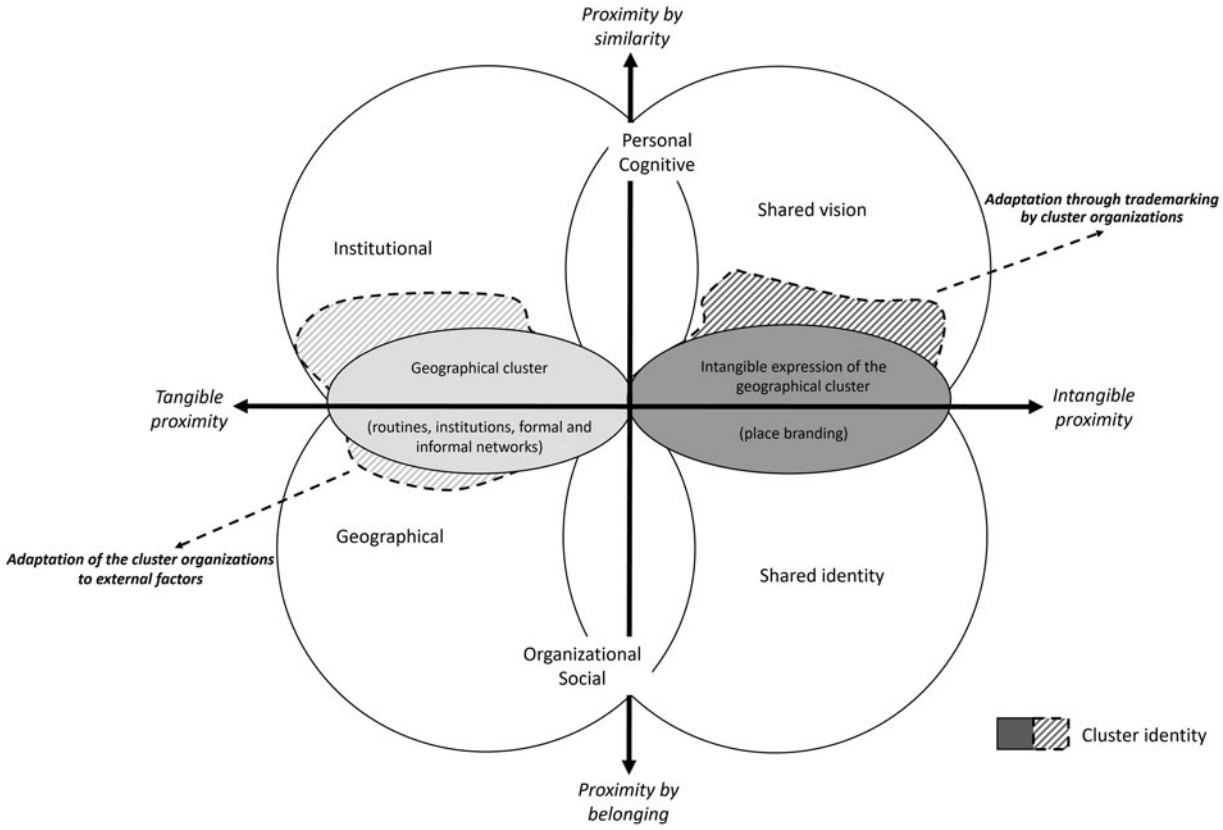

Figure 1. Proximity matrix of cluster identity.

et al., 2015). On the other hand, trademarking by cluster organizations also enables place branding to adapt to evolving circumstances by creating communities of firms sharing common interests (Charters & Spielmann, 2014), similarly to the role tentatively attributed to collective trademarks for increasing the value of territorial brands (Charters & Spielmann, 2014; Block et al., 2022).

Examples of trademarks, which were either suggested during the interviews or identified by the authors, can include the following: the name of the cluster organization, a motto, a logo, a phrase including the name of the cluster organization and an introductory expression such as 'powered by X', 'made by X', 'approved by X', a phrase including the place of origin of the cluster organization such as 'X lifestyle', 'X way of living', a phrase including the sector of activity of the cluster organization such as 'X valley', or a combination thereof, to name a few.[4] Since, to our knowledge, there are no prior studies on cluster trademarks, we consider our research to be exploratory and hence, call for the application of our conceptual framework in different contexts, such as the one exposed in the following section.

4. ILLUSTRATING CLUSTER IDENTITY: THE BORDEAUX WINE REGION

4.1. Context

We chose to illustrate our conceptual framework in the Bordeaux wine region for several reasons. The first is related to the plethora of prior studies on wine regions in the cluster literature as well as in the place branding literature concerned with agri-food products. The wine industry, therefore, appears to be a natural convergence point between the cluster (e.g., Giuliani, 2007; Giuliani & Bell, 2005; Porter et al., 2013) and the place branding literatures. The latter 'considers the co-branding of products and places as one of the three key areas of place branding' (Lopes et al., 2018, p. 500), many of them being agri-food products. The second reason is more specifically linked with the prominence of identity creation processes in the wine industry, particularly in the case of the historically renowned Bordeaux brand. As pointed out by Beebe and colleagues, identity in the context of the wine industry 'is so powerful that it can serve as an ideal type for understanding the identity creation process and its value' (Beebe et al., 2013, p. 712) in different settings. In the concert of the great wine regions of the world, Bordeaux was always a leading figure. Its complex multilevel place branding system is taken as a point of reference worldwide as the Bordeaux wine brand 'was historically built around a strong territorial identity' (Bélis-Bergouignan, 2011, p. 73). The third reason is that in spite of Bordeaux maintaining its leading position during the 20th century, the so-called New World wines entered the scene in the late 1990s, challenging the existing market position with some different types of wines and new business methods applied to the wine sector (Campbell & Guibert, 2006). This fierce global competition has led the newcomers to position their region to the detriment of the one identified as being the top leader: Bordeaux.

One of the market trends affecting the wine business in Bordeaux is the tendency to consider that 'small is beautiful', and eventually, more respectful. Bordeaux bashing blames everything big in Bordeaux to deny its dominant position. Considered arrogant, expensive and unnatural (Réjalot, 2019), the Bordeaux wines are facing a constant campaign against what was formerly part of its success. The final reason is the recent creation of a specific auxiliary wine sector cluster organization that aims to meet the challenges of the sector by helping to germinate technological innovations, and to promote the competitiveness of companies in the wine industry through project engineering, business networking and the provision of personalized services.[5]

Bordeaux's geographical location shaped its commercial destiny from its earliest days. Historically, the success of Bordeaux wines has relied on its international trade. When the Duché d'Aquitaine and its capital Bordeaux were part of the English monarchy (1152–1453), the kingdom of England decided to source the wines of Bordeaux, and in particular, its traditional *clairet*. Trading with England, then Holland, Germany, Scandinavia, North America and the Far East more recently, Bordeaux has always shipped its wines across the world. The Bordeaux *négociants* were commissioning ships loaded with wine barrels ready to be delivered to merchants around the world. This early international appetite partly explains the reputation of Bordeaux wines. When away, the *négociants* could count on an intermediary profession in charge of sourcing the wines in the Bordeaux region and matching supply with demand to promote and sell their goods. The *courtier* (broker), a profession codified in 1321, supervises the delivery of the wines from the producer to the *négociant*, ensuring the strict compliance of the wines selected. This tryptic (chateaux–brokers–*négociants*) forms what is known as *la Place de Bordeaux*, a system that has its own codes and uses and is very much respected locally.

In 1855, a Universal Exhibition was planned for Paris, and goods from all over the world were to be shipped to the French capital for display. Back in time, the Universal Exhibition was a showplace for innovations and discoveries. On 18 April, the Brokers' Union produced a list of selected classified wines referred to as the '1855 classification' (Markham, 1998). More than 150 years after its drafting, it remains one of the most authoritative references in the world of wine and possibly Bordeaux's most remarkable competitive advantage. As a top wine-leading region, Bordeaux has to keep innovations permanently occurring to maintain its quality standards. A lot has been achieved in this regard, from policymaking to winemaking, including wine trade or wine tourism initiatives. In 2009, the creation of the Institut des Sciences de la Vigne et du Vin (ISVV – Institute of Vine and Wine Science), which brings together all research, education and technology-transfer teams working in the wine sector on a single site, gave rise to one of the highest concentrations of wine specialists in the world. Nowadays, ISVV researchers are notably involved in the assessment of the effects of climate change on vines and looking for innovative responses. In this task, they are supported by the action of the Inno'vin auxiliary wine sector cluster organization created in 2010 and located on the same site, whose main goal is to support companies' innovation projects. As the body in charge of the branding of the Bordeaux wine region, the Conseil Interprofessionnel des Vins de Bordeaux's (CIVB)[6] mission is to promote and reinforce the image of the wines of Bordeaux both nationally and internationally. In spite of a significant marketing budget (nearly €20 million/year, variable according to the levy paid by the wine producers) the task is not easy, the Bordeaux ecosystem being highly segmented with its 65 appellations. As a result, the Bordeaux region is a brand, the multiple appellations constituting Bordeaux are brands, and the 10,000 *châteaux* forming the Bordeaux DNA each is a brand, sometimes offering a wide range of commercial labels.

To assess the applicability and the explanatory value of our conceptual framework to the aforementioned challenges in terms of an increasingly failing brand image, we conducted 11 semi-structured interviews (45–75 min each) online between February and October 2021 (see Table A2 in Appendix A in the supplemental data online).[7] We focused on the members of the Bordeaux wine region (cluster organization manager, representatives of the organizations in charge of the place branding and academia).[8] We aimed to trace back the roots of its highly valued branding embedded in a longstanding tradition, which includes a complex multilevel and multi-actor institutional governance setting (Mooken et al., 2021), but also to record both the specific characteristics and dynamics of the industry, as well as the policies needed to facilitate the adaptation of the Bordeaux wine brand to emerging challenges and environmental changes.

4.2. Results

The Bordeaux wine brand is a product of its 'history of trade' (interviewees #21–23), which has shaped its reputation and its way of doing business. There is a consensus on the fact that the institutional heritage of the wine industry is indissociable from the success of the region. This legacy comprises: (1) the *Place de Bordeaux* marketplace as a powerful commercialization mechanism; (2) the CIVB as a collective governance organization in charge of the place branding ensuring that merchants, brokers and wineries are represented and in charge of the collective reputation of the industry; and (3) the appellation system, unanimously praised for representing *terroir* and quality in the communication strategy of the region. These institutional features have ensured the leading position of the Bordeaux wine industry by enabling an evolution that conforms to its historical legacy, while unceasingly safeguarding consensus among the main stakeholders. As demonstrated by the fact that '111,000 hectares out of the 115,000 in the region belong to the appellation system' (interviewee #19), the institutional settings of the region also constitute 'control mechanisms that ensure that everyone stays in the group' (interviewee

#21) since the appellation members 'share a strong sense of belonging' (interviewees #21, 23, 25).

Being a longstanding global leader in the industry does not, however, come without challenges, especially when the discourse around the place branding starts being perceived as arrogant and conformist. The Bordeaux-bashing phenomena intensified following a documentary filmed by a French journalist and diffused on one of the French public channels in February 2016, which depicted Bordeaux as relying heavily on pesticides for its production, a very sensitive topic for 'the biggest wine region in France, situated in densely urbanized environments' (interviewee #22). 'This systematic denigration of Bordeaux is revealing of the French mentality to put down leaders, but also of the long-term communication strategy of the CIVB' (interviewee #23). The CIVB, being a representative body of 5500 wineries, 300 merchants and 100 brokers, in other words of professions with 'conflicting interests in the short term' (interviewee #22), can only lead to 'consensual and soft moves' (interviewees #20–23), while 'the two-year mandate provided to each of these stakeholders makes it difficult to sustain a bold long-term vision' (interviewee #21). Hence, the communication strategy 'falls short in showing the efforts engaged by the actors of the wine industry, and does not offer any renewal' (interviewee #19). An example of the region's 'slow reactivity' (interviewee #22) to the reputational hazard it is facing is that, even if the CIVB recognizes that 'the region must demonstrate that it is promoting state-of-the-art research to reduce its impact on the environment' (interviewee #24), the adoption of the *Haute Valeur Environnementale* label tends to 'send a confusing message to the consumers, since it does not require stopping the use of pesticides' (interviewees #20, 22). Despite the urgent need to address climate change, there is growing tension between the need to preserve the traditional reputation of excellence of the region, 'in order not to 'break the toy" (i.e., *casser le jouet*) (interviewee #25), while at the same time demonstrating to the consumer that tradition is not synonymous with inaction. For that matter, 'the CIVB has created a strategic group in charge of redefining the Bordeaux brand, which is an uneasy balance between tradition and innovation' (interviewee #24).

The pressing nature of the challenges faced by the wine cluster, whether from the supply side (climate change) or the demand side (Bordeaux bashing), has also contributed to evidence the inertia which characterizes the governance of the geographical cluster. Fragmented by nature, it involves 'coordinating a multiplicity of appellations and classification systems' (interviewee #23). This horizontal coordination involves important issues related to the heterogeneity of the market situations between and within the appellations. In this context, the wineries show an increasing disinterest in the governance of the appellation's federations, as demonstrated by 'the absence of a vast majority of wineries in the General Assemblies' (interviewee #25). Another source of inertia comes from the unbalanced market power between merchants and wineries, a specificity of the *Place de Bordeaux*. This situation is mainly due to the 'high atomicity of the supply', which results in a 'major substitution effect between the less prestigious appellations' (interviewee #22), those wineries 'being at the mercy of a phone call from the merchants, which sometimes never comes' (interviewee #25). The Bordeaux system of intermediated sales 'is a typical oligopsony, which goes against the current global demand for storytelling and direct relation with the producers' (interviewee #22). As an illustration, the 'Bordeaux wine industry has always been refractory to the development of wine tourism' (interviewee #24), but the region's identity will 'be forced to adapt by the evolution of the market' (interviewee #20).

For this 'technical and market adaptation' to occur (interviewee #22), the auxiliary wine sector cluster organization has a major role to play, being the regional reference for 'providing innovative responses to the major challenges faced by the wine industry' (interviewee #19). On the one hand, the 'adoption of green practices can be regarded as an innovation, as it covers many aspects of the winemaking process, including the building of human capital' (interviewee #20). The auxiliary wine sector cluster organization could be instrumental in 'spreading information on technological innovation for sustainable wine production in the Bordeaux region' (interviewee #22). However, it is insufficiently known among wineries (interviewee #25), as the adoption of innovative processes does not yet concern wine producers belonging to smaller family businesses, situated in the less prestigious appellations (interviewee #19). In this regard, there is an education deficit, considering that 'most winery managers have a technical background, and very rarely business training, which implies that they don't know much about the market' (interviewee #22). On the other hand, there is potential for increasing the share of direct marketing and bypassing the pressure coming from the intermediaries, by embracing innovative marketing processes such as 'the management of communities of customers on social networks', which would however require 'a mutualization of commercial forces, of marketing activities and of brand building' (interviewee #22) for sharing the costs among several wineries. For that matter, the cluster organization should not only be influential in identifying technical solutions providers, but also in 'facilitating the evolution of beliefs' (interviewees #22), two indispensable keys for unlocking the region's adaptation to its current challenges and recreating a link with its consumers.

Our results, as summarized in Figure 2, shed light on the tension between the expression of tradition and a necessary evolution of the Bordeaux wine cluster identity. Appellations provide a strong sense of belonging to their members, but for the less prestigious ones, the adaptation of the territorial collective reputation to external threats requires rethinking their production and communication processes to better address evolving consumer preferences. The auxiliary wine sector cluster organization being at the forefront in terms of technological development, we identify a discrepancy and an opportunity in the adoption of the innovative solutions it offers: whilst the prevailing logic of

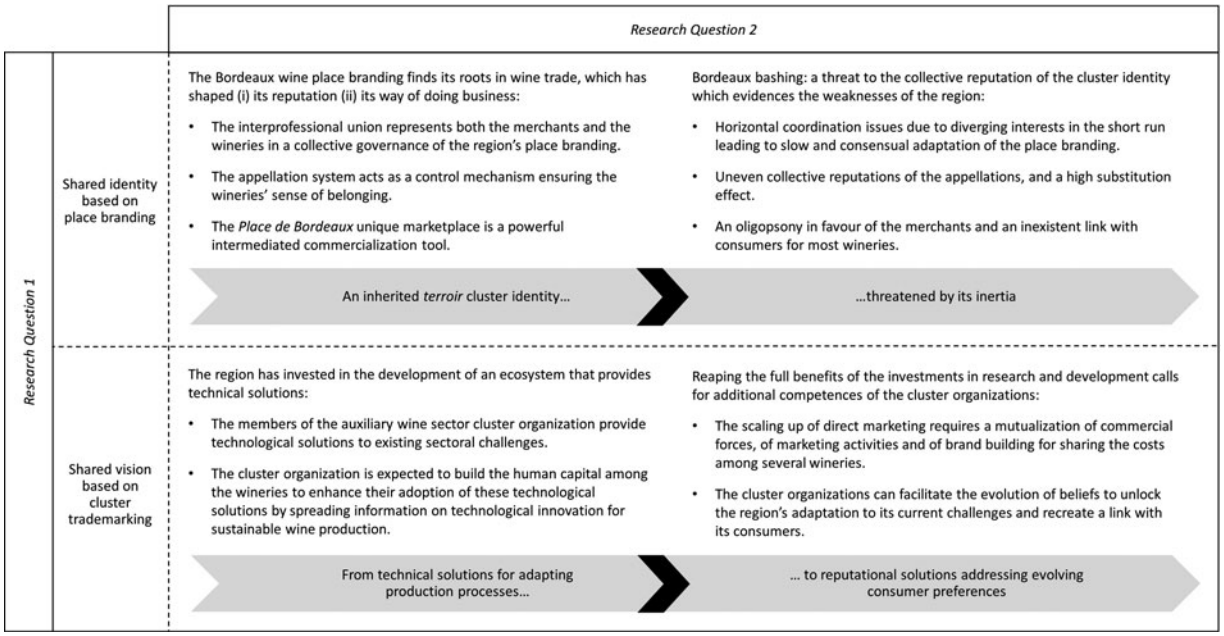

Figure 2. Summary of findings.

belonging benefits wineries from prestigious appellations and successfully serves as an exclusion mechanism (Cei et al., 2018), those belonging to less prestigious appellations would benefit the most from adhering to innovative solutions since they cannot seek rent from their appellation. However, the latter suffer from their lack of awareness of the existence of the auxiliary wine sector cluster organization on the one hand, and from their difficulties in reaching the final consumer on the other. Consistent with our conceptual framework, we, find that there is an opportunity for the cluster organizations to engage in building a shared vision for the wineries keen on adopting new practices through the use of trademarks so that the tangible effects it aims at providing also translate into intangible effects in the form of reputational benefits for those wineries who could benefit the most from them.

5. DISCUSSION AND CONCLUSIONS

The paper specifies the concept of 'cluster identity' as both place branding and trademarking by cluster organizations, respectively anchored in a 'logic of belonging' and a 'logic of similarity', derived from the proximity literature. We define cluster identity as the two sides of the same coin. *Heads* is the intangible expression of the geographical cluster in place branding, meant for creating a shared identity based on a logic of belonging. *Tails* is the intangible expression of the cluster organizations in cluster trademarks, with the purpose of building a shared vision around a logic of similarity. Doing so, we contribute to the literature on clusters by pointing to the positive social returns of trademarks at the regional level (Castaldi & Mendonça, 2022), thereby putting flesh on otherwise 'lifeless corsets' (Mauroner & Zorn, 2017, p. 292). We illustrate our conceptual framework in the Bordeaux wine region, which highlights how a prevalent logic of belonging may impair community-building and be conducive to a toxic place branding unable to respond to reputational challenges.

Expanding on previous contributions on trademarks as indicators for intangible territorial assets, we introduce how trademarking by cluster organizations can facilitate the adaptation of cluster identity in the face of external threats. Our conceptual framework proposes that cluster trademarks may offer five benefits:

- Developing cluster trademarks requires including the whole value chain of the cluster organization to elaborate its branding strategy. When communicating their innovation promotion activities, cluster organizations need to bear in mind who those innovations' end-users may be. Their member base can therefore be broadened beyond the traditional category of innovation providers.
- Cluster trademarks create a sense of similarity for communities of actors sharing values. The purpose of place branding is to provide a geographical indication and quality standards, whereas cluster trademarks translate the activities of the cluster organization for communities keen on embracing innovation.
- In the case of a highly atomized supply subject to substitution effects, cluster trademarks can also introduce a source of differentiation, and consequently superior market power leading to a competitive advantage. The literature on the concomitant use of place branding and private firm trademarks (Block et al., 2022; Menapace & Moschini, 2012) provides interesting grounding for the design of a multilevel trademark system comprised of the cluster and private trademarks.
- Forming part of a subcommunity sharing the same vision triggers collaboration opportunities based on the adherence to a cluster trademark. This entails

benefits related to the mutualization of the costs inherent to branding.
- At the territorial level, cluster trademarks are instrumental in fostering the adaptation of cluster identity, especially in cases where place branding can be conducive to reputational risks, or when it provides a weak collective reputation. They can provide hedging tools to mitigate the negative effects of place branding (Hira & Swartz, 2014).

We suggest that further research could examine the potential of cluster trademarks as a cluster management and cluster policy tool, in the shape of an indicator for evaluating cluster organizations. Cluster trademarks can either provide a more agile response to the evolution of consumer preferences than place branding, or act as a surrogate in the absence of place branding, whilst substantiating the additionality provided by the cluster organization. However, in practice, the use of cluster trademarks is still very limited despite cluster managers recognizing the potential of branding. Following recent contributions on the myopic motives not to trademark (Castaldi, 2018), we believe our contribution may raise cluster managers' awareness of the potential of cluster trademarks in sustaining their business models through territorial community-building. Including trademarks in policy evaluation exercises (Castaldi & Mendonça, 2022), by way of expanding the European cluster labelling criteria towards the inclusion of cluster trademarks, would lead to exploring the measurement of the soft effects of cluster organizations. Only then could the labelling system truly fulfil its evaluation purpose and set a solid ground for communicating the impact of cluster organizations to policymakers, by harmonizing and aggregating evaluation at the European level. At the same time, cluster managers would also benefit from the availability of a holistic labelling system for developing their communication with current and potential members, as well as with society. Deconstructing cluster identity appears necessary for moving away from the skewness which has led to underrating the intangible dimension of proximity in clusters, and paves the way for broadening the scope of cluster organizations from trade to trademark.

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NOTES

1. Some interviewees were interviewed more than once, and hence the number of interviews is not coincident with the number of interviewees. As Table A1 in Appendix A in the supplemental data online shows, some informants were interviewed twice to gain a deeper understanding of some of the points raised in the interview, or to discuss issues that were raised by other informants.
2. Section A3 in Appendix A in the supplemental data online includes the questions formulated during the interviews, by type of actor.
3. The institutional, geographical, social, organizational, cognitive and personal proximities, and their respective dynamics, namely institutionalization, agglomeration, decoupling, integration, learning and (de)clicking, are discussed by Boschma (2005), Balland et al. (2015) and Werker et al. (2016).
4. In these examples, 'X' is used to preserve the anonymity of the cluster organizations.
5. See https://innovin.fr/en/ (last accessed 4 December 2022).
6. CIVB is the inter-professional council of Bordeaux Wine, a syndicate led by representatives of the wine industry (merchants, brokers, producers).
7. See note 1.
8. Section A4 in Appendix A in the supplemental data online includes the questions formulated during the interviews, by type of actor.

ORCID

Stephanie Francis Grimbert http://orcid.org/0000-0001-9295-5813
Jon Mikel Zabala-Iturriagagoitia http://orcid.org/0000-0003-1975-2555
Jacques-Olivier Pesme http://orcid.org/0000-0001-6443-7349

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Chapter 5. PAPER 2

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Collective shared value creation as emergent strategy for cluster management organizations

Stephanie Francis Grimbert
Deusto Business School, University of Deusto, San Sebastian, Spain

James R. Wilson
Orkestra – Basque Institute of Competitiveness, University of Deusto, San Sebastian, Spain

Xavier Amores Bravo
University of Girona, Girona, Spain, and

Alberto Pezzi
Agency for the Competitiveness of Business, Barcelona, Spain

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Abstract

Purpose – Cluster management organizations (CMOs) have emerged over the past few decades as intermediaries that support the competitiveness of place-based clusters of economic activity. Despite their economic origins, policymakers are now starting to experiment with a broader use for cluster policies that seeks to leverage CMOs to tackle societal challenges in approaches aligned with the concept of creating shared value (CSV). However, there remains a void in conceptual understanding around the specific roles that CMOs might play in overcoming the barriers faced by their members for CSV, which this paper aims to address. Bridging this gap presents an opportunity for cluster practitioners and policymakers in a context in which environmental and social sustainability are at the top of policy agendas.

Design/methodology/approach – Based on analysis of literature around collaborative approaches to CSV for mitigating transaction costs, the authors define the contours of a new conceptual framework for the roles that CMOs can play in fostering collective CSV. The authors illustrate how the different components of the framework are reflected in emerging cluster practice in the context of a new wave of European cluster-based projects tackling CSV elements.

Findings – The resulting framework reconciles the concepts of clusters and CSV by explicitly positioning CMOs as intermediaries for facilitating the CSV strategies of their members. CMOs embrace emergent strategy making that targets (tangible and intangible) collective CSV capabilities and addresses collective CSV challenges. Collective CSV can provide a theoretical anchor guiding future cluster policies to fully leverage the transformative potential of CMOs. This conceptual framework opens a promising empirical research agenda, particularly around evaluating the plurality of impacts of CMOs.

Originality/value – By stressing the social impact of CMOs alongside their well-understood economic impacts, and by enabling a categorization of functions that can support the monitoring of CMO activities toward collective CSV strategies, the framework provides a novel basis for inspiring further empirical research into the evidencing of these roles.

Keywords Collective CSV, Cluster management organization, Emergent strategy, Collective reputation

Paper type Conceptual paper

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1. Introduction

Cluster policies are widely used by national and regional governments to support the economic competitiveness of small and medium-sized enterprises (SMEs). They are typically operationalized by dedicated cluster management organizations (CMOs) that play an intermediary role to foster collaboration between SMEs, government and research/educational organizations. This "triple helix" policy approach has been largely oriented toward economic goals: increasing firm-level productivity and market reach through collaborative solutions to innovation, internationalization and improving the local business environment (e.g. cluster-specific infrastructure or skills).

Yet, amidst increased recognition of pressing societal challenges and the widespread adoption of the Sustainable Development Goals (SDG) framework, policymakers are starting to experiment with a broader use for cluster policies that seeks to combine economic and social goals. As such, the report of the European Expert Group on Clusters included a recommendation on "clusters addressing societal challenges" (European Commission, 2021, p. 24), and regions with well-established cluster policies such as the Basque Country and Catalonia have sought to innovate their policy support to encourage the active engagement of CMOs with the SDGs and/or with concepts such as "creating shared value" (CSV) (Porter and Kramer, 2011). What is missing, however, is a strong conceptual foundation for understanding the roles that CMOs might play to simultaneously foster the economic competitiveness of their members and create shared value that contributes to addressing societal challenges.

CSV is defined as the "policies and operating practices that enhance the competitiveness of a company while simultaneously advancing the economic and social conditions in the communities in which it operates" (Porter and Kramer, 2011, p. 6), and it has been most applied to framing the social value of large corporations. However, in concomitant work on strategic philanthropy, Kania and Kramer (2011) recognize that collective impact initiatives associating groups of actors for long-term commitments benefit from "backbone organizations" (p. 40), leading "to more effective systems and improved community outcomes" (Turner *et al.*, 2012, p. 1). Later conceptualized as an "ecosystem of shared value, whereby companies must sometimes team up with governments, NGOs, and even rivals to capture the economic benefits of social progress" (Kramer and Pfitzer, 2016, p. 81), one of the means for companies to create economic value while simultaneously creating societal value is recognized as "building supportive industry clusters at the company's locations" (Porter and Kramer, 2011, p. 7).

Despite this link between CSV and collective impact, CSV has been criticized for maintaining the self-interest of large corporations at the center of the economic system (Jackson and Limbrick, 2019). Indeed, until now, clusters have essentially been framed as an outcome of corporate-centric CSV processes, and the roles played by backbone organizations such as CMOs in facilitating the generation of collective outcomes have been largely overlooked. There is, however, recognition of the potential for clusters to support social and environmental sustainability (Belfanti and Alberti, 2022; Konstantynova and Wilson, 2017), including growing empirical research on specific cases (Alberti and Belfanti, 2019, 2020, 2021; Arena *et al.*, 2021; Bergquist and Eriksson, 2019; Collazzo Yelpo and Kubelka, 2019; Jackson and Limbrick, 2019; Pezzi *et al.*, 2021).

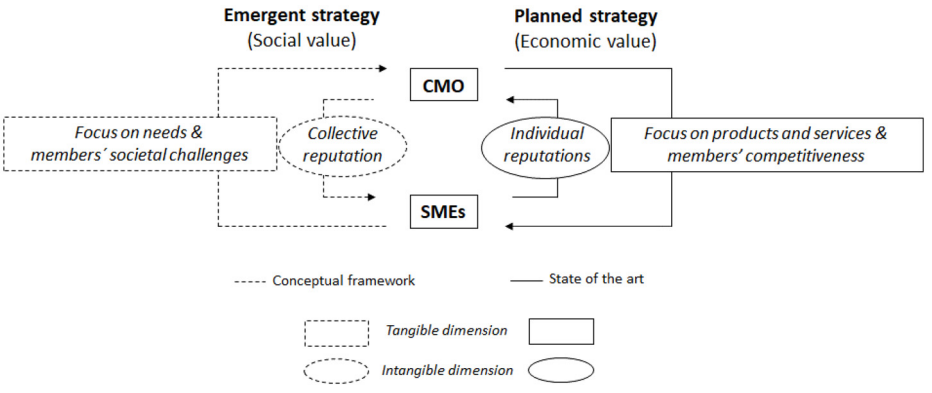
The main contribution of this paper is to respond to the gap in conceptual understanding around how CMOs – defined as triple-helix membership organizations that provide services to and facilitate collaboration among their members to improve their collective competitiveness – might help to overcome the barriers faced by SMEs in creating shared value. We develop a new conceptual framework that:

- captures the capacity of CMOs to implement an ecosystem of shared value; and
- articulates the specific roles that CMOs can play in a mutualized approach to CSV that is consistent with the needs of SMEs.

The question of how CMOs can support SMEs in generating shared value is itself framed in the context of today's grand societal challenges, most notably the challenge of transition toward sustainability. In this regard, recent research in sustainability strategy-making considers the relevance of emergent strategies for generating collaborative approaches to corporate sustainability (Luederitz *et al.*, 2021). In a corporate understanding, emergent strategy differs from planned strategy in as much as the focus is on learning from practice rather than direction and control (Mintzberg and Waters, 1985). An emergent strategy for CMOs, therefore, arises from their confrontation with pressing societal demands for sustainability, requiring them to shift from a pure focus on enhancing their members' economic competitiveness, to a wider role that also addresses these societal needs (Beschorner, 2014).

This emergent strategy, nurtured by CMO members initiating and shaping sustainable practices and projects in a geographically proximate collaborative setting (Abfalter and Piber, 2016; Rubio-Andrés *et al.*, 2022), is built on CSV opportunities that enable SMEs to differentiate themselves from conventional competitors (Schmitt and Renken, 2012) by benefitting from (and ultimately contributing to) the collective reputation (CR) (Tirole, 1996) facilitated by the CMO. The integration of planned and emergent strategy-making within CMOs, therefore, allows SMEs to align their business objectives with sustainability goals (Corazza *et al.*, 2017), using community relationships to access necessary resources (Luederitz *et al.*, 2021). Figure 1 articulates the interaction between the planned and emergent CSV strategies of a CMO and anchors the paper's conceptual contribution on "collective CSV", which we argue comprises tangible and intangible dimensions.

The paper begins with a literature review focused on collaborative approaches to CSV to mitigate CSV transaction costs. This provides the basis for defining the contours of a new concept of "collective CSV" that delimits the levers through which CMOs can contribute to supporting their members in addressing social alongside economic challenges. In the context of growing European policy interest in the wider roles for clusters, the framework is then explored through a series of empirical illustrations capturing the emergent strategies of CMOs in facilitating collective CSV. Conclusions and implications for policy and for further research are discussed in the final section.



Source: Authors' own elaboration

Figure 1. Planned and emergent strategies for collective CSV in CMOs

2. Cluster management organizations and creating shared value

2.1 Collaborative approaches to creating shared value

The concept of CSV is anchored in the competitiveness of the firm as a continuation of Porter's competitive strategy model (Porter, 1998), whereby the firm's competitive positioning benefits from solving relevant societal challenges (Beschorner and Hajduk, 2017). From the inception of their conceptual contribution linking competitive advantage and corporate social responsibility (CSR), Porter and Kramer (2006) identify three categories of social issues affecting firms and their related CSR strategies. To be valuable for business, strategic CSR should ignore "generic social impacts" and focus on "value chain social impacts" and the "social dimensions of competitive context" (Porter and Kramer, 2006, p. 6). Regarding the third category, Porter and Kramer state that "where a social issue is salient for many companies across multiple industries, it can often be addressed most effectively through cooperative models" (Porter and Kramer, 2006, p. 7), in the form of local cluster development. Hence, they envisage cluster development for CSV as a company-led initiative to "improve company productivity while addressing gaps or failures in the framework conditions surrounding the cluster" (Porter and Kramer, 2011, p. 12), stressing that success depends on the capacity to collaborate with different actors beyond the private sector. The rationale for local cluster development emerges from the firms' consideration that suppliers are missing locally, or that institutional weaknesses and community deficits create internal costs.

A few months after the publication of their article, one of the leading thinkers on industrial districts, Giacomo Becattini, replied with a cautious celebration of this "re-discovery" of the linkages between profit-driven economy and its effects on wider society from "one of the true scientific-ideological hearts of capitalism such as Boston's Harvard University" (Becattini, 2011, p. 413). Indeed, in the context of the pressing need for a new approach to sustainable competitiveness that integrates economic, social and environmental dimensions, the nexus between the concepts of clusters and CSV has the potential to "reclaim" the social and community dimensions of clusters that were heavily present in Becattini *et al.*'s analysis of Italian industrial districts but have not been prominent in the widespread application of cluster policies over the past three decades (Konstantynova and Wilson, 2017). While recognizing controversy around the conceptual thickness of CSV, whereby many business ethics scholars consider it as a mere management buzzword lacking theoretical grounding (Dembek *et al.*, 2016), and both the tension between business and society (Aakhus and Bzdak, 2012; Beschorner, 2014; Crane *et al.*, 2014) and the necessary social and political acceptance of a company's strategic decisions (Wieland, 2017), CSV has the merit of expanding "the company's obligation to shareholders to involve a broader number of stakeholders" (Rendtorff, 2017, p. 121).

Despite the recognized collaborative potential of CSV (Lee *et al.*, 2014; Berti and Mulligan, 2016; Grèzes *et al.*, 2016; Serra *et al.*, 2017; Alberti and Belfanti, 2019; Collazzo Yelpo and Kubelka, 2019), to date, the literature reconciling CSV and clusters is relatively scarce. It is mostly focused on the benefits SMEs obtain from clustering, because they tend to outperform large firms in the case of CSV related to local cluster development and stakeholder projects (Corazza *et al.*, 2017), and they particularly benefit from CSV as a differentiation strategy (Schmitt and Renken, 2012). The ultimate level of CSV engagement for SMEs is defined as a networked engagement (Lüth and Stierl, 2015), where the cluster setting is likely to provide the leverage to achieve CSV outcomes that may otherwise prove unattainable for the individual firm (Collazzo Yelpo and Kubelka, 2019). Yet, both conceptual framing and empirical evidence of CMOs actively working to enhance the CSV strategies of SMEs is lacking (Alberti and Belfanti, 2019, 2020; Camoletto and Bellandi, 2019;

Pezzi *et al.*, 2021). More fully reconciling the cluster and CSV concepts requires shifting from a bottom-up view of firms creating opportunistic CSV clusters to a systemic meso perspective that recognizes CMOs as key initiators and enablers of the conditions for SMEs to implement their CSV strategies. In this sense, Alberti and Belfanti (2020) interrogate the causal relation between cluster development and CSV and find that shared value may emerge from the collaboration dynamics within clusters, transposing to the cluster context Porter and Kramer's (2006) original intuition according to which local cluster development strengthens the link between a company's success and community success.

2.2 The mitigation of creating shared value transaction costs by cluster management organizations

The literature on the collaborative dimension of CSV highlights its natural relation to the transaction cost theory (TCT) (Acquier *et al.*, 2017; de Zegher *et al.*, 2019; Obaze, 2020; Spicer and Hyatt, 2017), with Rendtorff (2017, p. 137), noting, for example, that "CSV is only efficient within transaction cost economics and stakeholder management" (Rendtorff, 2017, p. 137). Transactions costs can be categorized into three types:

(1) the cost of finding partners;

(2) the cost of negotiating agreements; and

(3) the cost of enforcing and monitoring compliance with agreements (Shelanski and Klein, 1995).

For instance, Spicer and Hyatt (2017) provide a detailed account of Walmart's journey toward more sustainable practices, where they find that partner companies in Walmart's consortium "needed to incur transaction costs of reporting, auditing, aggregating, and communicating sustainability product information" (Spicer and Hyatt, 2017, p. 128). Consistent with the EU agenda by which value creation should be driven by the integration of stakeholder interests and resources (European Commission, 2011), CSV also requires companies to develop new norms through multi-stakeholder initiatives (de los Reyes *et al.*, 2017). In this regard, the TCT literature also considers specific coordination and transactional issues stemming from the broadening of stakeholders toward non-commercial partners rendered necessary by the identification of relevant social and environmental issues (Acquier *et al.*, 2017).

The presence of CSV-based transactions costs emphasizes the cultural and social barriers that need to be overcome beyond mere technical barriers for cooperation (Shin, 2020). Indeed, Kramer and Pfitzer (2016) acknowledge that regulations or cultural norms may limit a firm's ability to implement CSV, and that there are conditions beyond the control of firms (Menghwar and Daood, 2021), such as the issue of "intercultural difference in the local meaning of values" (Wieland, 2017, p. 14). In this regard, Camoletto and Bellandi (2019) bring an explicit territorial dimension to their definition of "communitarian shared value" (p. 5) to express the jointly reinforcing relation between company and community prosperity that reconciles "the company's profit function with the function of social utility of a place" (Becattini, 2011, p. 3). More generally, following Becattini's (2011) reading of the CSV concept and adopting a TCT perspective, cluster initiatives themselves represent a place-based approach to CSV that can be oriented toward mitigating transaction costs, as CMOs are situated somewhere between market transactions and the internal corporate hierarchies developed to manage resources without the costs of market transactions (Valdaliso and Wilson, 2015; Konstantynova and Wilson, 2017).

Similar to the specific governance structures that alleviate transaction costs at the corporate level (such as joint ventures, long-term contractual relationships, etc.), CMOs have the potential to act as a governance mechanism for SMEs CSV challenges. To pursue collective goals, SMEs are required to make strategic decisions about alliances and partners and to determine their level of contribution to cooperative efforts (Spicer and Hyatt, 2017). CMOs can compensate for the institutional voids, which lead companies to internalize CSV-related transaction costs (Spicer and Hyatt, 2017), by putting in place "mechanisms such as transparency, collaboration, trust, commitment, vertical integration, and information sharing (...) that safeguard against negative outcomes such as opportunism and the defection of relationships" (Obaze, 2020, p. 553). For a successful collaborative approach to CSV, CMOs therefore should provide strong and legitimized leadership at the local level, identify the existence of common social and environmental problems to be managed at the cluster level and ensure cooperation with external actors to evaluate CSV commitment and initiatives via local multi-stakeholder committees (Battaglia *et al.*, 2006).

3. A conceptual framework of collective creating shared value

3.1 Defining tangible and intangible collective creating shared value

According to Porter and Kramer (2011), CSV can be focused on reconceiving products and markets, redefining productivity in the value chain, and/or enabling local cluster development. Inverting the third channel for CSV, we suggest that the cooperative environment created by CMOs (and the policies supporting them) can facilitate the development of projects that assist SMEs in generating shared value, including in the first two channels. This leads us to extend the concept to one of *collective CSV*, defined as: the strategic integration of the social dimensions of the competitive context through CMO-led practices that mutualize tangible and intangible CSV for their SME members, fostering the adaptation of the framework conditions surrounding the CMO.

Adapting earlier work by Alcalde-Heras and Carnelli (2019) on CSV ecosystem functions and Tirole (1996) on CR, we identify a series of levers through which CMOs can stimulate the cumulative growth of tangible and intangible collective CSV capabilities (Figure 2).

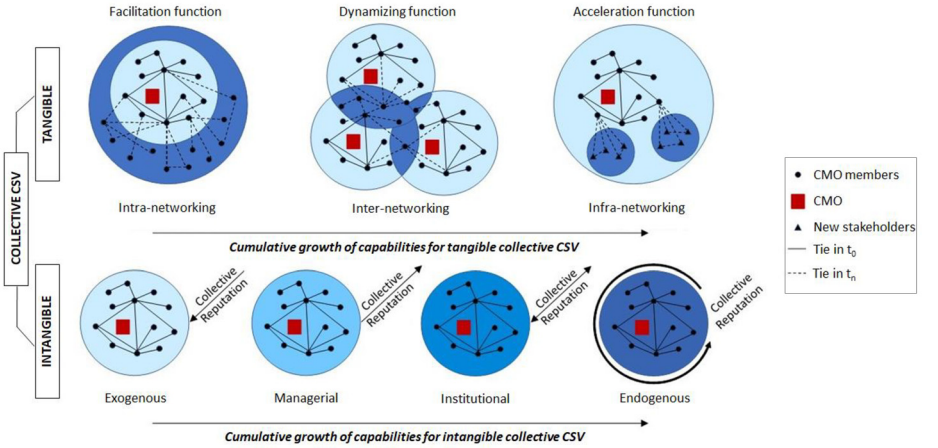


Figure 2.
Tangible and intangible collective CSV in CMOs

Source: Authors' own elaboration, based on Tirole (1996) and Alcalde-Heras and Carnelli (2019)

Tangible collective CSV capabilities refer to the networking functions of CMOs, aimed to address their members' societal challenges alongside their economic competitiveness. Intangible collective CSV capabilities accrue to the reputational aspects of CMOs, whereby the mutualistic effects of the networking are supported by the CMO's CR (see Grimbert *et al.*, 2023 for an extensive discussion on how CMOs encompass both tangible and intangible proximities).

3.1.1 Tangible collective creating shared value: facilitation, dynamizing and acceleration. The transitions literature points to the role of innovation intermediaries such as CMOs for accelerating environmental sustainability transitions (Mignon and Kanda, 2018; Kivimaa *et al.*, 2019; Kanda *et al.*, 2020), through their work at three levels of intermediation (Kanda *et al.*, 2020). Intermediation occurs at the level of the network by mobilizing members who develop a common strategic vision (*intra-networking*); in between networks by aggregating the resources and competences of different networks that share a common agenda to pursue higher-level objectives beyond the reach of the individual networks (*inter-networking*); and finally, in-between actors, networks and institutions to ensure the appropriation of benefits beyond those involved in networks to the society as a whole, thereby translating higher-level policy objectives to local stakeholders (*infra-networking*). In what we define as "tangible collective CSV," CMOs can support the transition from a desire among SMEs to develop CSV strategies into operational feasibility. Following Alcalde-Heras and Carnelli (2019), they can do this by performing the three functions depicted in the top half of Figure 2: facilitating, dynamizing and accelerating.

Facilitation function – intra-networking: Addressing complex societal challenges requires improving both the structure of networks and the individual roles played by firms and other stakeholders in those networks (Molina-Morales and Martínez-Cháfer, 2016). Path dependency can lead to intermediary organizations such as CMOs gradually becoming "simple service suppliers instead of valuable networking arenas" (Molina-Morales and Martínez-Cháfer, 2016, p. 879), with informational asymmetry encouraging conformist choices and opportunistic behaviors (Suire and Vicente, 2016). However, CMOs have the potential to play a more impactful facilitation role, providing the skills and processing abilities to support the wider acquisition, assimilation, transformation and exploitation of knowledge relevant for CSV strategies. In this regard, the topological characteristics of clusters influence their social capital as well as their ability to develop relations, and CMOs should seek to reach optimal network topology (Choi *et al.*, 2013) by designing relevant collaborative incentives for firms (Crespo *et al.*, 2016), facilitating the identification of common interests between firms and technology centers (Etxabe and Valdaliso, 2016) and connecting peripheral with core organizations to create network structures (Crespo *et al.*, 2016). Moreover, the bridging behaviors of knowledge gatekeepers or other central actors in clusters, either because of their strong knowledge base or their multiple connections (Etxabe and Valdaliso, 2016), should be nurtured in such a way as to facilitate learning and knowledge formation processes that are not just locally relevant but also regionally and globally connected (and hence connect with the dynamizing and acceleration functions set out below).

Dynamizing function – inter-networking: As intermediaries between SMEs operating in key parts of the economy and other relevant research, training and government organizations, CMOs can give consistency to shared leadership for the design and development of a territorial strategy (Larrea *et al.*, 2017), within which the individual firms' CSV strategies can be positioned. This requires empowering CMOs at the operational level (Aranguren *et al.*, 2016), by recognizing their role in the promotion of inter-cluster collaboration, both within and beyond the territory. Inter-regional cooperation creates important opportunities as regards unrelated variety and knowledge

spillovers (Content and Frenken, 2016) that can be important for the feasibility of CSV strategies, and evidence from practice shows that inter-cluster networking benefits shared value projects (Marsé *et al.*, 2015). In this sense, thematic inter-regional partnerships can benefit regions by allowing them to access resources, skills, knowledge and capabilities and by creating cross-border value chains.

Acceleration function – infra-networking: As socio-economic entities that bridge firms, people and communities in specific locations, clusters are at the heart of the process of change affecting society. CMOs can therefore play a key role in endogenizing processes of economic democracy by linking cluster firms with wider community actors, thus accelerating experimentation with CSV initiatives and new, sustainable models of competitiveness. For example, CMOs can promote micro-networks that enhance the inclusiveness of end users, such as co-working spaces that produce additional variation within the producer-user context and create new knowledge about resource combinations (Capdevila, 2014; Eklinder-Frick, 2016). As such, one of the five policy recommendations for innovation networks in the European Commission's current research and innovation framework program is "building innovation infrastructure to promote informal networking opportunities" (Morisson and Pattinson, 2020, p. 13). This has been stressed again in the recent POINT Report, which underlines the importance of prosumers (technologically, environmentally or socially progressive consumers) in shaping demand and the necessity to take them into account in a holistic review of the opportunities for industrial transitions (En, 2020). The actions of CMOs in facilitating learning by using has so far been neglected in the "Doing-Using-Interacting" (DUI) literature, which only considers facilitators within the scope of the firm (Alhusen *et al.*, 2021). Because SMEs preferentially implement DUI mode innovation activities, CMOs can also play the role of external facilitators for SMEs within the cluster network, hence widening the scope of DUI from the micro to the meso level and linking it with CSV opportunities.

3.1.2 Intangible collective creating shared value: collective reputation. In parallel with the three tangible functions of CMOs in supporting collective CSV among their members, the bottom half of Figure 2 sets out an intangible function that relies on embracing and endogenizing the dynamics of CR (Tirole, 1996), thereby implying a shift from creating shared *value* to creating shared *values*. Tirole (1996) defines CR as determined by individual reputations as well as shaping them and displaying a strong history dependence. In other words, expectations are self-fulfilling (Levin, 2009), meaning that individual behaviors tend to comply with the CR. The CR of CMOs can create a strong incentive for SMEs not only to adhere in the long term to the cluster, but most importantly to conform to its standards to avoid exclusion. In turn, SMEs would benefit from this intangible collective CSV, because CR acts as a hedging tool to cover reputational risks, as well as leveraging horizontal differentiation from competitors.

Concomitantly to CMO strategies progressively integrating planned (competitiveness) and emergent (CSV) aspects, the CR of a CMO goes through an evolutionary process, which we depict in four-phases, leading ultimately to self-fulfillment. CR is first implemented externally by the original stakeholders who decide to create the CMO as a reflection of the planned strategy (*exogenous*). The CMO then becomes responsible for its deployment and improvement through its communication strategy (*managerial*), before seeking institutional recognition through, for instance, the provision of external quality labels (*institutional*). Finally, CR truly serves its purpose in terms of intangible collective CSV when individual firms conform to the standards set by the CMO and collectively contribute to their improvement (*endogenous*). Here, the learning process within the cluster is critical in developing and nurturing over time a mentality oriented toward creating collective goods

and sharing knowledge and resources (Boneu *et al.*, 2016), thus shaping the future visions and expectations of the CMO members in the context of a collective CSV strategy.

3.2 Cluster management organization functions, activities and services for addressing collective creating shared value challenges

While the framework proposed in Figure 2 articulates the different tangible and intangible roles that CMOs can play in fostering collective CSV among (and indeed beyond) their members, the next step is to be more explicit on how CMOs can address collective CSV challenges. In their study on the implementation of strategic CSV in global value chains, Acquier *et al.* (2017) identify three types of economic costs: organizational costs due to the transformations of productive processes; transaction costs of redesigning contractual arrangements with business partners; and cooperation costs for identifying and reaching agreement with secondary stakeholders. They also highlight the presence of behavioral threats related to value chain members seeking a disproportionate distribution of investment and profit. In Figure 3, we explore how these collective CSV challenges can be tackled by the CMO functions developed in the previous section, themselves being operationalized into specific function-related activities, which are supported by the transversal services typically offered by CMOs.

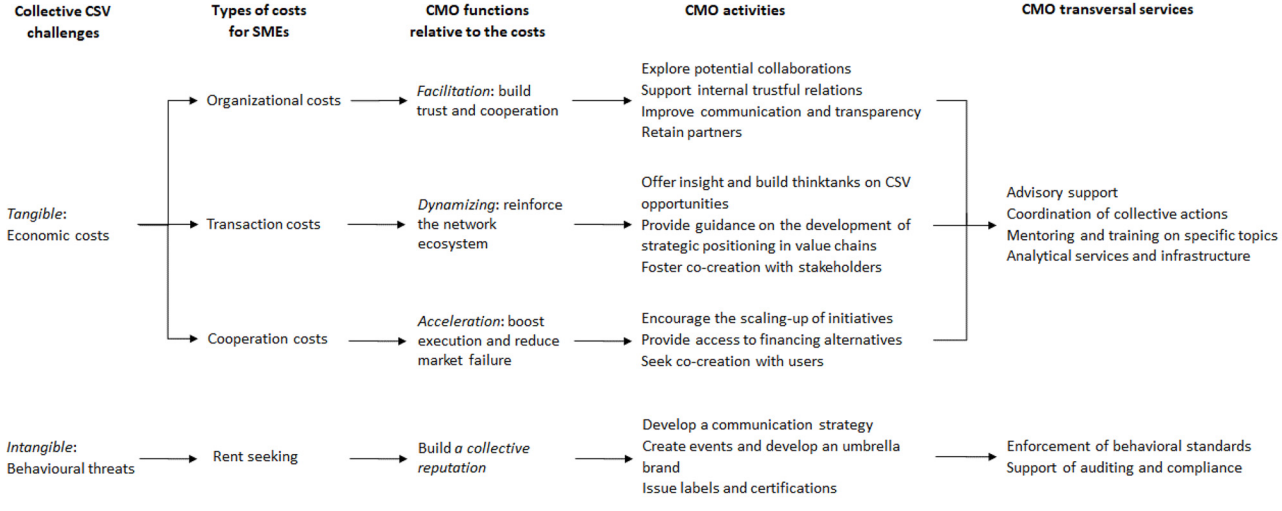
First, the *facilitation function*, developed through intra-networking, can address organizational costs by focusing on creating trustful relations between the cluster actors and encouraging the sharing of knowledge for discovering CSV opportunities. These interactions can serve to "unite partners around mutual interests, share motivations, strengths and weaknesses to identify under which basis collaboration can be developed" (Pezzi *et al.*, 2021, p. 75). Arriving at common ground regarding which issues to address collectively requires exploring potential collaborations, encouraging exchanges of ideas by promoting communication and transparency between CMO members and retaining partners by ensuring their continuous participation.

Second, the *dynamizing function*, fostered through inter-networking, provides a response to transactions costs by easing access to external knowledge and strategic positioning in value chains for CMO members. CMOs can encourage their members to make use of co-creation mechanisms to reconceive products and markets and redefine productivity in their value chains and to broaden their networks toward the inclusion of science and technology-based collaborations with agents that are not necessarily present locally, such as for instance research centers and universities.

Third, the *acceleration function*, promoted by infra-networking beyond the cluster network and into wider society, seeks to mitigate cooperation costs from such outreach by "counterbalancing resource limitations and reducing risks of market failure that firms could have upon the implementation of a CSV strategy" (Pezzi *et al.*, 2021, p. 75). In particular, CMOs can provide an incubating environment by attracting actors providing specific services and financial support to improve the scalability of initiatives. Accelerating also implies sourcing valuable information for developing or improving products that "helps reduce risks and lead times of product development while enhancing flexibility, product quality, and market adaptability" (Pezzi *et al.*, 2021), by allowing co-creation spaces with users.

Finally, collective CSV also generates behavioral threats stemming from rent seeking by CMO members, and this requires careful consideration of the distribution of the investments required to implement collective CSV, and of the value that is collectively created. By adopting collective CSV as an emergent strategy, CMOs engage in building a CR "continually formed and solidified by both the cluster initiatives' management and the cluster members" (Mauroner and Zorn, 2017, p. 307). A multi-stakeholder management of the CR is necessary

Figure 3.
Collective CSV challenges and related CMO functions, activities and services



Source: Authors' own elaboration based on Acquier *et al.* (2017) and Alcalde-Heras and Carnelli (2019)

for ensuring the adherence of CMO members, and this can be operationalized for example through a communication strategy engaged in the creation of events, brand building and the provision of labels and certifications (Grimbert *et al.*, 2023).

4. Leveraging clusters for creating shared value: emerging European cluster policy trends

The framework set out in the previous section reconciles the concepts of clusters and CSV by explicitly positioning CMOs as intermediaries for facilitating the CSV strategies of SMEs. They do so by developing strategies that target (tangible and intangible) collective CSV capabilities and address collective CSV challenges. While this is a departure from the ways in which the concepts have previously been treated in the literature, where cluster development has typically been viewed as an outcome of CSV strategies, it has nevertheless been anticipated by emerging policy practice in Europe.

Catalonia was one of the pioneers in developing a dedicated cluster policy during the 1990s, and the policy today is implemented in partnership with around 30 CMOs in a wide range of different industries. Since 2015, there has been a systematic attempt to integrate the shared value concept, through:

- a retrospective analysis of past collaborative projects at cluster level to identify initiatives that included a CSV component;
- training offered to CMOs and their members on the CSV concept; and
- pilot projects based on a methodology for identifying the potential of clusters to generate shared value through specific projects (Pezzi *et al.*, 2021).

For example, Pezzi *et al.* (2021) provide a detailed analysis of three cases – CMOs in the fields of water, automotive and sustainable energy – and find that a wide range of projects have emerged to build more sustainable competitiveness models for cluster firms, based on a legacy of past and existing collaborative dynamics.

More generally, at the European level, there has been acknowledgment of the potential for CMOs to leverage their members toward social and environmental sustainability challenges (European Commission, 2021, Franco *et al.*, 2021). While not yet explicitly integrated in European cluster policy programs, Amores Bravo (2020) has identified almost 30 cluster projects across different European programs that have elements of CSV. Cluster projects are a suitable unit of analysis to illustrate the framework developed in the previous section, because they are led by CMOs and oriented to specific challenges or issues faced by cluster actors, which may (or may not) contain elements of CSV.

The European Commission's Horizon 2020 "Innovation in SMEs" (INNOSUP) program is particularly relevant in this regard because it is one of few programs where CMOs are direct beneficiaries and the objectives of the program calls – promoting new value chains, developing circular economy or silver economy, reducing water and energy usage and so on – clearly have a CSV dimension. We have undertaken a systematic analysis of the funded INNOSUP-1 projects that were completed by 2021 to identify those that involved CMOs as a core partner and tackled issues related to CSV outcomes from the perspective of the third channel to CSV, enabling local cluster development. Seven out of the 13 completed projects meet these criteria, and are presented in Table 1, which highlights how the objectives of each project can be interpreted according to the proposed functions of CMOs in generating collective tangible CSV (facilitation, dynamizing, acceleration), alongside the dissemination activities of CMOs contributing to collective intangible CSV.

Table 1.
Collective CSV in INNOSUP-1 projects

INNOSUP project	Sector	CMO members of the consortium (country)	Objectives of the project (*tangible collective CSV*) Facilitation	Dynamizing	Acceleration	Dissemination of the project (*intangible collective CSV*)
NEPTUNE	Blue Growth	Aerospace Valley (France), Corallia (Greece), MLC ITS Euskadi (Spain), Parco Tecnologico Padano (Italy), Pôle Mer Mediterrannée (France), Space PL (Poland), Eurecat (Spain), Water Innovation Accelerator (Sweden)	• Support the creation of fertile regional ecosystems (smart specialization strategies) that provide the framework conditions for supporting and funding the emergence of collaboration actions between SMEs and between the cluster partners	• Enhance the development across Europe of new value chains in the Blue Growth industries through a systematic approach providing entrepreneurship and innovation support to individual and groups of SMEs in the three target areas • Offer SMEs the opportunity to extend their markets worldwide	• Support the development of large-scale demonstrators for Blue Growth • Foster the creation or the improvement of market ready technologies, products (goods and services) or the improvement of production processes with the reduction of raw material consumption • Deliver a methodology for facilitating the identification of market trends and project ideas emergence in an inter-cluster, cross-border and cross-sectoral collaboration-driven context	Logo website: neptune-project.eu Communicaton kit Press releases Social networks
SUPERBIO	Biomass	Flanders Biobased Valley (Belgium), Corporacion Tecnologica de Andalucia (Spain), Polish Technology Platform on Bioeconomy (Poland), Toulouse White Biotechnology (France)	• Create open collaboration spaces for SMEs, LEs and other stakeholders in the bio-based economy	• Identify new industrial value chain concepts maximizing the benefits of the EU business and citizens • Construct highly promising, disruptive and sustainable new industrial value chains by selection of synergistic groups of SMEs, LEs and other stakeholders and providing a diverse, stepwise and comprehensive innovation support program that enables to efficiently and optimally validate the new value chains and to bring them closer to the market	• Implement new value chains, production of drop-in chemicals and products or the production of new chemicals and products with improved features. It can lead to investments in dedicated industrial production sites for the new value chains eg. through ESIF funds and therefore be a leverage for re-industrialization of the EU using innovative technologies	Logo website: h2020-superbio.eu Press releases Promotional videos
INNOLABS	Personalized e-health	Norway Health Tech (Norway), Berlin Partner for Business and Technology (Germany), Campania Bioscience (Italy), Eurob Creative (Spain), Cap Digital (France), Biotecyl (Spain), Health Cluster Net (UK), Interizon (Poland)	• Allow better and more effective remote interaction with health-care staff	• Prompt value chain innovation and industrial transformation in the health-care sector	• Empower patients, allowing them to remain healthier longer and carry treatments in a more independent manner, find better treatment/diagnosis solutions	Logo website: innolabs.io Press releases Promotional videos

(*continued*)

Table 1.

INNOSUP project	Sector	CMO members of the consortium (country)	Objectives of the project (*tangible collective CSV*) Facilitation	Dynamizing	Acceleration	Dissemination of the project (*intangible collective CSV*)
INCluSilver	Personalized nutrition for the silver sector	Danish Food Cluster (Denmark), Agropolis International (France), Corallia (Greece), Innoskart (Hungary), Skane Food Innovation Network (Sweden), Distretto Agroalimentare Regionale (Italy), Asociación Clúster Alimentario de Galicia (Spain)	• Support cooperation between firms in the value chains of agrofood, IT, health and creative industries	• Get an access to new markets through cross border cooperation	• Soft financing that supports SME's to develop/market/scale up innovations to the market and to the point where investments in equity, venture and risk capital can be obtained. Work together with customers	Logo website: inclusilver.eu Press releases
Cross4Health	Patient-centered personalized care	Norway Health Tech (Norway), Aerospace Valley (France), Biotecyl (Spain), Eurob Creative (Spain), Zenit (Germany), Innovation Skane (Sweden), Health Cluster Net (UK)	• Involve a very large range of healthcare stakeholders: SMEs participating in the acceleration programs	• Support innovative SME-led projects, which leverage technology and know-how from aerospace, energy and creative industries sectors for the benefit of personalized health care	• Develop new solutions; end-users, hospitals, municipalities who have helped identify the most pressing needs in the sector; service providers; expert evaluators and jury members; and the consortium partners themselves	Logo website: final.cross4health.eu Press releases Promotional videos
C-VoUCHER	Circular economy	Lifestyle and Design Cluster (Denmark), Blumorpho (France), FundingBox (Poland), Foreningen Made (Denmark)	• Generate new cross-sectoral and cross-border value chains with a circular economy approach	• Combine industrial value chains (agrofood, health, sea industries, textile and manufacturing) with enabling technologies (digital, hybrid and engineering) through design thinking concepts	• Produce a "Circular Design Toolkit for Regions" to mainstream the methodology in other EU regions	Logo website: c-voucher.com Press releases Social networks
VIDA	Water and energy efficiency for the food sector	Aragón Innovaliment (Spain), BalticNet-PlasmaTec (Germany), Clean (Denmark), ZINNAE (Spain), Food-Processing Initiative (Germany), Lombardy Energy Cleantech Cluster (Italy), Nanoprogres (Czech Republic), Stichting Water Alliance (Netherlands), Sociedade Portuguesa de Inovação (Portugal)	• Increase collaborative working across sectors and EU borders. Increase access by SMEs to KETs and other new innovative technologies and applications	• Reinforce existing value chains involved in the project • Create new industrial value chains leading to emerging industries	• Encourage emerging industries, including patent applications	Logo website: vidaproject.eu Communicaton kit Press releases Social networks

Source: Table by authors

5. Conclusions

In a context in which environmental and social sustainability are at the top of policy agendas, CMOs are beginning to leverage their collaborative capital to play important roles in facilitating green transition and contributing to social innovation. Consequently, there is a need to ground the value proposition of CMOs in a theoretical framework that highlights the functions and capabilities necessary for transition toward sustainable competitiveness models. This is particularly important to frame and analyze the emerging contributions of CMOs to the development of their regions beyond the purely economic rationale that has characterized cluster policies until recently (Konstantynova and Wilson, 2017). In proposing a framework that reconciles the cluster and the CSV concepts to make the role of CMOs explicit in fostering what we term "collective CSV," this paper provides conceptual foundations that support a pluralistic approach to cluster policy analysis, which can in turn provoke reflexive learning around the adoption of systemic innovation approaches that encompass social and environmental goals.

In this paper, we have brought together different strands of relevant literature to articulate such a framework and illustrated how its different components are reflected in emerging cluster practice in Europe. The main limitation of this research approach is that it only provides a conceptual starting point for enabling a deeper understanding of the roles that CMOs play and could play in practice as regards contributing to grand societal challenges. A consolidated operationalization of tangible and intangible collective CSV requires further in-depth study and, specifically, an evaluation framework. This is particularly important because CMOs increasingly need to legitimize their actions to secure their sustainability in a fast-changing competitiveness policy environment. This involves going beyond the simple transposition of corporate business models to CMO management and requires adopting a tailored approach for developing specific CMO business models. The framework developed here, by stressing the social impact of CMOs alongside their well-understood economic impacts, and by enabling a categorization of functions that can support the monitoring of CMO activities toward collective CSV strategies, provides a conceptual basis for inspiring further empirical research into the evaluation and evidencing of these roles.

The evaluation of cluster policies is indeed widely acknowledged as challenging due to their complex effect logic and an underlying rationale – to overcome the obstacles to collaboration – that overlaps with other policies and responds to a market failure that has little concrete empirical evidence (Graf and Broekel, 2020; Wilson *et al.*, 2022). As such, the rationale for CMOs to generate "behavioral additionality" is a fuzzy concept whose veracity is under-analyzed in practice (Gök and Edler, 2012), in part due to the constraints of available methodologies. For example, while the use of social network analysis (SNA) is recognized as central to study the dynamics of network structures in space (Ter Wal and Boschma, 2009), and can help assess the role of supporting organizations and intermediate outputs such as collaborative projects, it cannot draw conclusions on their real economic (or social) benefits (Schmiedeberg, 2010). Much day-to-day evaluation practice among cluster policymakers and practitioners, therefore, is focused on monitoring either the operational policy framework in place to support cluster collaboration or the day-to-day management of cluster initiatives. It gives only limited insights as regards the impacts of the policies or initiatives and often fails to adequately capture more qualitative elements, such as the essential role of trust-building and leadership, that are argued to be essential for successful clusters (Smith *et al.*, 2020).

The measurement of CSV also has acknowledged limitations, with calls for a better understanding of the means through which it is created, its outcomes in terms of meeting

social needs and the beneficiaries of the outcomes (Dembek *et al.*, 2016). While some attempts have been made to construct an ecosystem of SV by mapping the CSV concept into system components (Yang and Yan, 2020), little attention has been given to establishing a shared measurement system, despite it being one of the key features identified by the authors who introduced the ecosystem of SV concept (Kramer and Pfitzer, 2016). To do so effectively, it is helpful to adopt a multi-level and transformative evaluation perspective (Aranguren *et al.*, 2017), with the beneficiaries of the outcomes of CSV concomitantly at the micro and macro levels, and the facilitating role of intermediaries such as CMOs the focus of attention at the meso level.

Tailored approaches or "one size fits one" policies (Crespo *et al.*, 2016) are necessary to account for heterogeneity in regional and industrial context and to avoid lock-in situations stemming from routinized behavior. Diagnoses of existing relational structures should be systematically implemented to improve the knowledge base of CMOs (Crespo *et al.*, 2016) and reduce resistance to change and path-dependency among the networks facilitated by them (Choi *et al.*, 2013). As place-based organizations, bridging between clusters is a source of path creation potentialities (Lucena-Piquero and Vicente, 2019), with CMOs considered as "transition intermediaries" that can support the diffusion, improvements and institutional reforms needed for accelerating innovation and new path development (Kivimaa *et al.*, 2019). In line with the trailblazing contribution of Alberti and Belfanti (2020), we contend that collective CSV can provide a theoretical anchor guiding future cluster policies to fully leverage the transformative potential of CMOs.

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Corresponding author
Stephanie Francis Grimbert can be contacted at: stephanie.grimbert@opendeusto.es

Chapter 6. PAPER 3

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Stephanie Francis Grimbert, Jon Mikel Zabala-Iturriagagoitia & Ville Valovirta

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Transformative public procurement for innovation: ordinary, dynamic and functional capabilities

Stephanie Francis Grimbert [a,b], Jon Mikel Zabala-Iturriagagoitia [a,b,c] and Ville Valovirta [d]

[a]Deusto Business School, University of Deusto, Donostia-San Sebastian, Spain; [b]CIRCLE, Lund University, Lund, Sweden; [c]USN School of Business, South-Eastern University Norway, Kongsberg, Norway; [d]VTT Technical Research Centre of Finland, Espoo, Finland

ABSTRACT

Public Procurement for Innovation (PPI) requires multiple roles from the public administration according to the problem-solution space, delineated by the level of consensus around the definition of the needs of the contracting authority and the potential solutions to address them. Each role involves a distinct mix of capabilities, which we categorize as ordinary (i.e. doing things right), dynamic (i.e. doing the right things) and functional (i.e. addressing functional challenges). Following a Mutual Learning Exercise with procurement officials of 15 European countries, we identify 45 capabilities for contracting authorities to embrace the different facets of PPI as a transformative policy instrument.

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KEYWORDS Public procurement for innovation; problem-solution space; capabilities; functional procurement; transformative effects

Introduction

One of the main factors hindering the effectiveness of innovation policies is the lack of capabilities at the administrative level (El-Taliawi and van der Wal 2019; Haque et al. 2021; Obwegeser and Müller 2018), which is the level at which policies are implemented (Magro, Navarro, and Zabala-Iturriagagoitia 2014). While the literature has provided evidence about the aspects influencing the management of innovation at the corporate level (e.g. Felin et al. 2012; Teece, Pisano, and Shuen 1997), 'insufficient attention has been paid to where the equivalent level of public-sector capacity comes from and its dynamic evolution over time' (Mazzucato and Kattel 2020, 260). As argued by Borrás (2011), Mazzucato and Kattel (2020), Haque et al. (2021) or McLaren and Kattel (2022), identifying strategic capabilities is necessary to avoid policy failure, which may emerge due to weak administrative capacity.

The uncertainty associated with our current high-velocity environments requires leaving space for experimentation in the public sector as a necessary condition for the emergence of innovative behaviours and innovations (Demircioglu and Audretsch 2017; Huitema et al. 2018; McFadgen and Huitema 2018).[1] As stated by Mazzucato

CONTACT Jon Mikel Zabala-Iturriagagoitia jmzabala@deusto.es

(2018a), the role of the public sector should evolve 'from fearing failure to welcoming experimentation' (p. 807), with key organizational agents implementing 'the necessary institutional reforms when confronted by shocks' (Boschma 2015, 743). Accordingly, capabilities need to be continuously reconsidered and rebuilt (Farazmand 2009) for governments to innovate in their organizational and managerial structures (Wu, Ramesh, and Howlett 2015). In particular, innovation policy needs to be very responsive to adapt to changing needs and to provide an agile response (Labory and Bianchi 2021; Pablo et al. 2007). As expressed by Borrás et al. (2023) in the context of sustainability transitions, the transformative capacity of public sector organizations is conditioned by their capabilities, along their internal and external assets and their institutional roles.

Within the large variety of policy instruments that can be used for higher societal purposes, either from the supply or the demand side (Borrás and Edquist 2013; Edler and Georghiou 2007; Flanagan, Uyarra, and Laranja 2011), public procurement has been recognized as one of the most powerful to stimulate innovation, to enhance competition and to achieve societal transformation (Edler 2023; Grimbert and Zabala-Iturriagagoitia 2023). However, despite this potential, public organizations find many challenges when implementing these policy interventions (Edler and Yeow 2016; OECD 2017b), mainly due to the presence of routines that may have been adequate in the past, but do not allow procurement to be adapted to the new and changing demands of high-velocity environments. There is increasing evidence (Edquist and Zabala-Iturriagagoitia 2021) suggesting that public procurement is perfunctorily conducted, meaning that its process follows certain patterns and organizational routines by the force of habit (i.e. 'because this is the way procurement has always been done') (Piening 2013).

The paper aims to identify the capabilities that are needed on the public side to reap the full transformative benefits of Public Procurement for Innovation (PPI), as one of the demand-side policy instruments with the largest potential to promote innovation (Edquist and Zabala-Iturriagagoitia 2015; Edquist, Hommen, and Tsipouri 2000). While previous research (Georghiou et al. 2014; Uyarra et al. 2014; Valovirta 2015) has explored the barriers to PPI from a suppliers' perspective, a gap exists as to the capabilities required on behalf of contracting authorities. The extant literature points out that the acquisition of off-the-shelf goods requires relatively limited in-house competence (Rothwell and Zegveld 1981), but that the more complex the demanded systems are, the higher the required skills on the public side to encourage suppliers to innovate and meet their needs (OECD 2011; Yeow, Uyarra, and Gee 2015). Edquist and Zabala-Iturriagagoitia (2021) suggest, for instance, that the use of functional specifications (as opposed to technical ones) in the formulation of the procurement documentation is best suited to foster adaptive routines and to stimulate innovation, but that the specific implementation challenges relative to functional procurement need to be further explored.

To identify the necessary capabilities for the management of PPI, we rely on the information gathered from a Mutual Learning Exercise (MLE) on PPI coordinated by the European Commission, which started in January 2017 and was concluded in March 2018. The participants in the MLE were public officials working in public procurement agencies and contracting authorities of 15 European countries. Within the context of this MLE, 29 focus groups were developed, each of them with 33 participants. Using grounded theory as a methodological approach (Glaser and

Strauss 1967), our findings shed light on the different phases of the PPI cycle. Given the acknowledged potential of functional procurement to tackle grand challenges, we specifically discuss the functional challenges identified during the MLE for each phase of the PPI cycle. We identify 45 capabilities for the management of PPI which we classify, building on Teece's taxonomy of capabilities (2020), into ordinary (i.e. doing things right), dynamic (i.e. doing the right things) and functional (i.e. addressing functional challenges).

The paper contributes to the literature on public management by considering PPI from both a substantive and a procedural policy tool standpoint (Bali et al. 2021; Capano and Howlett 2020; Demircioglu and Vivona 2021), thereby assuming that PPI holds transformative potential beyond its outcomes, in its ability to increase the quality of the demand formulated by contracting authorities. We conceptualize the transformative effects of PPI according to the multiple roles played by contracting authorities in the problem-solution space, fostering innovation in the public sector and providing an agile response to the targeted societal needs. With this paper, we therefore also contribute to the practice of public management by addressing the concerns of Saussier and Tirole (2015), who argue that it is necessary to increase the professionalization of contracting authorities by developing capacity-building for civil servants in charge of the management of PPI.

The remainder of the paper is organized as follows. Section 2 discusses why PPI, in order to tackle grand challenges, requires specific capabilities in the public sector. Section 3 explains the context in which the data for the empirical part of the paper were gathered, and the methodology followed. Section 4 identifies the sets of capabilities required at the different stages of the PPI cycle as the main findings. Finally, Section 5 concludes by presenting the contributions of the paper to theory and to the practice of public management, and by proposing potential avenues for further research.

Literature review

The motivation for this paper is situated at the junction between the recognized ability of PPI to tackle grand challenges, and the literature on dynamic capabilities in the public sector. One of the foundations of missions' thinking is creating cross-sectoral spillovers, which is best achieved when the process of innovation remains open and cross-disciplinary (Mazzucato 2018b). This in turn requires, among other instruments, new forms of public procurement such as PPI, recognized for its fundamental role in societal transformation (Edquist and Zabala-Iturriagagoitia 2012). However, the level of complexity of the PPI process becomes more stringent based on the different types of intermediation expected from contracting authorities (Edler and Yeow 2016; Rainville 2021), and therefore requires corresponding capabilities.

The transformative potential of PPI

The fundamental turn that missions' thinking represents in the redefinition of innovation policy as a state-led market-shaping tool (Mazzucato 2018a), leads to identifying new types of institutional capacities (Penna et al. 2021) and appropriate intervention strategies via policy-mixes for their successful implementation (Hekkert et al. 2020). A policy-mix can include instruments from both a supply and a demand side (Borrás and Edquist 2013; Flanagan, Uyarra, and Laranja 2011). According to Edquist and Zabala-

Iturriagagoitia (2015, p. 156), 'supply-side policy instruments address those determinants that intend to increase the operative efficiency of markets and industries'. In turn, demand-side innovation policies are defined as 'a set of public measures to increase the demand for innovations, to improve the conditions for the uptake of innovations or to improve the articulation of demand in order to spur innovations and the diffusion of innovations' (Edler and Georghiou 2007, 952). For the public sector to foster societal transformation requires broadening the scope of the policy-mix towards instruments such as public procurement (Larrue 2021; Robinson and Mazzucato 2019) because missions transcend the traditional borders between policy domains (Janssen et al. 2020).

PPI can play a fundamental role as an instrument of demand-side policy (Edler and Georghiou 2007; Edquist and Hommen 1999; Edquist and Zabala-Iturriagagoitia 2015; Edquist, Hommen, and Tsipouri 2000) with unexploited benefits in terms of fostering societal transformation (Neij 2001; Wesseling and Edquist 2018), sustainability (van Berkel and Schotanus 2021) and circularity (Grimbert and Zabala-Iturriagagoitia 2024; Rainville 2017, 2021) at the national (Uyarra and Flanagan 2010) and subnational levels (Uyarra et al. 2020; Zabala-Iturriagagoitia 2022). However, public procurement is a very conservative area of public policy (Selviaridis, Hughes, and Spring 2023). Public procurers need to follow strict rules and regulations, not only to provide stability to the public administration but also to control potential threats to corruption. Besides, these procedures are difficult to be digitalized and human intervention is needed, which renders the previous point of following strict rules and regulations necessary. In this regard, a tension/challenge emerges: public procurers need to follow open and transparent processes while also exploring new alternatives to create the conditions for the emergence of innovations to provide (unknown) solutions to (known) wicked problems. Since contracting authorities cannot predict where innovations may occur, functional requirements can facilitate the emergence of novelty, by widening the scope of possible sources of innovation. Such functional procurement, defined by Edquist and Zabala-Iturriagagoitia (2021) as when a public agency buys functions that provide solutions to problems, avoids the lock-in that has been traditionally associated with public procurement by encouraging suppliers to experiment for responding to a concrete societal need.

Uyarra et al. (2020) identify that contracting authorities can play different roles within a four-dimensional problem-solution space (see Table 1). This problem-solution space is defined according to the nature of the problem (i.e. divergent or convergent problem statements) and the nature of the solution (i.e. whether there are

Table 1. Roles of contracting authorities and types of PPI.

		Nature of solution space	
		Solution unclear or contested	Consensus about solutions
Nature of problem space	Demand poorly articulated or fragmented	Role: Purchaser of R&D Type of procurement: Pre-Commercial Procurement	Role: Catalyst Type of procurement: Catalytic PPI
	Clearly identified and agreed upon needs	Role: Lead-user Type of procurement: Direct PPI (functional specifications)	Role: Broker Type of procurement: Innovation-friendly procurement (product specifications)

Adapted from Uyarra et al. (2020, 4) and Edquist and Zabala-Iturriagagoitia (2021).

divergent or convergent views of innovative solutions) (Wanzenböck et al. 2020). When there is deep uncertainty both about the nature of the demand and the potential solution, the public sector can play a 'purchaser' role to support the development of basic R&D. This can be achieved through the use of Pre-Commercial Procurement (PCP). PCP is defined as 'a process by which public authorities. . .can steer the development of new technologically innovative solutions' (European Commission 2006, 2). A 'catalyst' role can be instrumental when the public sector aims at spreading the solutions to the broader public, in order to consolidate the demand. In this regard, catalytic procurement occurs when 'the purchased innovations are ultimately used exclusively by the private end-user' (Edler and Georghiou 2007, 954). Acting as a 'broker' implies that since the problem-solution constellation is well-defined, the public sector can implement innovation-friendly public procurement advertised with product specifications. According to Knutsson and Thomasson (2014, 245), this refers to the ability of contracting authorities to enlarge the market for a certain type of product or service or to change the market structure by making it attractive for new entrances. Finally, acting as a 'lead user' (von Hippel 1986) can be desirable in the cases in which the large purchasing power of the public sector can contribute to the creation of a new market (what was referred to by Dalpé et al. (1992) as a first user of innovations), with the use of direct PPI advertised with functional specifications (Edquist and Zabala-Iturriagagoitia 2021).[2]

These multiple scenarios are however particularly demanding for the contracting authority, which tends to adopt by default a market-type of governance for the procurement process. The appropriate type of governance for more complex transactions should be a non-market trust-based one (Rokkan and Haugland 2022), with a certain continuity aimed at fostering 'contract memory' and 'bargaining power of the public party' (Saussier and Tirole 2015, 11). If not, the risk of conformist behaviours may impair the transformative potential of PPI, which is contingent to several factors, ranging from the governance and regulatory framework to the operationalization of the PPI process (Wesseling and Edquist 2018). In particular, functional procurement affects the way the procurement is advertised in terms of specifications and the way the procurement process is executed (Edquist and Zabala-Iturriagagoitia 2021). As a result, contracting authorities face implementation challenges when moving from procurement based on product specifications to functional specifications, the focus lying in the needs to be addressed rather than on the potential solutions that may solve them (i.e. the 'what' rather than the 'how'). The needs are then translated into functions, and those functions presented to potential suppliers as requirements.

Capabilities in the public sector

One of the criticisms raised in the literature is that public procurement tends to be 'perfunctorily conducted' (Edquist and Zabala-Iturriagagoitia 2021, 600), the public sector therefore not acting as a 'demanding and intelligent customer' (Uyarra et al. 2014, 640). Even though the 2014 EU directives (European Union 2014) have relaxed the rules governing public procurement contracts and contribute to encouraging (re)negotiations at various stages of the procurement process (Saussier and Tirole 2015), the capacity of contracting authorities to achieve mission-related objectives is still under scrutiny, if not dismissed. The reasons for this are the 'asymmetries of information and contractual incompleteness' (Saussier and Tirole 2015, 1) inherent to

PPI contracts, which entail transaction costs ranging from planning and procedure costs to negotiation and conflict settlement costs.

The nexus between transaction costs and the (dynamic) capabilities needed to address them was demonstrated by Teece in the context of private firms (Teece 2020), where they 'must coexist in a theory of the boundaries of the firm' (p. 1078). In other words, private firms are expected to adapt to market evolutions by reassessing their contracting needs and opportunities. The related transaction costs depend on the organizational capabilities of the firm, which in this evolutionary perspective ought to be dynamic capabilities. Similarly, contracting authorities being confronted to several scenarios (as identified in section 2.1), this requires public officials and civil servants not only to develop certain capabilities but also to keep those capabilities updated so as to adapt to rapidly changing contexts. This is the starting point which has motivated the transposition of the famous theory on dynamic capabilities (Teece 2016) in the context of the public sector (Kattel and Mazzucato 2018; Mazzucato and Kattel 2020; Pablo et al. 2007; Trivellato, Martini, and Cavenago 2021). Accordingly, Gullmark (2021) defines ordinary capabilities as those enabling 'organizations to achieve high levels of efficiency' and dynamic capabilities as those that 'satisfy valuable, rare, imperfectly imitable, and non-substitutable criteria and enable an organization to strategically change' (p. 511).

As discussed by Mazzucato and Kattel (2020, 257), capabilities in the public sector are defined as the set of skills and resources 'necessary to perform policy functions, from the provision of public services to policy design and implementation'. For example, Borrás (2011, 729) distinguishes between administrative (i.e. ability to develop, direct, and control resources to support the discharge of public policy and programme responsibilities), analytical (i.e. use and command of techniques of policy analysis) and reflexive and institutional capabilities (i.e. ability to make informed reflections about the problems and solutions regarding state – economy – society relations in innovation and technology diffusion processes). For the public sector to effectively address societal challenges, McLaren and Kattel (2022, 24) propose that the policy capabilities required for transformative societal missions include: strategic navigation, coordination (internally and across external networks) and embedding learning and reflexivity, a view shared by Borrás et al. (2023) in the context of sustainability transitions.

Mazzucato and Kattel further identify 'the dynamic capabilities needed in the public sector to engender mission-oriented policies' (2018, 797) such as leadership, broad engagement, coordination, experimentation, and evaluation. However, they argue later that these capabilities tend to be narrow and focus on the stability of the public sector (i.e. continuity, transparency, predictability of services, and interventions) (Mazzucato and Kattel 2020, 260). Indeed, public organizations are more or less prone to developing dynamic capabilities due to a number of underlying features such as their degree of publicness, their level of environmental turbulence and their path dependency (Gullmark 2021; Piening 2013). According to Piening (2013, 214), 'the historical development of an organization, learning barriers and micropolitics' create resistance to change, which reflects a lack of adaptation to an evolving context and entails maintaining capabilities that no longer serve their purpose, which in the private sector is expressed as 'negative evolutionary fitness' (Helfat et al. 2007).[3] On the contrary, investing in dynamic capabilities with a long-term perspective 'provides sources of agility and responsiveness during deep crises and their aftermath' (Mazzucato and Kattel 2020, 265).

Empirical setting and methods

The paper relies on the information gathered from an MLE on PPI coordinated by the European Commission, which started in January 2017 and ended in March 2018. The MLE tackled the following topics that emerged from a previous consultation that the European Commission had made to the 15 participating member states, according to their needs as regards PPI policy (European Commission 2015): (i) Developing strategic frameworks, (ii) Capacity-building; (iii) Financial mechanisms; and (iv) Monitoring, evaluation and impact assessment. These four topics were developed in several workshops carried out in Brussels (Belgium), Den Haag (the Netherlands), Frankfurt (Germany), Madrid (Spain) and Vienna (Austria).

Within the scope of these workshops, 29 focus groups were developed (see Appendix 1) with the participation of procurement officials. Each focus group lasted between 30 and 45 minutes. The 33 participants in the MLE (Appendix 2) joined all workshops, and therefore, all focus groups. During the focus groups participants were distributed over five tables. Each table was managed by one of the experts engaged in the MLE, which were nominated by the European Commission. Throughout the MLE, procurement officials were easily accessible, and were eagerly engaged in collaboration for research purposes.[4] The conclusions of the MLE were validated by all participating contracting authorities, as well as the European Commission in the final workshop that closed the MLE, and which took place in Brussels (Belgium) in February 2018.

Given the paucity of knowledge on the capabilities needed to exploit the transformative potential of PPI, we chose to apply the grounded theory method (Glaser and Strauss 1967). Grounded theory enables researchers to discern patterns within the data, identify pertinent themes, and establish relationships between them. This methodological approach is built upon two key concepts: 'constant comparison', in which data and theory are continuously contrasted throughout the data collection and analysis process, and 'theoretical sampling', in which the theory under construction determines which data should be collected next (Suddaby 2006). The 'organic process of theory emergence' (Ibid., p.634), which characterizes grounded theory, is thus embedded in the progressive refinement of the conceptual categories chosen for their relevance to the reality being observed, in a logic of analytical induction defined as 'a double fitting or alternative shaping of both observation and explanation' (Katz 1983, 134). The appropriateness of grounded theory is here reinforced by the intimate knowledge of the authors with the line of theoretical research under scrutiny and their enduring relationship with the participants of the MLE over several months, a long-standing connection which therefore explicitly becomes part of the consequent conceptualization (Strauss and Corbin 1998).

In the context of a research study employing a grounded theory approach, focus groups can serve as a valuable and robust methodology for gathering qualitative data. Focus groups, characterized by their interactive and group-oriented nature, align seamlessly with the principles of grounded theory. By bringing together participants who share common experiences or characteristics, focus groups facilitate dynamic discussions, encouraging participants to express their thoughts, opinions, and experiences openly. This group dynamic often leads to rich, spontaneous, and diverse data, capturing a wide array of perspectives and viewpoints. Through open-ended questions and group interactions, focus groups enable researchers to delve deeply into the participants' lived experiences, beliefs, and attitudes, which are fundamental aspects

of grounded theory research. Moreover, the social context of focus groups can reveal nuanced interactions and social phenomena that might not be evident in individual interviews or surveys (Charmaz 2006).

The minutes of all the focus groups were taken by various participants. Upon completion of transcription, each researcher, working autonomously, identified segments of text pertinent to the fundamental inquiries of the study (Auerbach and Silverstein 2003), relative to the capabilities needed on the public side to reap the full transformative benefits of PPI. Subsequently, the researchers convened to compare and contrast their individual conceptual categories, their uniformity attesting to the consistency and reliability of the analysis. This has enabled us to discriminate these capabilities according to their ordinary or dynamic nature, consistently with the literature on PPI (Valovirta 2015). This distinction follows the description made by Teece in his tribute to Nobel Laureate Oliver Williamson (Teece 2020) between ordinary capabilities as 'doing things right' and dynamic capabilities as 'doing the right things'.

A third conceptual category emerged from the focus groups, consisting in the functional challenges associated to the PPI process. Functional challenges were identified as such when they could be related to the specific use of functional specifications within PPI. While ordinary and dynamic capabilities are transversal to the different roles played by contracting authorities in the problem-solution space, functional capabilities are paramount in a 'lead user' type of context, for which direct PPI based on functional specifications applies (see Table 1). As there is no prior reference to these functional capabilities in the extant literature, we conducted individual interviews with the focus group participants who had identified such functional challenges to validate inferred functional capabilities.[5] Accordingly, we deduct functional capabilities providing a response to these functional challenges, and define them as 'addressing functional challenges'. As argued by Lambert and Loiselle (2008, 230) 'individual interviews and focus groups also may be combined for the purposes of data completeness and/or confirmation', which can be understood as triangulation, since 'the data obtained by one method are anticipated to corroborate those acquired with the other' Lambert and Loiselle (2008).

Findings

We emulate Demircioglu and Vivona (2021), who consider that public procurement can be considered alternatively a substantive and a procedural policy tool (Bali et al. 2021; Capano and Howlett 2020), depending on 'whether the intention of the procurement affects outside of an organization (substantive tool) or inside the organization (procedural tool)' (Demircioglu and Vivona 2021, 383). Hence, we consider the transformative effects of PPI in the light of both its expected substantive effects (i.e. the outcome relative to the type of procurement) and procedural effects (i.e. the capabilities depending on the role of the public administration). We define the transformative effects of PPI as both substantive and procedural, according to the multiple roles played by contracting authorities in the problem-solution space.

From this procedural perspective, we depict an idealized PPI cycle as a four-phase process requiring related capabilities. It should be noted that each of these four phases entails the conduit of a set of activities (see Edquist et al. 2015; Talebi, Rezania, and Bragues 2022). We follow the taxonomy introduced by Teece (2020), who defined ordinary capabilities as 'doing things right' and dynamic capabilities as doing the right

things'. We introduce functional capabilities as those 'addressing functional challenges' associated to the PPI process, according to the experiences gathered by the participants in the MLE. This section lists the whole set of the necessary capabilities for the management of PPI, according to their nature (i.e. ordinary, dynamic and functional) and the phase of the PPI cycle. As it may be noted, the capabilities comprise resources, structures and processes. They do not only refer to analytical capabilities, as they are not just a matter of mastering a bundle of methodological techniques, but rather a whole organizational context where these are unfolded interactively (Borrás 2011, 728).

For example, to clarify unmet needs and missing solutions (i.e. phase 1), contracting authorities can either rely on their own resources (i.e. ordinary capability), engage in participatory processes (i.e. dynamic capability), or translate technical specifications into functional ones (i.e. functional capability) (see Table 2). A practical illustration could be the following. A contracting authority releases a tender specifying the need for a soundproof solid wall barrier to be installed along a highway, due to the high decibel level in the surroundings (i.e. doing things right). When the contracting authority consults the civil society, this may lead to the tender being enriched with other additional requirements, such as the aesthetic (i.e. visual) impact of the wall or the use of sustainable materials in its manufacturing (i.e. doing the right things). More ambitiously, the contracting authority could decide to spell out the tender in functional terms, by setting a maximum level of decibels produced by the highway, which would open solutions (i.e. a silent asphalt) that top the performance of the wall (i.e. addressing functional challenges). We consider that the finer level of granularity of capabilities identified in our findings can help contracting authorities in the prioritization of their efforts, and most importantly, in realizing the full transformative potential of PPI after adequate capacity-building.

Phase 1: clarifying unmet needs and missing solutions

The first phase consists in clarifying unmet needs and missing solutions, which requires 'cross-over' communication capabilities between users and procurement professionals, the execution of market analysis and early market engagement and testing of solutions.

> There is a need to look beyond engagement of procurement professionals to users and end users in order to uncover the genuine needs. We have worked at the federal level to do this by engaging all levels, from inter-ministerial, to sector leads and so on. (Workshop C, participant 12)

For phase 1, the functional challenges identified are: the tendency for end-users to prescribe solutions instead of formulating functional requirements; their risk-averse behaviour, which leads to privilege the certainty provided by performance requirements instead of functional requirements; their preference for well-known standard products, or well-known products in technical terms; and the lack of time or experience to formulate functional requirements.

> Getting to the need and defining it is a puzzle and not an easy task. Knowing what you want is not trivial. Customers need to know what they want and this takes time and cooperation between departments. The lack of time and coordination is a barrier. Thinking in terms of what we need not how the need is met requires a change in mind-set at the specification and the contract monitoring stage. (Workshop B, participant 19)

Table 2. Capabilities for PPI (i).

Phases of the PPI cycle	Ordinary capabilities	Dynamic capabilities	Functional capabilities
1 Clarifying unmet needs and missing solutions	Need identification and definition	Participatory need identification and definition	Translation of the need into functional requirements
	Identification of solutions in the market	Elaboration of early demand maps	Creative dialogues to define the function to be met (i.e. functional specifications)
	Pre-competitive market dialogues with suppliers	Broadening the scope of potential suppliers through intermediaries	– Build supplier relationships while respecting procurement norms of fairness and non-discrimination – Include users as stakeholders in early engagement dialogues to increase acceptance of new prospective solutions

Authors' own elaboration.

Phase 2: developing a PPI strategy

The second phase, developing an innovation procurement strategy, calls for coordinating the distributed PPI responsibilities, as well as providing a convincing pro-innovation-procurement argumentation based on calculations (e.g. life-cycle costing) without prohibiting the use of functional specifications (see Table 3).

> Our operative goals include: political commitment, coordinating innovation procurement at the federal level, raising awareness, fostering dialogue between demand and supply, setting a monitoring and benchmarking system. (Workshop D, participant 1)

> It is difficult to know whether to go for PCP or PPI ex-ante. Finding the answer to this question is central, the rest is quite instrumental. Sometimes you may go for PCP thinking there is no solution available in the market, and then, during the market consultation you notice there are various technological solutions available. The opposite can also happen, meaning, that you believe there are solutions available and decide for PPI when there are actually none, and previous R&D is required. (Workshop E, participant 27)

The main functional challenge hampering the development of phase 2 is related to the limited ability to establish competitive dialogues and to bring external expertise, which poses a particular challenge in the case of functional procurement, since the solution to be procured is still to be developed (see Table 3).

> Public entities require a better understanding of the effective use of the various procurement procedures and the adequate formulation of the tenders, of how to deal with the innovation related risks, of how to get internal (top-management) as well as external (politics) backing. Politicians require a better understanding of the overall societal and long-term benefits of innovation procurement. Further stakeholders (professional procurement agencies, research institutions, etc.) require support in effectively communicating with each other in order to better deal with issues such as coping with risks, acting co-creative, clarifying IPRs and eventually achieving co-operatively optimal innovation procurement results. (Workshop A, participant 10)

Table 3. Capabilities for PPI (ii).

Phases of the PPI cycle	Ordinary capabilities	Dynamic capabilities	Functional capabilities
2 Developing a PPI strategy	– Understand the government's market power to drive innovation – Master the different procurement procedures available (e.g. competitive dialogues, innovation partnerships, pre-commercial procurement)	Understand the government's market power to influence the structure of the supply-side	Understand the government's market power to drive societal transformation
	Develop administrative interfaces between areas of public policy beyond procurement (finance, education, R&D, taxes . . .)	Create inter-organizational horizontal and vertical cooperation to bundle the demand of common needs (nationally and internationally)	Integrate and balance innovation goals with other societal objectives
	Minimize the legal risks of the contracting authority	Manage technological risks associated with the innovation for both the contracting authority and the suppliers	Anticipate the current and future public, private and societal risks associated with the developed solution
	Ensure the integration of the developed solution with existing technical systems and organizational practices of the public sector	Facilitate the adaptation of public sector technical systems and organizational practices to new solutions	Promote the acceptance of innovations among users by communicating their societal benefits, and elaborate a diffusion strategy

Authors' own elaboration.

Phase 3: executing the PPI process

The third phase, executing the innovation procurement process, demands an effective use of procurement procedures, approaches and technical (functional) specifications, but also continuous dialogues during the negotiations between procurers and suppliers, and the ability to divide the tender into smaller lots to incentivize the (potential) participation of smaller firms (see Table 4).

> Our agency collects needs from public bodies, converts them into functional needs, launches calls for grants to address these needs, and provides financial incentives. (Workshop B, participant 2)

In phase 3, as evidenced by the still timid use of intermediaries in the procurement process, the lack of interaction between the suppliers and the procuring organizations challenges the execution of the PPI process in functional terms.

> We need to build capabilities to define functional procurement. Procurers do not know how to write specifications, in terms of functional needs, so that acts as a barrier for the translation from regular procurement to PPI.(Workshop C, participant 27)

Table 4. Capabilities for PPI (iii).

Phases of the PPI cycle	Ordinary capabilities	Dynamic capabilities	Functional capabilities
3 Executing the PPI process	Monitor the execution of the PPI cycle to reduce deviations	– Continuous interaction and competitive dialogue with bidders to facilitate the execution of the PPI cycle – Raising the awareness of bidders on the existence of an ecosystem of public institutions supporting PPI	– Co-generation of functional solutions requiring organizational changes in both contracting authorities and economic operators (e.g. products as services) – Pilot testing with final users
	Evaluation of bidders (MEAT criteria)	Systemic evaluation of solutions through life cycle costing methods	– Evaluate solutions using functional performance requirements – Embrace trial and error as part of the necessary experimentation by measuring the intent rather than the outcome
	Guarantee the provision of the developed solution to the contracting authority	Manage IPR in a way that enables exploitation of the developed solution by suppliers	Provide feedback to economic operators following the use of the functional solution leading to IPR reformulation

Authors' own elaboration.

Phase 4: using learnings for future PPI

Finally, the fourth stage, relative to the use of learnings for future procurements, relies on the capacity to evaluate the extent to which the contracting authority is satisfied, and the identified societal need addressed.

> Contracting authorities need to market their services. It's a sort of internal lobbying for PPI. They need success stories where PPI worked to convince other public authorities for further uptake. Guidelines are provided but potentially, these guidelines can be improved with good examples from other countries. (Workshop C, participant 18)

> We might be monitoring/evaluating process, programs, policies, projects or organizations to see if the financing/resourcing being applied is being used well or being effective, as well as to extract learning to improve future actions. (Workshop D, participant 11)

The conclusion of the PPI cycle in phase 4 poses specific functional challenges in terms of evaluating and comparing the extent to which the proposed solutions address the specified need; this evaluation challenge is related to the limitation of the functional space by norms, standards, interoperability, and (internal) regulations of contracting authorities (see Table 5).

> To measure PPI we need to involve various stakeholders from different administrative levels, which adds complexity, not only for the sake of gathering data, but also for the data to be defined and a common understanding to be built. Not having a central procurement agency also makes the acquisition of data difficult. (Workshop D, participant 5)

> It is important to address challenges rather than focusing on concrete technologies in future calls. The more open the calls are, the larger the margin they open for innovation. The European Commission aims to be technology neutral instead of pushing/stimulating concrete technologie. (Workshop E, participant 8)

Table 5. Capabilities for PPI (iv).

Phases of the PPI cycle	Ordinary capabilities	Dynamic capabilities	Functional capabilities
4 Using learnings for future PPI	Assess the degree of fulfilment of the identified need by the developed solution	Assess the diffusion to other clients, users or export markets	Assess the externalities created (or avoided) by the developed functional solution
	Implement e-procurement platforms which include all project records	– Ability to acquire, validate, manage, use and analyse large-scale data and analytics of suppliers – Ability to translate evaluation results to policymakers so these new insights can be considered in the policy definition process	– Ensure current and future public value creation through public data sharing – Forecast the weaknesses of suppliers and communicate possible corrective actions to other areas of public policy
	Launch a new PPI cycle based on currently identified needs and existing solutions	Anticipate future needs through forecasting	Elaborate a continuous involvement of the civil society in the definition of future functional needs

Authors' own elaboration.

Discussion and conclusion

The new generation of innovation policy scholars is raising awareness about the specific challenges posed in terms of public management, ranging from the multi-translation process of missions (Wittmann et al. 2021) and the multi-level stakeholders involved (Wanzenböck and Frenken 2020) to the complexity of the problem-solution space (Uyarra et al. 2020), those challenges having yet to be transposed to the instruments of the policy-mix. In the case of public procurement, contracting authorities are expected to develop strategic capabilities for enhancing their procurement practices consistently with the target 12.7 of the UN Sustainable Development Goals 'to promote public procurement practices that are sustainable in accordance with national policies and priorities', particularly in the European context (European Commission 2018; OECD 2017a, 2020). In line with the focus of this special issue, we adopt here a procedural perspective to PPI (Bali et al. 2021; Capano and Howlett 2020; Demircioglu and Vivona 2021), given the disproportionate number of prior studies acknowledging its substantive dimension (see for instance Edquist and Zabala-Iturriagagoitia 2015; Edquist, Hommen, and Tsipouri 2000). We aim at providing contracting authorities with an actionable framework for embracing the transformative effects of PPI, based on the capabilities identified in Section 4. Our contribution can therefore help ministries, procurement agencies and contracting authorities to roll out effective and targeted capacity-building programmes, which will lead to the professionalization of civil servants in charge of the management of PPI.

The literature on PPI has tackled the adequacy of the public procurement procedures to achieve innovation outcomes, the barriers to participation in PPI initiatives, particularly from the supply side, the risks associated to PPI and how to handle them, and the means to evaluate PPI practices. In all of the above cases, capabilities are needed to overcome those barriers, bypass those risks, follow the procurement process, or apply the procurement procedures in the most effective way. However, the literature

falls short in adopting a public management perspective to the necessary capabilities for PPI, which bears the risk of encouraging conformist product procurement over riskier forms of public procurement using functional specifications. As expressed by Edquist and Zabala-Iturriagagoitia (2021), a faulty public management of risk averse behaviours may 'lead to lack of renewal and to lower quality of the services offered by the procuring organizations' (p. 600), a gap we intend to address by contributing to the literature on the public management of PPI.

In the context of wicked challenges, for which the views on the needs to be tackled and the potential solutions addressing these can be either convergent or divergent (Wanzenböck et al. 2020), contracting authorities can adopt multiple roles for which different types of PPI are suitable (see Table 1). We define the transformative effects of PPI in this problem-solution space, which embraces both the transformative potential of PPI in its outcomes and in its ability to build innovative capacity in the public sector. Based on the information gathered from a MLE on innovation procurement coordinated by the European Commission between 2017 and 2018, we identify 45 capabilities that are necessary within the public sector to effectively deliver transformative PPI. These capabilities, which we classify into ordinary (i.e. doing things right), dynamic (i.e. doing the right things) and functional (i.e. addressing functional challenges), constitute a mix which may vary according to the role of the contracting authority. Additional research is however needed to further elucidate how the problem-solution space may influence the relative share of each of the three categories of capabilities.

The MLE being the empirical setting for the paper, for which grounded theory was applied, entails associated strengths and limitations. On the one hand, we would like to emphasize the opportunity provided by the MLE to gain access to primary sources about the state of capacity-building at the European level in terms of PPI. On the other hand, we recognize that the number of observations per country were limited, both as regards the number of participants and the time frame in which the study was conducted (2017–2018 only), which is not representative of the diversity of contexts that can be found in a country. This limitation is particularly relevant in countries where the competences are to a great extent subnational, for which the roles that contracting authorities can adopt within the problem-solution space may introduce regional divergences. However, we believe that the results provided in the paper may be generalizable, as they include the opinions of experts directly engaged in the administration of PPI programmes in 15 European countries, therefore accentuating the external validity of our research. The framework included in this paper can also be of interest for supranational organizations such as the European Commission and the OECD, or intermediary organizations such as the Sustainable Procurement Platform, the European Assistance For Innovation Procurement, or Procura+ European Sustainable Procurement Network, to name a few, which aim to facilitate the implementation of public procurement in its different forms (i.e. sustainable, circular, innovation-related).

We acknowledge that multiple stakeholders are involved in the context of PPI (e.g. ministries, contracting authorities, regional governments, municipalities, coordinating services and competence centres), which may also belong to different levels (i.e. national, regional, local, political, administrative, operational). Depending on their goals and roles, their required capabilities may be different. Hence, we contend that the relevance and adequacy of the capabilities identified in this paper may vary across levels of public administration (Haque et al. 2021; Talebi, Rezania, and Bragues 2022).

Further research could thus explore the alignment between the capabilities identified in this paper and the different stakeholders and administrative levels in which these should be present, and confirm that the identified capabilities reflect the realities of procuring organizations. We also consider that more case studies are needed to find out whether additional capabilities may be necessary for each of the phases of PPI. From this procedural perspective, another promising avenue for further research could be the impact that artificial intelligence and large language model developments can have on all stages of the PPI cycle.

Finally, we would also like to emphasize the potential of products as services for transformative PPI, as they could entail benefits in terms of effectiveness (quality of the service delivered by the public sector), efficiency (reduction of the risk assumed by the public sector), competitiveness and technological sophistication of the supply side. This shift from ownership to usership has implications for the way in which PPI could be conducted and on the outcomes of public procurement for public authorities and for society (e.g. higher efficiency and effectiveness, cost reduction, lower environmental impact due to lower needs in terms of manufacturing). Usership epitomizes the transformative potential of PPI, since the public sector does not have to own a particular good or service, but rather needs to provide the utility of that good or service to society, regardless the origin of the ownership. It is nothing new to the public sector, as buildings, machines, vehicles etc. are frequently sourced through rental agreements instead of purchasing. However, the uptake of products as services in public procurement calls for reconsidering the dimensions included in the problem-solution space, potentially adding a short term/long term and an ownership/usership dimension. As argued in the paper, the more complex the role expected from the public sector, the higher the need for functional capabilities. In particular, products as services open up the possibility for contracting authorities to use rental contracts for validating functional solutions, to manage a value chain of service providers and technology developing subcontractors and their respective interests, and more generally to apply to the practice of PPI some lessons from performance contracting. Additional evidence is thereby needed in relation to the potential offered by products as services to achieve transformative outcomes.

Notes

1. As Mazzucato (2017, p. 18) argues 'innovation is extremely uncertain, [hence] the ability to experiment and explore is key for a successful entrepreneurial state. Therefore, a crucial element in organizing the state for its entrepreneurial role is absorptive capacity or institutional learning'.
2. See Edquist and Zabala-Iturriagagoitia (2021) for an extensive discussion on product procurement and functional procurement.
3. As defined by Piening (2013, 216) 'evolutionary fitness measures how well a dynamic capability enables an organization to make a living by creating or modifying its operational capabilities'.
4. The topics to be discussed in the focus groups were suggested by participants prior to each session, enabling participating countries to pre-identify topics of interest for mutual learning. The European Commission compiled these proposed topics and formulated session agendas, disseminating them to participants in advance, allowing for potential revisions if necessary.
5. Appendix 1 details the topics discussed during the interviews and the interviewees. Each interview lasted on average 20'.

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ORCID

Stephanie Francis Grimbert http://orcid.org/0000-0001-9295-5813
Jon Mikel Zabala-Iturriagagoitia http://orcid.org/0000-0003-1975-2555
Ville Valovirta http://orcid.org/0009-0007-6496-4596

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Appendix 1. Workshop topics, locations and dates addressed in the MLE

Workshops	Focus groups	Topics of the follow-up interviews	Locations	Dates
A. PPI: state of the art in research and in policy	1. Strategic framework for PPI, and action plans 2. The role of national coordinating services and competence centres in supporting contracting authorities 3. Awareness raising on PPI	– Broadening stakeholder participation in early market dialogues to identify and define needs in functional terms, and in the evaluation process (Participants #10, 28, 32) – Outcomes of PPI, addressing societal needs and promoting societal acceptance (Participants #10, 28, 32)	Brussels (Belgium)	19 January 2017
B. Developing a strategic framework for PPI	4. Strategic Frameworks for PPI and PCP 5. Functional procurement and functional specifications 6. The set-up of organizations and institutions for PPI 7. Risk aversion and mitigation	– Defining functional specifications and their relative weight among evaluation criteria (Participants #19, 21) – Risk management (Participants #12, 32)	The Hague (the Netherlands)	23 March 2017
C. Capacity-building for PPI	8. A policy perspective on PPI capacity-building 9. A competence centre perspective on PPI capacity-building 10. Challenges and experiences related to capacity-building 11. Type of procurement requiring specific capacity-building 12. Capacity-building actors, activities and addressees 13. Tacit knowledge and the role of intermediaries in PPI 14. Capacity-building experiences on project basis 15. Capacity-building and political back-up	– Capacity building for functional procurement (Participants #9, 10, 13, 18, 25, 27)	Frankfurt (Germany)	31 May – 1 June 2018

(*Continued*)

(Continued).

Workshops	Focus groups	Topics of the follow-up interviews	Locations	Dates
D. Measurement, evaluation and monitoring of PPI	16. Towards a framework for the evaluation of PPI and PCP 17. State of play on the measurement of PPI at the OECD and EU levels 18. National innovation procurement initiatives and measurement systems 19. Monitoring and evaluation: barriers and set-ups 20. Capabilities needed to set-up and run monitoring and evaluation exercises of PPI	– Monitoring as a driver of PPI effectiveness (Participant #24) – Assessing the societal impact of PPI (Participant #1, #31) – Data sharing (Participant #5) – Forecasting (Participant #19)	Vienna (Austria)	20–21 September 2017
E. Financial and other enabling incentives and resources for PPI	21. The nature and rationale of PPI and PCP financing at the national level 22. Financing and incentives for PPI and PCP at the national level: European experiences 23. Financing and incentives for PPI and PCP at the national level: experiences from outside Europe 24. European Financing for PPI and PCP: rationale, experience, success factors and challenges 25. How European programmes support national agendas and how this could be enhanced 26. Management of PPI through a network of concerted centres 27. Challenges and success factors for PPI and PCP financing	– The market power of governments (Participants #10, 22, 24, 28) – The role of the European Commission in market shaping (Participants #4, 8, 9)	Madrid (Spain)	28–29 November 2017

(*Continued*)

(Continued).

Workshops	Focus groups	Topics of the follow-up interviews	Locations	Dates
F. Final conclusions	28. Main lessons learned during the MLE and their policy implications 29. Areas that need further discussion and exploration to consolidate PPI in Europe	–	Brussels (Belgium)	13 February 2018

Source: author's own elaboration.

Appendix 2. Participants in the MLE

	Country	Representatives	Responsibility
1	Austria	1. Federal Ministry for Transport, Innovation and Technology	1. Management of the innovation procurement platform
		2. Federal Ministry for Digital and Economic Affairs	2. Formulation of procurement strategies
2	Belgium	3. Innoviris, Brussels Institute for Research and Innovation	3. Responsible for the Living Labs Brussels strategy
		4. Innoviris, Brussels Institute for Research and Innovation	4. Legal advisor for the finance of scientific research and innovation
3	Estonia	5. Ministry of Economic Affairs and Communications	5. Executive officer for Procurement of Innovation
		6. Enterprise Estonia	6. Manager for building innovation procurement ecosystems
		7. Enterprise Estonia	7. Director of the innovation procurement support scheme
4	France	8. Ministry of Economy and Finance	8. Project manager for digitalization and procurement
		9. State Purchasing Directorate	9. Head of innovation, strategic sourcing and SME
5	Germany	10. Federal Association for Supply Chain Management, Procurement and Logistics	10. Management of the national competence centre for innovative procurement
		11. Federal Association for Supply Chain Management, Procurement and Logistics	11. Head of the national competence centre for innovative procurement
		12. Federal Association for Supply Chain Management, Procurement and Logistics	12. Management of the national competence centre for innovative procurement
6	Greece	13. Ministry of Economy and Development	13. General Director of Public Procurement
		14. Directorate general for public contracts and procurement	14. Legal advisor for innovation procurement
7	Latvia	15. Ministry of Economics	15. Head of the innovation policy division
		16. Ministry of Finance	16. Head of Procurement and Material Resource Management Division
8	Lithuania	17. Ministry of Education and Science	17. Head of department for public procurement
		18. Agency for Science, Innovation and Technology	18. Manager of public procurement projects

(*Continued*)

(Continued).

	Country	Representatives	Responsibility
9	Netherlands	19. PIANOo, Expertise Center for Public Procurement	19. Coordinator of innovation-oriented procurement
		20. Ministry of Economic Affairs	20. Policy advisor on public procurement
10	Norway	21. Agency for Public Management and eGovernment	21. Director for innovation procurement
		22. Ministry of Trade and Industry	22. Legal advisor for innovation policy
		23. Innovation Norway	23. Project manager for public procurement of innovation
11	Portugal	24. Portuguese National Innovation Agency	24. Coordinator of the competence centre for innovation procurement
		25. Portuguese National Innovation Agency	25. Coordinator of SME innovation and internationalization
12	Slovenia	26. Directorate for Public Procurement. Ministry of Public Administration	26. Legal advisor for innovative public procurement
13	Spain	27. Ministry of Economy, Industry and Competitiveness	27. Legal advisor for the finance of scientific research and innovation
		28. Ministry of Economy, Industry and Competitiveness	28. Technical adviser for public procurement for innovation
		29. Ministry of Economy, Industry and Competitiveness	29. Deputy assistant director general for innovation development
		30. Ministry of Economy, Industry and Competitiveness	30. Legal advisor for public procurement for innovation
14	Sweden	31. National Agency for Public Procurement	31. Innovation procurement strategist
		32. Swedish Innovation Agency VINNOVA	32. Program manager on innovation procurement
15	Turkey	33. Scientific and Technological Research Council of Turkey (TUBITAK)	33. Policy manager for innovation public procurement

Chapter 7. PAPER 4

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Article

Closing the loop without reinventing the wheel: public procurement for innovation promoting a circular economy

Stephanie Francis Grimbert [1,2] **and Jon Mikel Zabala-Iturriagagoitia** [1,2,3,*]

[1]Deusto Business School, University of Deusto, Camino de Mundaiz 50, Donostia-San Sebastian 20012, Spain
[2]CIRCLE, Lund University, Solvegatan 16, Lund 22362, Sweden
[3]Department of Business, Strategy and Political Science, South Eastern University Norway, Hasbergs vei 36, Kongsberg 3616, Norway
*Corresponding author. Deusto Business School, University of Deusto, Camino de Mundaiz 50, Donostia-San Sebastian 20012, Spain. E-mail: jmzabala@deusto.es

This theoretical paper adopts a procedural perspective to identify the challenges associated with the implementation of the full scope of approaches to circular public procurement (CPP). We contend that beyond considering CPP from a substantive standpoint (i.e. the procurement affects outside of the organization), adopting a procedural perspective (i.e. the procurement affects inside an organization) to public procurement can pave the way for reflecting transversally on how CPP can borrow from public procurement for innovation (PPI). Building on the challenges identified in the literature on CPP, we identify that PPI can contribute to consolidating CPP through such mechanisms as market engagement and intermediation, functional specifications, and coordinated unbundling. We provide illustrations for each of the identified procedural contributions of PPI to CPP derived from five cases. We discuss how procurement capabilities and evaluation can act as critical drivers for moving from a substantive to a procedural approach to CPP.

Keywords: circular public procurement; public procurement for innovation; circular economy innovation; circular economy; procedural instrument.

1. Introduction

The first version of the EU Action Plan for the Circular Economy (CE) adopted by the European Commission in 2015 (For a timeline, see https://environment.ec.europa.eu/topics/circular-economy/first-circular-economy-action-plan_en) recognized public procurement as a key driver in the transition towards the circular economy. It set out several actions which the European Commission would take to facilitate the integration of circular economy principles in Green Public Procurement (GPP), defined as the procurement of goods, services, and works with a reduced environmental impact through their life-cycle. These actions were focused on emphasizing circular economy aspects in GPP criteria, supporting a higher uptake of GPP among European contracting authorities, and leading by example in its own procurement and in EU funding. In its updated version from 2020, the new Circular Economy Action Plan for a cleaner and more competitive Europe (European Commission 2020) suggests integrating life-cycle assessment in public procurement. This recommendation is consistent with the advances made in the legislative framework set out by the EU Directives on Public Procurement (Directive 2014/24/EU), and in the international standards on Environmental Management Systems (ISO 14,001), which support a life-cycle perspective when identifying significant environmental aspects, environmental goals, and establishing routines for purchasing.

As a result, so far, circular public procurement (CPP) has been conducted as an extension of GPP with circular criteria, despite GPP being mainly focused on purchasing commercialized products at the detriment of innovation, which is only briefly mentioned in guidance documents. Just like the missions, a CE implies broad conceptual premises, system-based thinking with necessarily cross-sector and multi-stakeholder active engagement, and an emphasis on innovation and novel business models bringing a considerable degree of complexity and novelty within the procurement process (Mazzucato and Mikheeva 2020). The most challenging aspect regarding the promotion of a circular and resource-efficient economy consists in overcoming the inherent fragmentation of solutions which follow circular principles, instead of embracing the full scope of approaches to CPP, which encompass product, business model, and ecosystem innovations. For that matter, going beyond the basic approach to CPP as an extension of GPP and promoting the innovative and disruptive potential of CPP are essential for public procurement to go beyond facilitating different components of the circular economy, thereby building solutions from a circular basis by following the ideal of a circular economy (Alhola et al. 2019).

The sluggish uptake of CPP suggests that there is a lack of understanding and training of public procurers (Alhola et al. 2017b), especially in countries not yet familiar with innovative forms of procurement. As such, public procurement for innovation (PPI), as a more established type of procurement whose framework conditions are already geared towards the uptake of decision-making for innovation by public organizations (Liu et al. 2022), is perfectly aligned with the aims of CPP and can contribute to overcoming the challenges identified above. Innovation is a key to creating new circular products and business models (Neessen et al. 2021), and experienced procurers in PPI are already well-versed in the development of innovation ecosystems to support the emergence of innovations, which can provide a solid base for the shift to building circular ecosystems. However, previous literature underscores that despite the innovative character of the procurement of

circular business models and the promotion of circular ecosystems, there is a paucity of research departing from innovation studies to address the challenges posed by a CE (de Jesus and Mendonça 2018).

This theoretical paper aims to respond to the previous gap by exploiting the synergies between CPP and PPI as a more established form of public procurement for addressing grand challenges (Edquist and Zabala-Iturriagagoitia 2012; Chicot and Matt 2018; Wesseling and Edquist 2018; Kundu, James and Rigby 2020; Uyarra et al. 2020), in order to provide guidelines for contracting authorities to adopt the full scope of approaches to CPP. Several factors make the transition towards circular purchasing challenging: 'the complexity of the organization, the multiple stakeholders that are involved in the purchasing process, the flexibility required to work together in networks, and the innovation needed to create new circular products' (Neessen et al. 2021: 2). As such, we contend that beyond considering CPP from a substantive standpoint (i.e. the procurement affects outside of the organization), adopting a procedural perspective (i.e. the procurement affects inside an organization) to public procurement (Demircioglu and Vivona 2021: 383) can pave the way for reflecting transversally on how CPP can borrow from PPI. In particular, PPI can contribute to CPP through such mechanisms as market engagement and intermediation, functional specifications, and coordinated unbundling, which respond to several of the previous challenges posed by CPP. We provide illustrations for each of the identified procedural contributions of PPI to CPP derived from five cases.

The remainder of the paper is structured as follows. The next section offers a review of the literature that introduces the four approaches to CPP and their related challenges in practice and then presents the types of innovation relevant for a CE and how public procurement can be understood through a substantive and procedural lens. Section 3 discusses the procedural contributions of PPI to CPP and offers illustrative cases. In Section 4, we pinpoint strategic contract management and evaluation as critical drivers for alleviating the skewness inherent to contracting authorities towards a substantive rather than a procedural approach to CPP. Finally, we conclude the paper by emphasizing how the recommendations provided may be contextualized according to the level of experience of contracting authorities.

2. Literature review

2.1 Approaches to CPP and challenges in practice

CPP was originally described as 'the process by which public authorities purchase works, goods, or services that seek to contribute to closed energy and material loops within supply chains, whilst minimising, and in the best case avoiding, negative environmental impacts and waste creation across their whole life-cycle' (European Commission 2017: 5). These decoupling and resource efficiency objectives can be pursued by closing resource loops (replacing primary materials with secondary ones), slowing resource loops (extending the product life-cycle), and narrowing resource flows (extracting more value from the resource itself) (Bocken et al. 2016).

Approached from a broader perspective, CPP is expected to increase the circularity of products and processes, and to promote the development of circular business models and ecosystems, helping themselves to reach circularity. Alhola et al. (2019) introduce an enhanced definition of CPP as 'a procurement of competitively priced products, services, or systems that lead to extended life spans, value retention, and/or remarkably improved and nonrisky cycling of biological or technical materials, making use of and supporting the circular business models and related networks' (p. 105). We retain their four approaches to CPP (see Table 1) as our theoretical anchoring, as they explicitly refer to the circular business model and ecosystem innovation (see section 2.2). These approaches range from the inclusion of circular award criteria to existing and/or new products, to the adoption of business concepts such as product-service systems for the procurement of services, and finally to the promotion of circular ecosystems signalling the emergence of new markets for circular products and processes.

In practice, CPP suffers from a slow implementation (Hunka et al. 2023), focused on Approaches 1 and 2 in the shape of GPP with circular-based ecolabels on the one hand, and product-oriented PPI with circular technical specifications on the other. Despite the disputable effects of GPP on greening processes (Krieger and Zipperer 2022), CPP tends to be conducted in disguise identically to GPP, through the inclusion of circular-based environmental criteria during the tendering process (Fuertes Giné, Vanacore and Hunka 2022). In the same way that GPP mainly relies on ecolabels focused on the environmental impacts related to products, the common practice for CPP is therefore to use circular-based ecolabels as award criteria. As shown in Table 1, this way of conducting CPP only represents one out of the four approaches to CPP and can be considered as an extension of GPP rather than an additional type of procurement (Kristensen, Mosgaard and Remmen 2021), which overlooks the differences between these categories of public procurement in terms of their respective definitions, principles, objectives, and execution. Likewise, the nexus between innovation and CPP remains largely overlooked (Morales 2021), with an emphasis on product innovation rather than the business model and ecosystem innovation, as discussed in Section 2.2.

The reasons for this discrepancy between the ambition of the EU for CPP and its practical deployment are transversal to other types of procurement and pertain to the lack of experience and information among contracting authorities in terms of how to carry out a circular procurement, a dominant emphasis on price rather than quality, a lack of interaction with markets, a lack of training within procuring organizations (Bratt et al. 2013; Georghiou et al. 2014; Uyarra et al. 2014; Valovirta 2015; Alhola et al. 2017a, 2019; Lindström, Lundberg and Marklund 2022) and overall 'the culture of risk avoidance that dominates the procurement landscape' (Kristensen, Mosgaard and Remmen 2021: 9). The training of procurers is particularly demanding given that the transition towards CPP involves multiple stakeholders in the purchasing process, which are requested to work together in networks (Neessen et al. 2021), including end-users (Morales 2021), to identify opportunities for circularity in public procurement. The uptake of CPP is finally impeded by the fact that innovative forms of procurement require indefectible political backup (van Berkel and Schotanus 2021), as well as top managers and cross-departmental management having a leadership and strategic perspective, as a necessary antecedent to their scaling up (Sönnichsen and Clement 2020). In particular, the lack of

Table 1. Approaches to circular public procurement.

	Approach 1 Procurement of existing products respecting circular criteria	Approach 2 Procurement of new circular products	Approach 3 Procurement of new circular business models	Approach 4 Procurement promoting circular ecosystems
Objective	Marginally improved products are procured: - Recyclability - Share of recycled materials - Reuse - Packaging materials	New circular products are procured and/or developed: - Products that are significantly better in terms of recyclability, share of recycled materials, long lifespan, disassembly	Product-service systems are procured and new approaches are applied that promote circular aspects: - Leasing concept - Buy per use - Shared use - Buying and selling back	Investments are made that stimulate the development of circular ecosystems: - Develop or support closed loops - Create new networks and alliances - Waste as material
Examples	- Paper products - ICT devices - Packages - Furniture	- Building components of recycled materials - Textiles made of recycled materials	- Buying light instead of lamps - Leasing furniture instead of buying it	- Buses running by locally produced biogas - Construction projects with closed material loops
Type of procurement applicable in practice	GPP with circular-based ecolabels	Product-oriented PPI with circular technical specifications		

Source: own elaboration based on Alhola et al. (2017a: 14).

well-formulated guidelines and criteria by policymakers may be perceived by contracting authorities as increasing the risk of litigation due to seemingly unfair practices (Hunka et al. 2023).

2.2 Circular economy innovation

A CE, by promoting slowing and closing resource loops (Bocken et al. 2016), encompasses product, process, service, and business model innovations (Engez, Ranta and Aarikka-Stenroos 2021), as well as ecosystem innovation (Konietzko, Bocken and Hultink 2020: 9), whereby circularity is a property of a system of actors rather than of an individual, product or service. However, the literature exploring so-called 'CE innovation' (Engez, Ranta and Aarikka-Stenroos 2021: 195) remains marginal and dominated by the concept of 'eco-innovation' (Rennings 2000), despite little evidence of its effectiveness in facilitating the transition towards a CE (de Jesus et al. 2018, 2021). Previous research on CE innovation emphasizes 'dynamic CE business models at the micro level' (de Jesus et al. 2018: 3014), consistent with Approach 3 described in Table 1. One of the most promising avenues regarding circular business model innovation are Product-Service Systems (PSS), described as the prominent innovation strategy towards a CE (Manzini and Vezzoli 2003; Wong 2004; Tukker and Tischner 2006; Hunka et al. 2023). PSS are instrumental in attaining the objective of moving away from the product-centric approach of traditional public procurement. Table 2 identifies the three categories and eight types of PSS identified by Tukker (2004).

The first category is *product-oriented services*: the business model is still mainly geared towards selling products, but some additional services are added such as insurance or maintenance contracts and advice or consultancy. The second category is *user-oriented services*: the ownership of the product remains with the provider, and it is made available in a different form, sometimes shared by several users, such as product leasing, product renting or sharing, or product pooling. The third category is *result-oriented services*: the client and provider agree on a result and there is no predetermined product involved, such as outsourcing or functional sales. Result-oriented PSS are the most suited in terms of contributing to the circular economy (Rosa, Sassanelli and Terzi 2019), with the profit centre being the result achieved rather than the product. On the one hand, the material products and consumables become cost factors, whose use ought to be minimized. On the other hand, this category of PSS implies radical changes in the business model of organizations, which hampers their implementation and hence their contribution to a CE (Tukker 2004, 2015; Rosa, Sassanelli and Terzi 2019; Jacobson, Carlson and Lindahl 2021; Peñate-Valentín, Del Carmen Sánchez-carreira and Pereira 2021).

CE innovations such as PSS are hampered by technical, economic, and market factors (de Jesus and Mendonça 2018), such as the challenge of creating and maintaining a pool of potential tenderers (Halonen 2021). In particular, as a subcategory of result-oriented PSS, functional sales suffer from a lack of public demand leading to companies' unwillingness to turn to PSS opportunities (Bratt et al. 2013), especially in the case of Small and Medium-sized Enterprises (SMEs), for which the complexity and scope of PSS contracts may represent an entry barrier (Geet et al. 2015). Functional sales remain unstimulated since public procurement criteria tend to focus on current market situations and existing products and services. Indeed, while ordinary purchases can rely on long-established rules and regulations, functional sales represent unconventional legal transactions (Jacobson, Carlson and Lindahl 2021) involving end-users during the contract (Morales 2021). For CPP to facilitate the transition towards functional sales, public authorities need to switch from a price per product to a price per delivered service as a functional unit. As a result, Witjes and Lozano (2016) suggest a circular framework for CPP as an alternative to the linear process of traditional public procurement (see Fig. 1). For CPP to successfully close the loops through recovery, procurers and suppliers are requested to collaborate from the preparation stage of the tender onwards to establish its technical and

Table 2. Product-service combinations.

Product-based value	Pure product	Product sale The ownership of the product changes			
PSS	Product-oriented	**Product-related service** Selling a product combined with a product-related service		**Product-related advice** Selling a product with a product-related service	
	User-oriented	**Product lease** Exclusive use of a product without being the owner	**Product sharing/renting** Non-exclusive use of a product: consumer as owner (sharing), or provider as owner (renting)	**Product pooling** The product is simultaneously used	**Pay-per service unit** The user pays for the output of the product according to the use level
	Result-oriented	**Outsourcing** A third party owns the product and provides a product-related service		**Functional sales** A service provider delivers a specific result, the type of product is secondary	
Service-based value	*Pure service*	*Service providing An activity is provided without the use of any product*			

Source: adapted from Tukker and Tischner (2006).

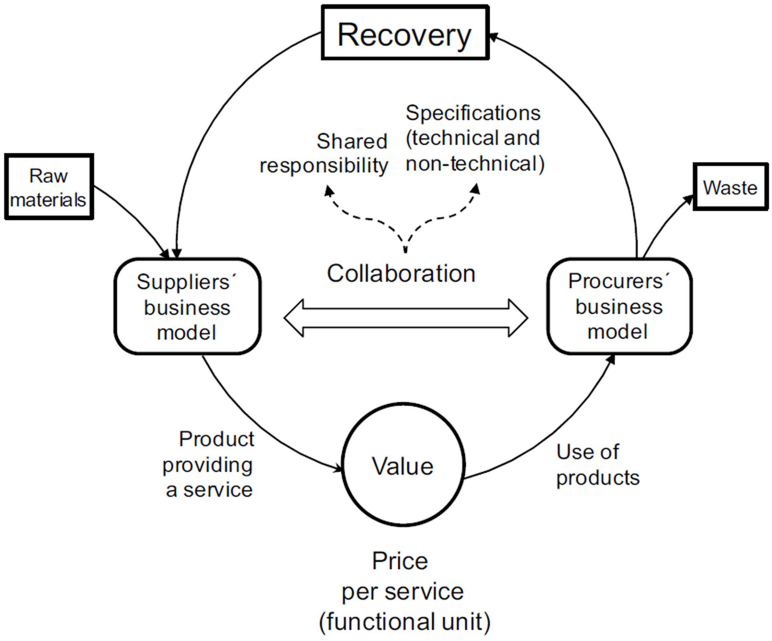

Figure 1. Collaborative process for PSS.
Source: Witjes and Lozano (2016: 42).

non-technical specifications, and to share the ownership of the PSS. In turn, such a collaborative process may help overcome several barriers usually identified by public procurers in functional sales, such as low experience, lack of flexibility, uncertainty, and duration (Peñate-Valentín, Sánchez-Carreira and Pereira 2021).

2.3 Transformative public procurement: substantive and procedural aspects

Policy instruments such as public procurement can be considered alternatively as substantive and procedural tools (Capano and Howlett 2020; Bali et al. 2021; Demircioglu and Vivona 2021), depending on 'whether the intention of the procurement affects outside of an organization (substantive tool) or inside the organization (procedural tool)' (Demircioglu and Vivona 2021: 383). From a substantive standpoint, public procurement is expected to deliver an outcome relative to the type and goal of the procurement. While we provide in the 'Discussion' section the evaluation agenda for measuring the substantive effects of public procurement on CE (see Section 4.2), we adopt in this paper a procedural perspective to embrace the full scope of transformative effects of public procurement (Grimbert and Zabala-Iturriagagoitia 2023).

Demircioglu and Vivona (2021) find that public procurement activities favour the innovativeness of contracting authorities, thereby providing a new rationale for policymakers to make use of such procedural tools, which 'are concerned with altering aspects of a government's own workings' (Howlett 2017: 99). As we explained in Section 2.1, Approaches 1 and 2 to CPP can be conducted through the use of GPP with circular-based ecolabels and product-oriented PPI with circular technical specifications, respectively. However, as stated by Alhola et al. (2019), the procurement of new circular business models and the promotion of circular ecosystems (Approaches 3 and 4) 'seem to support the

idea of innovative public procurement' (p. 105). Considering the procedural aspect of CPP means focusing on the processes affecting how it will be formulated and implemented and is instrumental for it to deliver the expected substantive effects in terms of outcomes (Bali et al. 2021). It could thus be assumed that CPP holds a transformative potential in encouraging contracting authorities to implement innovative procedures, thereby advancing the objectives of a CE.

Previous literature has already attempted to adopt a procedural perspective such as the policy implementation theory in the case of SPP (van Berkel and Schotanus 2021), the policy change theory for CPP (Hunka et al. 2023), a law and economics approach and criteria development process for GPP (Bratt et al. 2013; Halonen 2021), or functional contractual arrangements and the use of performance-based specifications (Turley 2013; Jacobson, Carlson and Lindahl 2021; Morales 2021). Given the innovative character of the procurement of circular business models and the promotion of circular ecosystems, de Jesus and Mendonça (2018) suggest departing from innovation studies to address the challenges posed by a CE and underscore the paucity of research tackling CE innovation (de Jesus et al. 2021). In fact, circularity can be considered a substantive effect of PPI (Rainville 2021), a policy instrument well-recognized for fostering societal change (Neij 2001; Edquist and Zabala-Iturriagagoitia 2012; Wesseling and Edquist 2018; Uyarra et al. 2020). Assuming a procedural standpoint to public procurement can therefore pave the way for reflecting transversally on how CPP can borrow from PPI (Alhola et al. 2019), as discussed in Section 3.

3. The procedural contribution of public procurement for innovation to circular public procurement

Table 3 lists the main challenges derived from the literature on CPP, and the procedural contributions already identified by previous research to Approaches 1 and 2. In what follows, Section 3 will discuss the procedural contributions from PPI that best address the challenges faced by Approaches 3 and 4, which we have retained for their transversal character (The procedural contributions that PPI can make to CPP, and which we discuss in this paper, should not be confused with the procedures that are mentioned in the EU Directives on Public Procurement (Directive 2014/24/EU), and which include open procedures, restricted procedures, competitive procedures with negotiation, competitive dialogues, and innovation partnerships.).

3.1 Market engagement and intermediation

3.1.1 Approach 3: PSS. A fundamental condition for effectively conducting CPP is the implementation of preliminary market consultations with suppliers, which are specifically allowed by the EU public procurement directives and which may be used in the preparation of the procedure (see Articles 40 and 41 of Directive 2014/24/EU). Therefore, CPP can build upon the existing practice of involving suppliers and other stakeholders in market dialogues for PPI (Edquist and Zabala-Iturriagagoitia 2012; Edler and Yeow 2016; Uyarra et al. 2017). In the same way that engaging market dialogues in the design and definition of specifications phases is critical to trigger innovation, it also ensures embedded circularity within the procurement process by enabling the co-creation of circular solutions (Thiébault and Tonda 2018). It enables procurers to gain knowledge of the market (products, suppliers, manufacturers, service providers, etc.) for them to develop a greater understanding of what is already available and what may be feasible in circular terms, across relevant sectors. In the context of PPI, this is usually referred to as the elaboration of early demand maps (Zabala-Iturriagagoitia 2022). As developed in Section 2.1, the collaboration between procurement and business models for a circular economy framework (Witjes and Lozano 2016) implies that CPP requires a shift from technical specifications being set solely by the procurer, to a process where specifications are set following exchanges between potential suppliers and procurers (European Commission 2017). More broadly, market dialogue in the form of cooperation involving the overall chain of manufacturers, suppliers, logistics, reprocessing, and end markets as well as consumers is necessary for implementing future CPP (Alhola et al. 2017a). Such market engagement can encourage the shift to circular business models, by relying on longer-term collaborations (Peñate-Valentín, Sánchez-Carreira and Pereira 2021). Only then can market dialogue lead to identifying the potential and feasibility of innovative types of procurement such as result-oriented PSS. The European Commission (2017) points out that establishing an innovation partnership can be justified if a product or service meeting the criteria of the circular economy is currently not available on the market. This competitive dialogue with suppliers provides means to identify the possibility of procuring PSS fulfilling the needs of the contracting authority.

3.1.2 Approach 4: Circular ecosystems. Market engagement also sheds light on the importance of intermediation. To ensure the market impact of CPP, innovative cooperation mechanisms such as the consultation of intermediaries between buyers and suppliers, can help articulate the appropriate demand in circular terms (Rainville 2021). Pre-procurement consultation is facilitated by intermediation (Edler and Yeow 2016), which serves to provide market information to the procurement process. Intermediaries can be categorized according to whether their expertise is technical, related to markets, or to project management. Beyond their role as facilitators in coordinating the cooperation between industry players as well as between them and the public buyer, they can also encourage the uptake of more ambitious circular criteria in the final tender (Rainville 2021), thereby overcoming the traditional conformism of procurers. Intermediated market dialogue thus becomes a space for experimentation, risk-taking, and learning, ultimately leading the contracting authority to rethink its needs and ensuring the actual inclusion of circularity by promoting the creation of a circular ecosystem. In this regard, and beyond the traditional purposes of market dialogues, Alhola et al. (2017) recognize that they can be instrumental in including end-users and other stakeholders in the process of defining procurement needs and translating them into award criteria.

3.2 Circular functional specifications

3.2.1 Approach 3: PSS. As mentioned in Section 2, it is widely recognized that CPP would benefit from formulating the requirements to be included in the call for tenders in functional terms (Turley 2013; Geet et al. 2015; Jacobson, Carlson and Lindahl 2021; Ntsondé and Aggeri 2021).

Table 3. Procedural contributions to the challenges identified in CPP.

	Approach 1 Procurement of existing products addressing circular criteria	Approach 2 Procurement of new circular products	Approach 3 Procurement of new circular business models	Approach 4 Procurement promoting circular ecosystems
Procedural challenges observed in the literature	Increasing the circularity of GPP (Pouikli 2021; Fuertes Giné, Vanacore and Hunka 2022; Krieger and Zipperer 2022)	Developing the eco-innovation/CE nexus (de Jesus and Mendonça 2018 ; de Jesus et al. 2018, *de Jesus* et al. *2021* ; Engez, Ranta and Aarikka-Stenroos 2021)	- Involving multiple stakeholders (Neessen et al. 2021) - Complexity of functional contracts (Turley 2013; Geet et al. 2015; Öhgren et al. 2019; Jacobson, Carlson and Lindahl 2021; Morales 2021) - Entry barriers for SMEs (Geet et al. 2015)	- Including users in the functional contractual arrangements (Alhola et al. 2017; Konietzko, Bocken and Hultink 2020; Kristensen, Mosgaard and Remmen 2021; Morales 2021) - Creating a pool of potential tenderers (Bratt et al. 2013; Halonen 2021)
Type of procurement applicable	GPP	PPI	PPI	PPI
Procedural contribution to CPP	Circular-based ecolabels	Circular technical specifications	- Market engagement and intermediation - Circular functional specifications - Coordinated unbundling	

Source: own elaboration.

Therefore, another procedural contribution of PPI to CPP lies in the use of functional specifications, as is the case in what is referred to as functional procurement (Edquist and Zabala-Iturriagagoitia 2020). Functional specifications differ from technical specifications (i.e. Approach 2) in as much as, instead of describing the product, what is being described is the function (i.e. problem or need) to be solved/satisfied. The longstanding evidence regarding the effectiveness of functional specifications (Chiappinelli, Giuffrida and Spagnolo 2023; Edler 2023) has led several contracting authorities to develop practical guidelines for functional procurement (e.g. Ministry of Infrastructure and the Environment 2013). As shown in the taxonomy displayed in Table 2, in the case of CPP, result-oriented PSS can be attained by adopting a functional approach to procurement, for which a solution is provided irrespective of the type of service/product. Using functional specifications creates the necessary space for embedding circularity in public procurement and encourages a shift towards the provision of products as services. A key element to enrich functional specifications with circular criteria (i.e. circular functional specifications) is dedicating careful attention to the co-creation of the functional definition of the contracting authority's need. This co-design process, consistent with the aforementioned market engagement during the pre-procurement phase, is central for unlocking the potential of CPP to stimulate innovation and requires regular interactions between the buyer and the suppliers or any other stakeholders involved in the procurement process (Ntsondé and Aggeri 2021).

3.2.2 Approach 4: Circular ecosystems. In PPI, contracting authorities embed the problem/need to innovate into functional specifications. PPI recognizes that the definition of the tender's functional specifications can benefit from consultations with the communities of potential future users. This requires an explicit process capturing the variety of perspectives around that problem and the diversity of needs that are derived from it. By design, functional procurement can therefore lead to experimentation and enhanced social acceptance (Edler 2023). Building on the state of the art in PPI as a collaborative procurement process between contracting authorities and users, CPP should also provide open calls including users, who may participate in the idea generation process (Timmermans and Zabala-Iturriagagoitia 2013). Taking into account the functional needs of users and their concerns is a powerful tool that can help overcome the risk aversion of contracting authorities, while legitimizing the procurement itself. Some examples of those concerns in circular terms may include packaging, the end users expressing their readiness to minimize its use (Kristensen, Mosgaard and Remmen 2021). However, including users in CPP requires certain conditions, as well as careful consideration as to not solely drive the procurement process either. First, there are success factors for the inclusion of users in CPP: they have to be empowered in the sense of not being restricted by rules and procedures, and most importantly possess specialized knowledge. Second, it must be kept in mind that including users does not suffice to reach business model circularity, since their consultation will mostly concern product innovations and more scarcely business model innovation. For end-users to be a driving force for including circularity in CPP, the procedural contribution of PPI, therefore, lies in the ability to influence the evolution of social practice, legitimizing new circular business models such as PSS.

3.3 Coordinated unbundling

3.3.1 Approach 3: PSS. An adverse effect of the large size of procurement contracts is that they tend to exclude *de facto* SMEs and social entrepreneurs, due to the difficulty of structuring long-term contracts, participating in time-consuming precompetitive processes, or coping with the time lag for contract pay-out (Geet et al. 2015: 15). A possibility that allows overcoming this discriminatory nature of PPI is using a 'coordinated unbundling' strategy (Timmermans and Zabala-Iturriagagoitia 2013). This form of coordination refers to the possibility of dividing procurement contracts into multiple lots and stages, distinguishing between two forms of

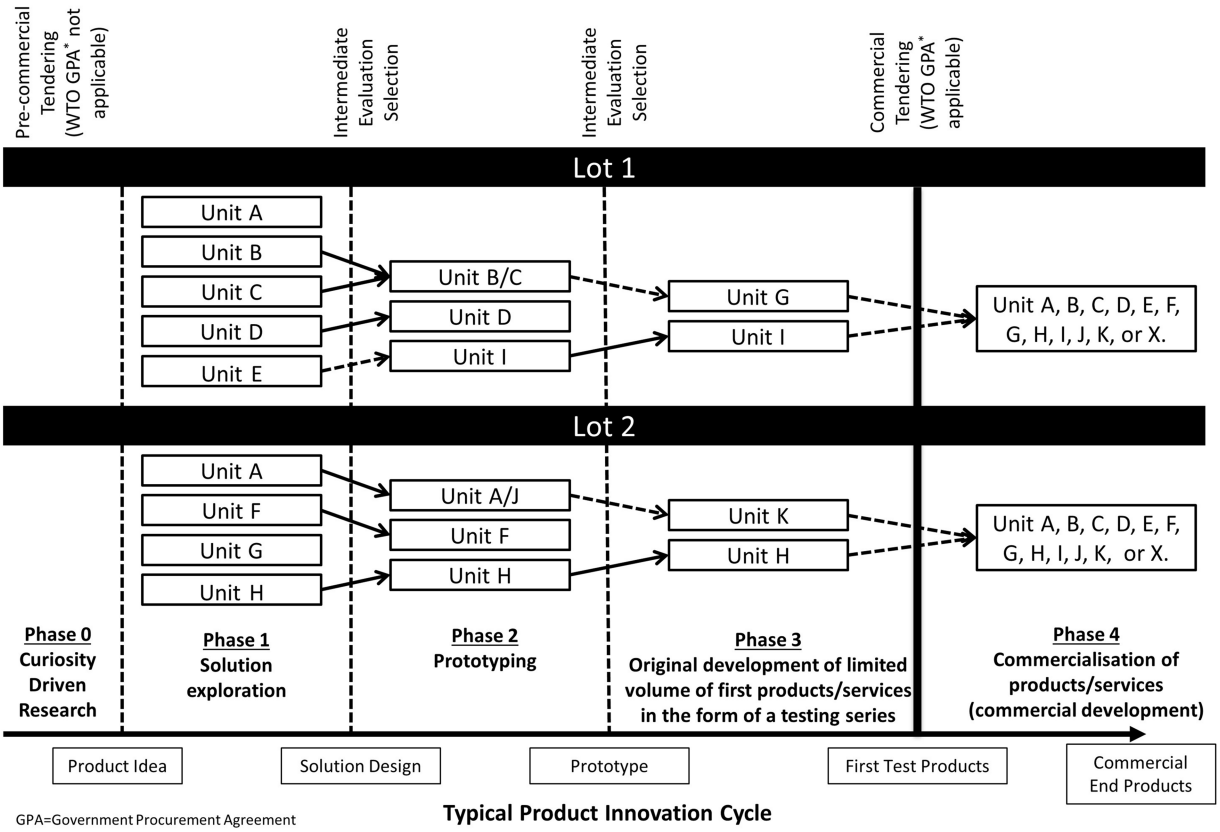

Figure 2. Horizontal and vertical unbundling in PPI.

Source: adapted from Timmermans and Zabala-Iturriagagoitia (2013: 679).

coordination, namely, vertical and horizontal unbundling (see Fig. 2).

The *vertical* unbundling of a procurement process allows a particular unit (i.e. firm, social entrepreneur, NGO, and university) to participate in one or more phases of the product innovation cycle, without this unit having to necessarily be active in the entire procurement process. For example, universities could be very active in the pre-commercial stage, through the research activities they conduct and their application into prototypes and utility models. However, it cannot be expected that universities may, in all cases, set up start-up firms to further develop those prototypes until they become commercially viable products. This vertical unbundling may therefore help to increase the level of sophistication of the solutions to existing problems, by guaranteeing that all types of actors can participate in the procurement process, regardless of their nature and mission.

In turn, through the *horizontal* unbundling of the procurement process, a unit (i.e. firm, social entrepreneur, NGO, university) can potentially participate in one or in several of the lots into which the procurement call has been split, as can be observed in Fig. 2. For example, a software company could be interested in participating in a lot that aims to improve the front-end of an application to monitor public transportation in a city, but naturally will not have the ability or capacity to provide the services for the maintenance of the extant fleet of bikes, scooters, trams, metros, buses, etc. Similarly, a company focusing on the maintenance of the fleet may not have the necessary skills to develop the software that designs the routes in such a manner that responds to the demands for mobility existing in the city in real-time (e.g. higher demand for mobility from the periphery to the centre in the mornings and vice versa in the afternoons). Hence, this horizontal unbundling may help to increase the effectiveness of the solution that is finally purchased, so as to provide a comprehensive response to the societal need being addressed.

Coordinated unbundling increases the possibilities for SMEs to participate in PPI contracts, as they may be involved in some of the lots but not necessarily in all. As compared to large established firms, SMEs do not have the scale to respond to all the requirements posed by large procurement contracts, what explains their limited participation in these policies (Knutsson and Thomasson 2014). Result-oriented PSS can provide an ideal setting for implementing coordinated unbundling with some actors contributing to product development, others to the provision of services, and a larger set of stakeholders engaged more systemically. Coordinated unbundling also affects the way functional specifications can be designed with additional circular criteria, and their potential to unlock circular innovations. Multiplying the number of stakeholders involved in the CPP process via coordinated unbundling may offer the opportunity to rely on their expertise to formulate circular functional specifications. This has two main effects linked with vertical and horizontal coordinated unbundling. First, a wider set of organizations possess the competencies for responding to the formulated requirements, and across different sectors, which is essential for circular functional specifications. Second, the particularity of

horizontal coordinated unbundling is the simultaneous procurement of more than one component, which provides more flexibility since the process is neither linear nor monolithic. Consequently, coordinated unbundling would enhance the inclusiveness of CPP, by providing space for the participation of a variety of firms (either start-ups, SMEs, or large firms) whose usual product markets may be different, and also of other types of organizations such as social entrepreneurs that have the competences to become involved.

3.3.2 Approach 4: Circular ecosystems. In PPI, coordinated unbundling allows a step-by-step competitive process among several SMEs and/or start-ups. This approach furthers experimentation and interactive learning between the contracting authorities and potential suppliers, thereby reducing uncertainty and risk (Edler 2023: 11). Moreover, this mutual learning opportunity can be further activated by involving a diverse set of stakeholders in focus groups or technological platforms. Coordinated unbundling sets the ground for an effective knowledge and technology transfer, which requires explicit policies to manage intellectual property rights that may emanate during the procurement process, which guarantees their effective use so as to bring more and better solutions to the marketplace and to society at large. Coordinated unbundling also increases the breadth of actors that can participate in the procurement process, by allowing the consultation of users. In the case of horizontal unbundling, this consultation can concern one of the processes, whereas in vertical unbundling, it can concern a phase of the product innovation cycle. Similarly to GPP, which tends to limit the pool of potential tenderers due to the use of mandatory requirements (Halonen 2021), CPP also runs the risk of disincentivizing potential bidders. This could hamper the level of competition, which is already concerningly low in public procurement. By dividing contracts into smaller lots, coordinated unbundling can contribute to increasing the level of competition in CPP by encouraging coopetitive practices among bidders. On the one hand, horizontal unbundling facilitates the development of circular cooperative activities among start-ups and SMEs, as the goods/services (i.e. lots) produced by some would become the inputs for others. On the other, vertical unbundling encourages the integration of start-ups and SMEs into circular value chains in which more established companies have a larger presence, opening for the establishment of new joint commercial agreements. These two effects, we believe, would make CPP more attractive to new incumbents, increasing their participation, the competition among them, and ultimately, the quality and comprehensiveness of the developed circular solutions.

3.4 Illustrations from practice

This research being exploratory in nature, the framework developed in Section 3 allows for consistent comparative analysis across cases (Casula, Rangarajan and Shields 2021). Accordingly, we provide five illustrative cases of the procedural contributions of PPI within the context of CPP, with a particular emphasis on the procurement of new circular business models such as PSS (Approach 3) and the advancement of circular ecosystems (Approach 4). These cases were identified in several European reports and platforms providing case study collections on circular and sustainable procurement (see Appendix 2). They were retained because, in addition to a circular focus, they also comprised a significant innovative aspect. As displayed in Table 4, we underscore how these cases exemplify the use of market engagement and intermediation, circular functional specifications, and coordinated unbundling, leading to Circular Economy Innovation.

Table 4. Summary table of illustrative cases.

	Approach 3 Procurement of new circular business models (PSS)	Approach 4 Procurement promoting circular ecosystems
Market engagement and intermediation	Case 1 Circularity for workplace ICT hardware (The Netherlands)	Case 2 Production of biodiesel from used food oils (Lille, France)
Circular functional specifications	Case 3 Reuse and transfer of work clothes (Herning, Denmark)	Case 4 Circular Building 't Centrum (Westerlo, Belgium)
Coordinated unbundling	Case 5: Zero emission delivery of goods (Nordic countries)	

Source: own elaboration.

The first case delves into the innovative approach taken in the Netherlands to procure workplace information and communication technology (ICT) hardware, emphasizing circularity and innovation. It demonstrates how active market engagement and effective intermediation have played pivotal roles in fostering the emergence of novel PSS. Case 2 exemplifies the significant contributions of circular functional specifications to PSS through an illustrative project involving the reuse and transfer of work clothing in Herning (Denmark). The third case, situated in Lille (France), explores the conversion of used food oils into biodiesel, shedding light on how market engagement and intermediation have been instrumental in establishing and consolidating circular ecosystems. In turn, Case 4 investigates the intricate interplay between circular functional specifications and the development of circular ecosystems. This case scrutinizes the creation of the circular building 't Centrum in Westerlo (Belgium), as a tangible manifestation of this relationship. Finally, the fifth case, centred on the Nordic countries, underscores the potential of coordinated unbundling in facilitating the evolution of both PSS and circular ecosystems in the context of goods delivery with zero emissions. (Appendix 1 provides a concise summary of each case, while a detailed description can be found in Appendix 2.)

4. Critical drivers for a procedural approach to CPP

As underlined in the framework introduced in Section 3, the implementation of CPP requires changing the behaviour of contracting authorities and aligning them with CPP goals (Grandia 2016) by embracing a procedural perspective rather than a substantive one. This is particularly salient for Approaches 3 and 4 to CPP (see Table 1), as regards the way CPP contracts are managed and the evaluation of CPP is being understood (Alhola et al. 2019; Jacobson, Carlson and Lindahl 2021). On the one hand, the current approaches that dominate the CPP landscape tend to emphasize the outcome to be procured rather than the function of the product or asset. On the other hand, the evaluation of CPP is also skewed

toward its substantive aspects (i.e. conducting impact assessments). In this sense, we outline in this section, how PPI can pave the way for adopting strategic contract management and procedural evaluation practices (i.e. behavioural change).

4.1 Strategic contract management

The aspect which is particularly demanding in the procurement of circular business models—such as PSS—is contract management, with contractual arrangements being considerably complexified, potentially mobilizing additional financial and human resources (Öhgren et al. 2019). PSS relations inherently signify moving from a transactional to a relational understanding of contracts, whereby procurers are requested to demonstrate relationship management skills on top of their technical competencies (Tukker 2015). Result-oriented PSS, such as functional sales, require a long-term relationship with the supplier, for which Jacobson, Carlson and Lindahl (2021: 2) suggest that the lack of legal underpinnings can be circumvented through the use of contracts. Such contracts allow for cooperation between the parties involved, can have a long lifespan, and can give the right to a third party to influence performance (ibid. p. 5). Contracting PSS may then paradoxically contribute to overcoming some barriers traditionally identified by procurers such as uncertainty and duration, by providing more flexibility (Peñate-Valentín, Sánchez-Carreira and Pereira 2021).

In PPI, similar contractual arrangements to PSS, as in functional procurement, are implemented through 'performance contracting', which emphasizes purchasing the outcome or functionality of the product or asset. The ownership of the asset remains with the provider, and the user/buyer only gets access to the functions and outcomes it provides. A classic example is the power-by-the-hour concept of Rolls-Royce providing jet engines to the military air force. Considering CPP from a procedural rather than a substantive perspective exposes the need for contracting authorities to be educated on the benefits and proper use of performance specifications (Turley 2013), and opens the door for yet another contribution of PPI to CPP relative to strategic contract management.

4.2 The evaluation agenda

The challenge of evaluating PPI (Edler et al. 2012) has called for approaching evaluation from a behavioural perspective (Zabala-Iturriagagoitia 2018), in order to move beyond output metrics and incorporate the formative role of evaluation. This is done by using behavioural additionality on top of the traditional input and output additionalities in the procurement process (Georghiou 2002, 2004; Clarysse, Wright and Mustar 2009). From an evaluation perspective, behavioural additionality seeks to signal in what ways behaviours may have been altered by policy measures and whether the new behaviours persist with time (Edler et al. 2012: 36). Broadening evaluation practices from a substantive to a procedural understanding is hence fundamental for moving away from the 'dominant design' (Ntsondé and Aggeri 2021: 5) in the way CPP is conducted.

As expressed by Halonen (2021), public procurement contracts entail direct and indirect costs. Direct costs consist of impacts on contract prices and transaction costs of using circular criteria, since performance-based specifications render procurement documents and procedures more complex. For instance, the use of life-cycle assessments (Article 2 defines life-cycle as 'all consecutive and/or interlinked stages, including research and developement to be carried out, production, trading and its conditions, transport, use and maintenance, throughout the existence of the product or the works or the provision of the service, from raw material acquisition or generation of resources to disposal, clearance and end of service or utilisation' (Directive 2014/24/EU). in the awarding phase, encouraged by the EU public procurement Directive 2014/24/EU as a tool to get the 'most economically advantageous tender' (MEAT) (Directive 2014/24/EU Subsection 3, Article 67), considerably increase direct costs. [The Directive devotes Article 68 (Subsection 3) to life-cycle costing to determine the relevant costs, how the data should be provided, and which methods shall be used: 'Life-cycle costing shall, to the extent relevant cover parts or all of the following costs over the life-cycle of a product, service or works: (a) Costs, borne by the contracting authority or other users, such as: (i) costs relating to acquisition, (ii) costs of use, such as consumption of energy and other resources, (iii) maintenance costs, (iv) end of life costs, such as collection and recycling costs. (b) Costs imputed to environmental externalities linked to the product, service or works during its life-cycle, provided their monetary value can be determined and verified; such costs may include the cost of emissions of greenhouse gases and of other pollutant emissions and other climate change mitigation costs' (Directive 2014/24/EU). For an overview of the specific challenges and experiences on the inclusion of externalities in life-cycle costing, see SPP Regions (2017).] The inclusion of such specific circularity metrics into life-cycle assessments constitutes the first step to expanding the MEAT criterion to a 'price-quality-circularity' ratio for the preparation and evaluation of tenders.

Life-cycle assessments require the collection of data aimed at capturing the entire lifespan of the product or service, which is challenging in the sense that this information can be held by the supplier. In the case of PPI, competitive dialogues are used to establish a constant monitoring and testing of the solution being developed to ensure that there are no deviations, respective to the need being addressed. Ultimately, competitive dialogues guarantee that the deployed solution does not require any further adaptation. Transferred to the context of CPP, contracting authorities could utilize research data from the marketing engagement phase and 'start to routinely request environmental information throughout the value chain as part of contractual clauses' (Alhola et al. 2019: 106).

Indirect costs pertain to the negative effects on final consumer markets of reduced competition. The use of mandatory requirements, such as circular ecolabels and technical specifications can disincentivize economic operators from participating in tenders (Halonen 2021) and fails to encourage suppliers to exceed standards (Rainville 2017). On the one hand, we demonstrate how coordinated unbundling can mitigate such costs by creating and maintaining a potential pool of tenderers, particularly as regards the potential involvement of SMEs. On the other hand, the use of circular functional specifications can overcome the adverse effects of establishing mandatory requirements.

5. Conclusions

This paper adopts a procedural perspective to public procurement in order to identify the challenges associated with the implementation of the full scope of approaches to

CPP and how these can be addressed by procedural contributions from PPI. We contribute to the literature on CPP by filling the gap relative to the CE–innovation nexus, by introducing some of the well-established PPI practices as an engine for CE innovation, understood as new circular business models such as PSS, and circular ecosystems. From a practical perspective, we discuss the critical drivers for moving from a substantive to a procedural approach to CPP and how contracting authorities can benefit from the procurement capabilities and the evaluation mechanisms previously developed for PPI.

The theoretical contribution outlined in this paper can benefit in different ways to different countries according to the level of comprehensiveness of their public procurement practices (European Union 2021). In the case of countries with a long-standing experience with PPI, we recommend enhancing their market engagement practices, particularly through the use of intermediation and exploiting circular functional specifications and coordinated unbundling to embed circularity in their tenders. For countries that do not yet have the benefit of hindsight in their more recent adoption of PPI, we would suggest that they continue along the path they have recently explored with the implementation of PPI, rather than trying to commit to yet another policy effort. In particular, we believe that pre-commercial procurement (PCP), defined as 'a process by which public authorities (…) can steer the development of new technologically innovative solutions that can address their specific needs' (European Commission 2006: 2), can represent an effective point of departure for the implementation of PPI. Most countries have been active in the development of science and technology policies through such mechanisms as R&D grants or tax incentives to R&D. We believe that such R&D-oriented programmes can be adapted to the requirements posed by PCP, as it represents a 'demand-side R&D policy instrument (that helps to) mitigate global challenges and societal problems at the same time as satisfying human needs' (Edquist and Zabala-Iturriagagoitia 2015: 157). While R&D grants usually target universities and public research organizations, and R&D tax incentives are usually awarded to firms, PCP can embrace both groups of actors, particularly SMEs and start-ups, which are particularly responsive in the case of short-term duration contracts. In order to include circularity in the PCP scheme, less-experienced countries could incorporate circular criteria in the assessment of PCP tenders.

In this sense, a possible policy recommendation could be using circular criteria as award criteria, instead of requiring them as technical/performance-based specifications. On the one hand, the inclusion of circular measures as part of the technical specifications in tender documents (e.g. recycling percentage of the raw materials used) fosters the use of CPP as an extension of GPP (Approach 1), instead of exploiting the full potential of CPP. In addition, CPP will tend to be more oriented towards product (Approach 2) rather than business model innovation (Approach 3). On the other hand, the application of circular principles as award criteria may create an incentive for firms to innovate beyond the levels set by the existing standards. As Rainville (2017) discusses, the inclusion of circular criteria in the technical specifications may be interpreted as 'knockout criteria' (p. 1034), thereby establishing a minimum threshold to be met. Instead, using award criteria may stimulate the voluntary performance of potential suppliers, leading to more comprehensive solutions (i.e. PSS) to tackle circularity from a systemic perspective (Pouikli 2021).

Further research could explore how the recommendations made in the paper emerged in the cases used to illustrate them and how they are articulated with elements of behavioural change among contracting authorities. A multiple case study could first shed light on the institutional and policy conditions that have led to those innovative circular procurement practices. Second, it could disentangle the process of behavioural change within contracting authorities, in order to grasp whether behavioural changes should be understood as an antecedent or as a consequence of innovative circular procurement policy measures. This additional evidence would give legitimacy to the proposed procedural contributions of PPI to CPP, moving beyond the well-known implementation barriers to PPI (Georghiou et al. 2014; Uyarra et al. 2014; Valovirta 2015), thereby corroborating previous innovation policy studies on its applicability to distinctive societal challenges.

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Appendix A: Summary of cases

CPP approach	Case (Location)	Goal	Substantive aspects	Procedural aspects		
				Market engagement and intermediation	Circular functional specifications	Bundling/unbundling strategy
Approach 3—Procurement of circular business models (PSS)	1. Circularity criteria for workplace ICT hardware (The Netherlands)	Including circularity goals for IT equipment	- All new central IT equipment is e-waste neutral - 46 tons of CO_2-reduction - Recycling of gold, silver, copper, and palladium	- Competitive dialogue - Ministry of Economic Affairs and Climate Policy - All departments in the Dutch government - IT firms	-	-
	2. Reuse and transfer of work clothes (Herning, Denmark)	Prolonging the life time of work clothes and incorporate reuse and recycling in daily operations	- EUR 6,700 savings - Elimination of 1,011 tons of CO_2 - Reduction in the price of the service to be paid by the municipality	- Negotiated procedure - Institutionalization of preliminary market dialogues to define the functional criteria - Municipality of Herning - Employees of the technical operations department - De Forenede Dampvaskerier - Danish Technological Institute - VIA University College TEKO - FORCE Technology	- Functional criteria defined for the reuse of work clothing	-
Approach 4—Promotion of circular ecosystems	3. Production of biodiesel from used food oils (Lille, France)	Transforming frying oil waste into fuel for the use of public vehicles	- Social Return on Investment of 40% - Sensibilization of the general public to waste valorization, zero-waste approaches, and climate change mitigation - –95% CO_2, –65 % particle emissions, 100 % renewable.	- PCP - Gecco (The project was supported by the European LIFE Programme, the Hauts-de-France Region, the European Metropole of Lille, the Communauté de Communes Pévèle Carembault and the McCain Food Europe. GECCO also received support through the BIOHEC-LIFE project and its partners (University of Lille, NEOECO, Pour la Solidarité-PLS and RREUSE).) - Ministry of Agriculture - Municipality of Lille - University of Lille	-	-
	4. Circular Building 't Centrum (Westerlo, Belgium)	Evidencing the possibilities opened by circular construction and serving as a paradigm for the construction industry	- Construction period of 11 months - 108% reduction in CO_2 emissions	- Competitive dialogue - Preliminary market consultations to validate the project's aspirations - Collaboration among participants facilitated - Dialogue to improve tender documents and suppliers' concepts	Functional requirements: - Circularity - Flexibility - Health and well-being - Image	-
Approaches 3 and 4	5. Zero emission delivery of goods (Nordic countries)	Getting zero-emission delivery of goods	- Multiple projects funded - New consumption habits - New mobility patterns - New distribution channels - Reduction CO_2 emissions	- Competitive dialogues - PCP - R&D funding - Dialogue among public agencies and contracting authorities - Dialogue to request information from suppliers - Competitive dialogues	- Promote environmental solutions that change the way people and goods move in the Nordic region	- Bundling demand from public authorities as an effective way to create a larger market for new solutions - Challenge the market through coordinated unbundling in several projects

Source: own elaboration.

Appendix 2: Description of cases

Case 1: Sustainability criteria for workplace ICT hardware (the Netherlands)

The Dutch government has set a mission to achieve a fully circular economy by 2050, with a pivotal milestone to halven the consumption of primary raw materials by 2030. A significant component of this initiative involves ensuring that all government procurements adhere to circular principles by 2023. In this context, the Dutch Ministry of Economic Affairs and Climate Policy, entrusted with the responsibility of procuring IT equipment for the entire Dutch government, has established a precedent for future tenders by pioneering innovative approaches to address various circularity dimensions.

Over a span of 1.5 years, the ministry incorporated ambitious circularity objectives into five distinct tenders, covering a wide spectrum of IT equipment categories including monitors, laptops, ICT workstations, iOS and MacOS devices, Android devices, as well as accessories and services (Rodenhuis 2023). To delineate specific requirements and award criteria, the ministry employed an innovative tool known as the 'ambition web' to prioritize its sustainability goals. The highest priorities were accorded to actions that aimed to reduce and mitigate carbon emissions, curtail the consumption of raw materials, and minimize the adverse impact of chemicals on both human health and the environment (ibid.).

Many of the strategies integrated into these tenders were derived from successful pilot projects, often involving smaller-scale initiatives that demonstrated favorable outcomes in terms of both cost-effectiveness and sustainability. These pilots played a pivotal role in legitimizing the overarching initiative, subsequently generating broader interest in the development of a new certification standard known as 'TCO Certified e-waste Compensated'. This certification is currently being applied to ICT procurement initiatives across the country.

To mitigate potential risks associated with the tenders, the ministry proactively engaged both internal and external stakeholders before the procurement process. Internally, all government departments in the Netherlands were actively involved in shaping the initiative. Simultaneously, a 12-month dialogue was initiated with the market to gather insights, minimize risks, elucidate and justify tender-related decisions, and garner widespread support. These extensive market consultations were deemed essential prerequisites for crafting sustainable tenders and for fostering a broad base of internal and external support. The topics addressed in these market consultations spanned various dimensions, including the concept of product-as-a-service, leasing arrangements, second and third-life utilization, rental options, emissions reduction strategies, CO_2 footprint calculation models, key performance indicators for CO_2 footprint, reparability of equipment, life-cycle considerations, plastic utilization, and offsetting methodologies (ibid.).

The market consultations validated the viability of the product-as-a-service model to achieve the circularity targets, which were subsequently integrated into the tenders. This model incentivized guaranteed residual values for products and promoted circularity by emphasizing two distinct avenues: either ensuring that not more than 20 per cent of the equipment becomes unusable and necessitates recycling, or prioritizing reuse to maximize the product's lifespan. Suppliers were obliged to accept returned equipment, facilitating precise knowledge of each device's chemical composition, thereby simplifying recycling efforts. The raw materials reclaimed through the recycling process are now channelled back into new equipment of similar quality. This practice extends to leased devices, with the Dutch government assuming responsibility for device reuse upon lease termination.

The contracts were officially awarded in July 2021, and as a result, all new central government laptops, tablets, and smartphones are now designated as e-waste neutral, conforming to the 'TCO Certified e-waste Compensated' standard. In 2021, this encompassed a total of 13,527 devices, translating into tangible benefits such as a reduction of 4,400 kg of e-waste, a decrease of 46 tonnes of CO_2 emissions, the recycling of 1.5 kg of gold, 570 kg of copper, 15.5 kg of silver, and 600 g of palladium (Rodenhuis 2023, p. 5).

Case 2: Production of biodiesel from used food oils (Lille–France)

The Municipality of Lille in France has formulated a comprehensive strategy aimed at fostering the development of alternative and renewable energy sources, promoting innovation and scientific research, advancing the circular economy, and enhancing public awareness about alternative and renewable energy options. In 2017, the Municipality initiated a PCP project (with a value below the EU threshold) in collaboration with Gecco, a local social enterprise operating under the category of *Entreprise Solidaire d'Utilité Sociale*. The primary objective of this PCP initiative was to facilitate the provision of biodiesel for municipal vehicles, utilizing waste oils as a sustainable alternative to conventional fuel consumption.

The partnership between the Municipality of Lille and Gecco was established through a negotiated procedure without notice, and it unfolded in two distinct phases (European Union 2020: 178):

- Phase 1: over an 18-month period, the City of Lille incorporated three vehicles running on biofuel derived from recycled cooking oils.
- Phase 2: by 2020, the experimental use of biofuel had expanded to encompass approximately twenty municipal vehicles.

Gecco, founded in 2007, initially operated by collecting used cooking oil from local restaurants and chip shops, which it then sold to a Belgian company specializing in biodiesel production (Press, Robert and Maillefert 2020). In 2010, Gecco embarked on a journey to explore the feasibility of locally processing collected oil into biodiesel (ibid.). The development of this biodiesel venture necessitated the establishment of a network of stakeholders, primarily through local social business networks. This facilitated Gecco's access into Ashoka, an international organization dedicated to social businesses. With Ashoka's intermediation, Gecco forged a partnership with McCain, the world's largest frozen French fry producer. McCain, having a well-established Corporate Social Responsibility (CSR) programme, sought local CSR partners, making this alliance mutually beneficial. This partnership, coupled with Gecco's recognition by the French Ministry of Agriculture, paved the way for Gecco to collaborate with the City of Lille, particularly at a time when the city was motivated to reduce vehicle emissions, support local enterprises, and cultivate ties with local startups (Press, Robert and Maillefert 2020: 569).

An evaluation of the project revealed a noteworthy social return on investment, yielding €1.40 for every euro invested. In terms of environmental impact, the newly introduced biofuel not only boasts 100 per cent renewability but also achieves a remarkable 95 per cent reduction in greenhouse gas emissions and a 65 per cent reduction in fine particle emissions compared to conventional fossil diesel fuels. Furthermore, the project has played a significant role in raising public awareness about waste valorization, zero-waste practices, and climate change mitigation. Gecco, in turn, has garnered recognition as an exemplary model for achieving CSR objectives and as an illustration of how to engage local businesses in the pursuit of sustainable development (Press, Robert and Maillefert 2020).

Case 3: Reuse and transfer of work clothes (Herning–Denmark)

To harness public demand as a catalyst for sustainable, environment-friendly development, the City of Herning (Denmark) embarked on a circular economy initiative in September 2013 (Jones, Kinch Sohn and Lysemose Bendsen 2017). The project's inception was rooted in a procurement agreement between the textile service company De Forenede Dampvaskerier and the City of Herning, focusing on the rental, washing, and repair of work attire for the city's technical operations department (Hillgrén, Bröckl and Halonen 2016). The primary challenge lay in the wasteful practice of providing brand-new work clothing to every new employee, with discarded attire upon employee departure, irrespective of its condition. Furthermore, when the existing textile service contract neared its end, all work clothing faced disposal without recycling efforts. In response, the City of Herning resolved to investigate the practical and legal avenues for integrating work attire reuse and recycling into its procurement and supplier chains.

To address this challenge, the City of Herning initiated a circular economy project with the following objectives (ibid.):

- establish functional criteria for the reuse of work clothing,
- modify the existing textile service contract to adopt a circular economy-based model,
- identify commercial recycling solutions for used work attire, and

the evolution of the project can be delineated into two key phases (ibid.). During the first phase, functional criteria for work clothing reuse were defined. This involved engaging with employees to address user culture, signalling the importance of recycling, and fostering a changed perspective on used clothing. Subsequently, objective criteria were outlined in accordance with established standards. The implementation of the procedures and the required functional criteria were agreed upon in cooperation with the supplier firm. Additionally, the recycling of work attire was examined by students from VIA University College TEKO, with economic and ecological impacts assessed by FORCE Technology. Novel recycling options were innovated, and productive dialogues were held with relevant industries.

The second phase encompassed the integration of circular economy principles into the existing contract. To ensure the transfer of in-use work clothing to the subsequent contract, an additional agreement (i.e. allonge) was needed. The allonge detailed the legal terms and conditions for material transfer, along with a calculation model for determining the net present value of the materials. Mutual approval and compliance with legal requirements were crucial. This project culminated in October 2014 after 13 months of dedicated effort.

The reuse and transfer of work attire not only saved EUR 6,700 but also reduced CO_2 emissions by 1,011 tonnes over a 4-year period, within Herning's technical operations department only. These economic savings directly impacted the service provider's costs, ultimately benefiting the municipality through reduced service pricing (ibid, p. 67).

A notable element of novelty within this project lies in the establishment of functional criteria for the recycling and disposal of work clothing. Furthermore, it led to the creation of a comprehensive guide for implementing circular economy principles in public procurement. Both the functional criteria and the guide serve now as foundational resources for initiating circular economy endeavors in various procurement sectors, industries, and municipalities.

Case 4: Circular Building 't Centrum (Westerlo, Belgium)

In 2018, Kamp C [Kamp C is an autonomous provincial company of the province of Antwerp (Belgium) (Ascione 2023)] orchestrated a circular procurement initiative with the objective of initiating preparations for the construction of Belgium's first circular building in Westerlo (Flanders). Kamp C, as the regional hub for sustainability and innovation in the construction sector, conceived 'the seven pillars of circular construction' as a theoretical framework (i.e. circular design, circular financing, circular working, circular materials, circular business model, circular procurement, and circular area developments) and subsequently established a demonstration project to showcase the practical implementation of this framework (ProCirc 2023).

In June 2018, as a prelude to the tendering process, Kamp C conducted stakeholder consultations wherein they introduced and validated the project's aspirations (Ascione 2023). Subsequently, from June to October 2018, five masterclasses were convened, featuring various speakers, case studies, and workshops that delved into multifaceted facets of circular construction. These masterclasses garnered significant interest, facilitating collaboration among participants. To establish functional requirements, a qualitative selection process was followed to foster innovative solutions. Consequently, a vision document was crafted, encapsulating the following functional aspirations (ProCirc 2023):

- Circularity: transitioning from conventional to circular practices.
- Flexibility: capacity to adapt to evolving spatial and functional demands.
- Health and well-being: offer a healthful and comfortable environment.
- Image: given serve as a paradigm for the construction industry.

The chosen procurement procedure followed a competitive dialogue (a two-step process). Seven consortia expressed interest, involving over fifty companies (ProCirc 2023). Among the seven consortia, three advanced to the next phase. Subsequent dialogues were held with each consortium to comprehensively discuss procurement documents and refine them based on feedback from all stakeholders involved. These dialogues facilitated improvements in both the tender documents and the suppliers' concepts (Ascione 2023). An individual evaluation process ensued, culminating in a consensus meeting, which resulted in the selection of the 'Kamp Circulair' consortium, which comprised seven public and private organizations.

The consortium developed a circular and functional design, characterized by judicious material choices, innovative techniques, and business models (ProCirc 2023). This design was conceived through a unique approach that involved envisaging various future scenarios for the building, ensuring adaptability to changing needs, and encompassing broader considerations beyond present requirements (e.g. potential land use changes, organizational growth, or contraction). All materials were cataloged in a comprehensive Building Information Model, equipped with an integrated material passport for inventory tracking.

Collaboration between firms and regional authorities in developing this design contributed to an astonishingly brief construction period of 11 months, from May 2021 to May 2022 (ProCirc 2023). In comparison to concrete and steel structures of similar size, the building achieves a 108 per cent reduction in CO_2 emissions (i.e. net carbon capture effect). Furthermore, 't Centrum' serves as an experimental ground for new business models, such as leasing lighting from providers to incentivize sustainable product production (Ascione 2023). Presently, Kamp C offers guided tours that elucidate the entire process from procurement to the final outcome. These tours are well-received by stakeholders in the construction industry, fostering motivation for proactive engagement.

Case 5: Zero emission delivery of goods (Nordic countries)

In May 2019, the Nordic Council of Ministers made a significant decision to engage cities across the Nordic region in a collaborative market dialogue aimed at fostering the development of environmentally sustainable solutions. The overarching goal was to identify a domain in which collective environmental solutions could be championed. Facilitating this endeavor, the Norwegian Directorate for Digitalization and the Norwegian National Program for Supplier Development extended invitations to collaborate to the Danish Environmental Protection Agency, the Swedish Public Procurement Authority, and Motiva, a Finnish sustainable development firm (Kihl et al., 2016). This collaborative effort sought to mobilize local stakeholders within their respective nations. The approach of uniting public contracting authorities with similar requirements, a practice often referred to as 'bundling demand', and collectively engaging the market, has proven to be an effective strategy for expanding the market for newly developed solutions.

To encourage participation from all Nordic cities, an extensive outreach effort was undertaken. This included issuing invitations, conducting online meetings to disseminate project information, and hosting a physical information meeting in Oslo in October 2019. (See: https://innovativeanskaffelser.no/zeroemissiondelivery/ (last accessed 28 November 2023).) Ultimately, eleven Nordic cities and two central government procurement entities decided to participate in a joint Nordic procurement initiative with the primary objectives of achieving zero-emission delivery of goods, supporting the growth of Nordic enterprises, fostering greener and more innovative solutions, and enhancing collaboration within the public sector. It is worth noting that emissions resulting from goods delivered to the public sector account for nearly 5 per cent of the total emissions in the Nordic countries. The public sector engages in substantial procurement of diverse physical goods, and the delivery of these goods contributes significantly to urban freight traffic. Typically, goods are individually ordered by various municipal departments, agencies, locations, etc. in an uncoordinated manner. As an illustrative example, Copenhagen estimated that product deliveries alone resulted in nearly 4.5 million vehicle kilometers travelled within the city limits annually.

In April 2020, a request for information was issued, paving the way for a digital market dialogue to introduce the initiative and formally extend invitations to potential bidders. In November 2020, the eleven Nordic cities and two central government procurement entities jointly issued a functional statement advocating for zero-emission delivery of goods. In April 2021, another market dialogue was convened, affording participating companies the opportunity to present their solutions, receive feedback, and establish connections with prominent Nordic buyers. This collaborative discourse and exploration of potential solutions and partnerships not only heightened predictability for all stakeholders, mitigating risks, but also accelerated the development of innovative solutions.

Spanning from 2019 to 2022, numerous funding mechanisms and initiatives were deployed to support innovative projects in various sectors such as furniture, ICT, mobility, waste management, and construction. Accordingly, both a horizontal and a vertical unbundling strategy have been followed to address the mission and facilitate the development of new solutions and the involvement of SMEs in these transformative processes. For instance, Nordic Innovation allocated NOK 16 million to fund 2–4 projects, providing up to NOK 4 million each for a maximum duration of 36 months to drive changes in the movement of people and goods. Another noteworthy initiative was the 'fast track for circularity' program, where five public buyers, over a 5- to 6-month period, articulated their needs, issued competitions, and qualified different suppliers, primarily startups, and SMEs, who submitted concepts for innovative solutions. Additionally, city hub initiatives have been introduced across all Nordic countries to facilitate zero-emission delivery of goods, aligning with the overarching mission.

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Article

Chapter 8. DISCUSSION AND IMPLICATIONS

8.1. Procedural effects of transformative innovation policy instruments

The aim of the dissertation is to define and explore a procedural approach to TIPI in order to identify procedural effects inspired by complexity science, illustrating the potential of TIPI to foster the convergence between the normative and epistemic dimensions of user STI policy. It therefore considers that the widening and deepening of innovation policy, which has led to the introduction of new and more sophisticated innovation policy instruments responding to the broadened scope of the policy itself, should move beyond the normative discourse. The epistemic shift in instrumentation, which is deemed necessary for the implementation of transformative innovation policy goals, requires integrating the substantive and procedural effects of TIPI in order to evidence the bi-directional linkages between the policy instruments and the users of specific policy outcomes, as depicted in the conceptual approach illustrated by Figure 1.

Table 2 summarizes how the compendium included in the dissertation contributes to the overarching conceptual approach. Each paper adopts a procedural approach to the innovation policy instrument considered (clusters and PPI), which exemplifies how the properties of complex systems (emergence, interdependence and interconnectivity, co-evolution, self-organization, feedback, historicity and path-dependence) can be applied to the study of TIPI.

Table 2. Summary of conceptual contributions.

	Procedural approach to policy instruments	**Procedural effects through a complexity lens**
Paper 1	- Defining cluster identity and the centrality of intangible proximity for cluster policy - Introducing trademarks as a new tool for CMOs	- Emergence: the dimensions of intangible proximity (shared identity and shared vision) build upon the interaction between the members of the cluster - Interdependence and interconnectivity: trademarking creates a community of members sharing a vision - Co-evolution: members can benefit from the trademark and sanction each other if a member deviates from the shared vision - Feedback: the reputational hazards faced by the cluster lead to investments in the CMO - Historicity and path-dependence: cluster identity is threatened by its inertia
Paper 2	- Identifying the CSV-related costs for SMEs	- Emergence: Collective CSV is an emergent strategy of CMOs

	- Defining the CMO functions and services for implementing collective CSV	- Interdependence and interconnectivity: different functions of the CMO aim at developing/densifying the network - Co-evolution: members need to conform to the standards of the CMO to avoid exclusion - Self-organization: the endogenous character of collective reputation
Paper 3	- Defining transformative PPI as substantive and procedural - Identifying the capabilities needed according to the roles of contracting authorities	- Emergence: capabilities are identified by practitioners rather than defined at the policy level and are progressively built up in a cumulative process - Feedback: evaluation is paramount to the success of direct PPI advertised with functional specifications - Historicity and path-dependence: PPI tends to be perfunctorily conducted because of a lack of capabilities and risk-averse behaviors
Paper 4	- Identifying the challenges for implementing the full scope of approaches to CPP - Determining the procedural contributions of PPI to address the challenges	- Interdependence and interconnectivity: the transversality of PPI is explored to address the challenges of the CE - Co-evolution: PPI practices can affect the scope of CPP, PPI and CPP display synergistic interdependencies - Self-organization: initiatives at the local/project level can lead to endogenous adaptations of CPP - Feedback: evaluation acts as a critical driver for moving from a substantive to a procedural approach to CPP

Source: Own elaboration.

8.2. Implications for theory

The normative turn in innovation policy poses specific challenges in terms of public management, ranging from the multi- translation process of missions (Wittmann et al. 2021) and the multi-level stakeholders involved (Wanzenböck and Frenken 2020) to the complexity of the problem-solution space (Uyarra et al. 2020), those challenges having yet to be transposed to the level of instrumentation. This dissertation aims to contribute to the literature on public management by considering the substantive and procedural effects of innovation policy instruments, thereby assuming that TIPI hold transformative potential beyond their outcomes, in their ability to act at the level of the implementation by public organizations of normative innovation policy goals. Along the lines of constructivist grounded theory, the validity of the conceptual frameworks developed in papers 1 and 3 was tested with the stakeholders in charge of the management of the innovation policy instrument, a level of analysis rather neglected in innovation studies (Aguinis et

al., 2022). Papers 2 and 4 also focus on the management level to provide an enhanced conceptual understanding of the potential of PPI and cluster policy to tackle grand societal challenges.

Second, the dissertation provides new perspectives to the literature on innovation policy by questioning the role of innovation policy instruments in the assumed convergence between normative and epistemic policy goals. The procedural approach adopted to unravel the instrumentation's epistemic shift therefore sheds light on new areas of interest for both cluster policy and PPI:

- The role of intangible proximity in clusters opens research avenues related to the construction and the adaptation of cluster identity, while the use of cluster trademarks confirms trademarks as useful indicators for intangible territorial assets.
- Collective CSV in clusters provides a theoretical anchor guiding future cluster policies to fully leverage the transformative potential of CMOs and opens a promising research agenda around evaluating the plurality of impacts of CMOs, by enabling a categorization of functions that can support the monitoring of CMO activities toward collective CSV strategies.
- The capabilities identified for transformative PPI aim at filling the capability and analytical gaps which hamper experimentation by the public sector in the context of grand challenges.
- Reflecting on the procedural synergies between PPI and CPP contributes to opening a research stream relative to the circular economy-innovation nexus in procurement.

Finally, the dissertation abounds in the direction of including users within an innovation systems approach. In doing so, it contributes to positioning the literature on innovation systems within the normative turn in innovation policy, following the path of mission-oriented innovation systems' scholars. It evidences that the systemic perspective, when applied to instrumentation as the unit of analysis, provides unique insights inspired by the properties derived from complexity science.

8.3. Implications for practice

The practical implications of the dissertation relate to the widening and deepening of innovation policy instruments. Approaching TIPI from a procedural angle offers four major benefits: a) the introduction of new tools for the management of policy instruments, b) a transversal use of policy instruments, c) a focus on capacity-building within the public organization in charge of a policy instrument, and d) the possibility to evaluate policy instruments from a formative rather than a summative angle.

In the context of cluster policy, the dissertation proposes the use of cluster trademarks as a management tool aimed at broadening the base of CMO members, creating a community of actors sharing values, introducing a source of market differentiation, mutualizing the costs of branding, and providing hedging mechanisms to mitigate the negative effects of place branding. Cluster trademarks could therefore enter the pool of indicators from the European cluster labelling criteria, in order to explore the measurement of the soft effects of CMOs. A trend which has also been uncovered in the context of PPI is the emergence of usership over ownership. Usership epitomizes the (normative) transformative potential of PPI, since the public sector needs to provide the utility of a good or service to society, regardless the origin of the ownership. In epistemic terms, products as services open up the possibility for contracting authorities to use rental contracts for validating functional solutions, to manage a value chain of service providers and technology developing subcontractors, and more generally to apply to the practice of PPI some lessons from performance contracting. In this regard, an epistemic shift such as using circular criteria as award criteria may stimulate the conception of more comprehensive solutions (such as products as services) to tackle circularity from a systemic perspective.

Transversal uses of a policy instrument emerge from their confrontation with grand societal challenges. They can be considered emergent strategic patterns based on the interaction and engagement of a range of actors in an open-ended learning process, which tends to erase the boundaries between formulation and implementation. For instance, collective CSV has been anticipated by emerging policy practice in Europe, despite not being explicitly integrated in European cluster policy programs (yet). A systematic analysis of the funded INNOSUP-1 projects that were completed by 2021 shows that some CMOs tackled issues related to CSV outcomes. Emergent strategizing also appears in procurement, as shown by cases where behavioral changes among contracting authorities led to the adoption of innovative circular procurement practices, thereby spontaneously uncovering the procedural contribution of PPI to CPP.

Capacity-building is paramount for the epistemic shift in innovation policy to be made possible by the procedural effects of TIPI. The dissertation provides useful guidelines to public managers on how to leverage extant capabilities for developing new ones and enhancing the substantive effects of innovation policy instruments. In the case of public procurement, expanding the use of PPI to meet circular objectives enables contracting authorities to benefit from the practices already in place - and encouraged in the 2014 EU directives (European Union, 2014) - such as the use of functional specifications, instead of committing to another policy effort. The corresponding functional capabilities are then articulated in a collaborative Mutual Learning Exercise setting, in order to ensure their relevance to public managers. Regarding cluster policy,

the research benefits from the insights of numerous cluster managers, including as co-authors, in order to propose a tailored business model for CMOs, along with specific tools responding to the needs of cluster managers in terms of ensuring the sustainability of their CMOs.

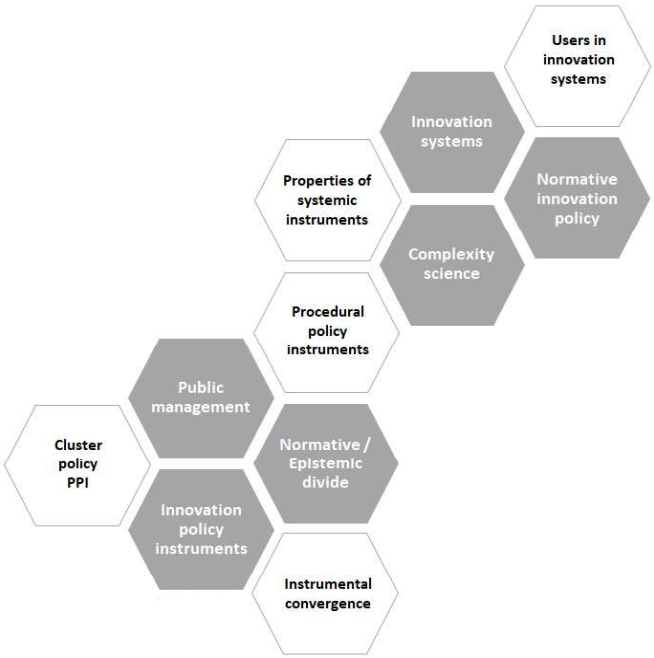
Finally, the compendium of papers include recommendations relative to the evaluation of the effects of TIPI. While assessing the substantive effects which have dominated the instrumentation landscape suggests summative evaluation, measuring procedural effects calls for alternative evaluation methods evidencing the formative benefits of TIPI (Bergek and Haddad, 2022; Janssen et al., 2022; Ghosh et al., 2021; Molas-Gallart, 2021). Although outcome-centered summative evaluation focused on measurable goals is out of the scope of the dissertation, formative evaluation relies on the rationale that evaluation should be "understood as a reflexive practice aiming at helping policy actors to navigate their TIPs and contributing to their capacities to do so" (Molas-Gallart, 2021 p. 435). The functional capabilities identified for transformative PPI include measuring the intent rather than the outcome in order to embrace trial and error as part of the necessary experimentation on behalf of contracting authorities. Such procedural evaluation practices aimed at inducing behavioral change are identified as critical drivers for reaching circularity goals. The proposed collective CSV framework also aims at capturing behavioral additionality within cluster policy, by identifying CMO functions and activities which can be monitored as intermediary outcomes that allow learning and policy adaptation. Cluster trademarks can constitute such intermediary evaluation tools, since their purpose, beyond the alleged benefits to CMO members, encompasses developing the communication of CMOs with policy-makers and society.

Chapter 9. CONCLUSIONS, LIMITATIONS AND FURTHER RESEARCH

9.1. Concluding remarks

The aim of this dissertation is to offer theoretical foundations to the concept of "Transformative Innovation Policy Instruments". As a result of the research conducted for the dissertation, TIPI are defined as *'integrating substantive and procedural effects in a user perspective of policy instruments that fosters the convergence of the normative and epistemic dimensions of transformative innovation policy goals'.* The compendium of papers included in the dissertation approach TIPI through various lenses and in different contexts, reinforcing the validity of the overarching conceptual framework presented in Figure 1. This research being exploratory by nature, various research streams from different disciplines are interwoven to advance the conceptual understanding of TIPI, as shown in Figure 5. Theoretical foundations from extant literature (innovation systems, normative innovation policy, complexity science, public management, normative/epistemic divide and innovation policy instruments) are combined to provide the main TIPI building blocks. For example, the user approach in innovation systems is situated at the intersection of the literatures on innovation systems and the normative turn in innovation policy (etc.). Each of these building blocks have been discussed in the dissertation, as well as the contribution of each paper to the identification of the complexity-derived properties of TIPI.

Figure 5. TIPI building blocks.



Source: Own elaboration.

The relevance for practice of the TIPI concept is also an inherent part of the dissertation, consistent with the principles of constructivist grounded theory as the methodological approach retained for this research. Adopting a constructivist stance means acknowledging that the researcher and the participants co-construct the data instead of it being an observation or a window on reality. Therefore, constructivist grounded theory proposes an interpretive understanding of the empirical phenomena in a theory that has credibility, originality, resonance, and usefulness for informing policy and practice (Charmaz, 2014). Accordingly, the practical utility of the academic contributions lies in their ties to the reality of the management of TIPI, enabled by the on-going interaction of the author with practitioners in cluster policy and public procurement, to which the developed conceptual frameworks were presented after the publication of the papers (either individually or in conferences). International organizations such as the United Nations Economic Commission for Europe have also expressed their interest for the research presented in this dissertation.

9.2. Limitations and further research

The comprehensiveness of the conceptual framework for TIPI developed in the dissertation can be improved by considering more demand-side innovation policy instruments. Cluster policy and PPI are part of a wider family of systemic instruments and public procurement, respectively. While they were chosen because of their prominence in the policy-making agenda (OECD 2007; 2016; 2017a; 2017b; 2020; 2021) and the intimate knowledge of these instruments by some of the co-authors of the research, more systemic policies and types of public procurement could be studied, as well as regulations and measures aimed at supporting private demand.

Another limitation of this research lies in the focus on instruments as the unit of analysis, which does not consider the specific input of the literature on policy mixes. This was a conscious decision given the gap in conceptual understanding around the procedural effects in instrumentation. However, the properties which are derived from complexity science (in particular interdependence, interconnectivity and co-evolution) could be usefully applied at the level of instrument mixes. In this regard, considering how TIPI are articulated within policy programs could enable studying the interactions between them, as well as with other supply-side innovation policy instruments. This research could unveil mechanisms illustrating the synergistic interdependencies either facilitating or hindering the use of an instrument within a broader policy mix, and how different instruments can display co-evolutionary patterns making outcomes difficult to foresee.

Each paper of the compendium opens various avenues to be explored with further research. Focusing more specifically on the contribution of the dissertation around the definition of TIPI, three main areas stand out:

- First, the conceptual frameworks developed in each paper require empirical testing in different contexts. For instance, comparative case studies could be conducted to analyze the use of cluster trademarks by emblematic CMOs (Aerospace Valley, Health Valley Netherlands, Agri Sud-Ouest Innovation…) and their effects on their membership and members. Another option could be to use data from the European Cluster Excellence Initiative initiated by the European Commission in 2009, which has implemented a cluster management excellence labelling process. CMOs ranked at different levels of the quality labels could provide a basis for another type of comparative case study relative to the role of intangibles. For PPI, further research could tackle the particular mix of capabilities required on behalf of contracting authorities according to their position in the problem-solution space. In this regard, another book chapter is currently under review, which goes deeper into the analysis of the specific capabilities required for a contracting authority to act as a lead user, a situation occurring when there is a consensus on the needs but a divergence in the solutions to address them as is prevalent in the context of grand societal challenges.
- Second, the identification of complexity-based properties for TIPI opens interesting opportunities in relation to the behavioral aspect of procedural effects. In particular, since the quality of feedback linkages are likely to determine the effectiveness of policy instruments, behavioral biases can fundamentally affect instrumentation by either leading to ignoring negative feedback to maintain stability, or amplifying positive feedback to drive change. Previous research on how behavioral biases affect the use of real options for reducing the uncertainty relative to investment decisions provides novel conceptual grounds for studying this behavioral component in the management of TIPI. A paper is also currently under review, which takes an attention-based view to identify behavioral biases in the use of real options in Pre-Commercial-Procurement sequential decisions for selecting and managing a portfolio of projects.
- Third, the instrumentation lens retained for this dissertation could be extended to analyze the role of innovation agencies in the formulation of convergent normative and epistemic innovation policy goals, and its effect on the deployment of policy instruments. The emblematic case of the Swedish Innovation Agency (Vinnova) can shed light on the implications of an agency following a transformation approach that deals with uncertainty and complexity to set different angles towards sustainability challenges. Again, while

extant studies focus on the design, implementation and evaluations of missions in the context of this innovation agency (Molas-Gallart et al., 2021; Penna et al., 2021), more research is needed to explore how the co-creation process, which was adopted for defining its missions, actually translates into policy instruments that could profit from the assumed convergence between normative and epistemic policy goals, should they be (procedurally and substantively) transformative.

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