

Governance Models in European Industrial Clusters: A Comparative Analysis of Germany, France, and Spain

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Abstract. This study examines cluster governance models across three leading European economies—Germany, France, and Spain—to identify best practices and success factors in cluster development. Using a qualitative comparative analysis of secondary data from international reports, we analyze differences in governance structures, financing mechanisms, and key success factors.

Our findings reveal three distinct approaches: Germany's mixed public private model emphasizing innovation and autonomy, France's centralized state-driven system, and Spain's regional governance framework. Key success factors include diversified funding sources, strong public-private partnerships, and alignment with regional industrial strategies. The study contributes to cluster policy literature by developing a comprehensive framework for understanding governance mechanisms and their impact on cluster performance. As result, we conclude that effective cluster governance requires balanced state intervention, sustainable funding models, and strong coordination between regional and national actors.

Keywords: Regional cluster, governance models, public funding, territorial ecosystem, competitiveness, industry knowledge, best practices.

1. Introduction

The current economic landscape emphasizes the importance of local territory in enhancing the competitiveness of national companies on the global stage. Europe has been a testing ground for developing a territorial policy based on ecosystems, drawing from theoretical frameworks such as the Marshallian district (1890) and Porterian cluster (1990) models.

The ecosystem approach based on clustering, as discussed by Marshall (1890) and Porter (1990) has resulted in varied outcomes, making it challenging to understand the boundaries of success and failure of each form. This complexity is compounded by the absence of conceptual foundations to frame the involvement of public authorities in forming clusters.

Therefore, there is a necessity to address the following questions through a comparative study:

- How can we clarify the ambiguity surrounding the concept of clustering?
- Clustering policy can be implemented without state intervention?
- What are the differences between the three international models?
- What is the most effective approach to develop strong territorial cluster?
- Which local factors enable a public policy to maximize its cluster model?

Furthermore, there is a lack of in-depth theoretical analysis and comparative empirical studies on the effectiveness and scope of these policies, leading to a need for comparative studies based on historical experience of European cases, which have developed their own approaches to establish an effective and sustainable territorial ecosystem.

Besides, Newlands (2003) highlights the lack of clarity in the theoretical literature regarding the State's role in the process of "clusterization," raising questions about the theory's ability to define the conditions of implementing and governing this territorial model. To fill the theoretical and empirical gap, an interpretative approach will be taken, involving a qualitative analysis based on secondary data from international reports and studies.

The analysis will focus on three prominent European cases: Germany, Spain, and France, due to their strong and resilient industries based essentially on a cluster model, which has undergone a significant process of crystallization, enabling them to acquire a maturity, and expertise in economic growing by local clusters. The article aims to provide a qualitative understanding of the differences observed between successful cluster models worldwide, contributing to addressing the ambiguity surrounding the interpretation of different cluster models, and enriching the academic debate on the role of the state in the success of a territorial ecosystem approach.

In this perspective, our article is structured into five sections. The first section proposes a literature review highlighting the various types of territorial ecosystems, and their levers of intervention. Nevertheless, our literature review is based mainly on the theoretical constructs of Marshall (1890) and Porter (1990), followed by an analysis of the empirical literature on cluster governance and financing systems, also we analyzed the role of clusters in ecological and technological transition.

Subsequently, the second section is devoted to the epistemological framework and methodological choice, also addressing sample selection, data collection methods, plus the tools and methods used to analyze the data collected. The third section deals with the results obtained, before moving on to the fourth section dedicated to discussion of the results and findings identified. The results of our work show that the success of clusters is not self-evident, but it depends on public intervention to guarantee the effectiveness of the mechanism, and its right governance to seek its territorial mission.

2. Literature Review

2.1. Territorial ecosystems in review: a global analysis of forms and specificities

In response to the various crises that have impacted the global economy over the years, different types of ecosystems have emerged. These ecosystems aim to enhance the competitiveness and resilience of

the economy in a sustainable manner, leveraging the resources and strengths provided by the local ecosystem.

In this respect, an abundance of literature has emerged highlighting the importance of territorial and regional factors in developing business competitiveness. Various approaches, such as the industrial district Becattini (1989), the innovative environment Maillat & al. (1993) and the cluster Porter (1998) have gradually emerged, based on examples from industrialized countries such as Italian industrial districts and Silicon Valley.

Indeed, the industrial district raised by Marshal (1890) is considered the first type of ecosystem which had appeared in Italy, presenting itself as a specialized production ecosystem made up of small production units located in the same geographical area. He emphasizes the importance of an environment that fosters both competition, and cooperation to ensure the sustainability of small and medium-sized businesses. Over the years, French researchers Aydalot (1986); Perrin (1992); Courlet and Pecqueur (1992); Maillat (1995) have taken up the principle of the industrial district and given it a new name, towards a new French mechanism brought to light by Grenoble-based researchers and taken up by DATAR: Localized Productive Systems (SPL).

In line with the above, Porter has introduced a new concept that seems to be more flexible and better adapted to the objectives of a local ecosystem. According to Porter (1998), a cluster is « a geographically proximate group of firms and associated institutions, interconnected within a particular field and linked by common elements and complementarities ». Moreover, Porter (1990) considers that the trust established between cluster members and the resulting interactions facilitate access to new competitive advantages. With this definition, Porter calls on the scientific research community to move beyond a vision that reduces the ecosystem to a single geographical concentration, and to broaden the concept towards a more integrated ecosystem involving deep interactions and relationships based on structural proximity that goes beyond geography.

It is evident that SPL, as a form of ecosystem that has emerged in the French context, is similar in substance to Marshallian districts, because they place productivity at the heart of their mission. On the other hand, the cluster opens up the prospect of a form that supports the competitiveness of companies at several levels, going beyond the question of costs and economies of scale.

From this perspective, Gaudron & Mouline (2016) clearly show that “classic” industrial policy is giving way to clusters, the proliferation of which is encouraged by international bodies (European Commission, 2009 ; OECD, 2007 ; World Bank, 2009) that publish practical guides to improve this mechanism. Therefore, clusters are presented as effective remedies for deindustrialization and declining productivity gains. Clusters are seen as systems capable of improving regional and local competitiveness, and influencing economic performance through a number of advantages that extend beyond the achievement of critical size to other factors such as access to knowledge and innovation (Storper and Harrison, 1991; Audretsch and Feldman, 1996).

According to Ritter & Gemunden (2003), cluster policy must be able to produce and contribute to several factors, notably: Access to different kinds of resources (physical, financial, informational); dissemination of information through formal channels (working groups, seminars) and informal channels (day-to-day collaboration) ; and technological cross-fertilization (involvement of network players in the design and generation of ideas and products).

With this in mind, French policy has tried to implement two clustering mechanisms whose substance resembles the constructs put forward by Marshal (1890) and Porter (1990). For this reason, France has firstly introduced the concept of localized production systems, defined by DATAR in (1998, p.8) as : « a specific productive organization located in an area, generally corresponding to an employment basin. This organization functions as a network of interdependencies made up of productive units with similar or complementary activities that divide up the work (production or service companies, research centers, training organizations, technology transfer and monitoring centers, etc.). »

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territorial mechanism that responds exactly to the productivity objectives of a business cluster, in line with the fundamentals of Marshallian districts. Secondly, France has set up another mechanism known as the “pôle de compétitivité”, which draws heavily on the foundations of the Porterian cluster. In fact, it consists of an association of companies, research centers and training organizations, committed to a partnership approach, designed to generate synergies around innovative projects.

Table 1 : Overview of different types of existing clusters

Ecosystem type	Definition	Context of appearance	Type of collaboration
Industrial district	Zeitlin (1992, p. 280) « a geographically localized production system based on an intense division of labor between small and medium-sized companies specialized in distinct phases of the same industrial sector ».	Italy	Horizontal collaboration within an industry sector between SMEs for a productive division of labor
Local production system	SPL is defined by (DATAR, 1998, p.8) as : « a specific productive organization located in an area, generally corresponding to an employment basin. This organization functions as a network of interdependencies made up of productive units with similar or complementary activities that divide up the work (production or service companies, research centers, training organizations, technology transfer and monitoring centers, etc.). »	France	Vertical and horizontal collaboration between SMEs and multinationals around a specialized activity
Technopoles or science parks	Ruffieux (1991, p. 374) « local geographic concentrations of innovative companies, located close to scientific research and training centers, with the aim of forming an innovative micro-system. »	Europe, Japan, United States, Russia	Vertical and horizontal collaboration between companies and technological and scientific actors for highly technological activities
Competitiveness clusters	A competitiveness cluster is defined by the French government as « an association of companies, research centers and training organizations, committed to a partnership approach (joint development strategy), designed to generate synergies around innovative projects carried out jointly, targeting a given market(s) in a given territory. »	France	Vertical, horizontal and transversal collaboration between public and private actors to promote innovative projects
Clusters	Porter, (2000, p.16) « a geographically close group of interrelated companies and associated institutions in a given field, between which there are commonalities and complementarities. Its geographical scope ranges from a single city or region to an entire country, or even a network of neighboring countries. »	United States	Vertical and/or horizontal collaboration between SMEs, GEs, multinationals and public actors for cooperation and synergies in various fields.

Elaborated by the authors

It is evident that the variety of forms developed after the Marshallian district and the Porterian cluster are simply names that renew the concept without changing its substance, with the aim of appropriating the concept to territorialize it, and adapt it to the local context. This observation is supported by our cross-analysis of the various definitions identified during our literature review. All of these definitions highlight the importance of federating stakeholders in a geographical area to create synergies. These synergies assist companies in addressing their competitive challenges, whether related to productivity or innovation.

Consequently, the ambiguity noted in the literature is mainly due to the appropriation of the term by different players in different contexts and for totally different purposes. Nevertheless, the hard core of the territorial ecosystem finds its essence in the Marshallian constructs taken up by Porter, which correspond to a cluster of actors mobilized to produce positive externalities for the benefit of the local

fabric. Also, the positive externalities are not reduced to spatial advantages, but tend towards relational, cognitive, organizational and institutional proximity, giving rise to an integrated local ecosystem.

2.2. Cluster governance analysis

The ecosystem concept proposed by Porter (1990) is considered the most suitable for promoting local strengths and creating a diversified system of synergy involving all regional and local actors. However, to ensure this approach is effective, strong and successful governance is absolutely vital. Numerous researchers are questioning the role of governance in developing effective cluster dynamics (De Propriis & Wei, 2007; Ehlinger, Perret, & Chabaud, 2007; Provan & Kenis, 2007; Bocquet & Mothe, 2009; Boquet, Mendez, Mothe, & Bardet, 2009; Thorgren & al, 2009; Berthinier-Poncet, 2012). Governance and leadership can significantly impact cluster performance, as demonstrated by (Sölvell, Lindqvist, & Ketels, 2003).

In a comparative study of two French clusters, Bocquet & al (2009) found that the differences between the governance modes of the cases analyzed led to different levels of performance, raising questions about the impact of the governance on cluster performance. In this sense, Lachgar & Benmoussa (2020) demonstrate that the good governance established among cluster members, due to the cluster's efforts has a direct impact on improving the business performance of Moroccan cluster member companies by introducing best practices. In addition, Achermann (2017) found that clusters foster a process of local territorial governance marked by institutional proximity, this enables local territorial actors to rally around dynamic innovation projects.

It's important to note that cluster members include private and public actors, individual and collective stakeholders, with no subordination ties, and have freedom of entry and exit based on their strategic interests (Berrone & Gomez, 2009). Given this, research on cluster governance has attracted more interest in recent years, exploring its role as a determinant of cluster performance and efficiency remains a crucial area to prove its legitimacy. In this respect, another theory has its place in establishing the foundations of inter-firm transactions. The convention theory emphasizes the importance of all stakeholders, including customers, shareholders, institutions and employees, in coordinating transactions. Convention economics, developed by a group of economists in France, aimed to take a fresh look at the institutionalist approach, drawing inspiration from other disciplines such as law, sociology and politics. According to, Orléan (2004, p.4), a convention is « regularity (R) in the behavior of members of a population (P), placed in a recurrent situation (S) », if the following six conditions are satisfied:

Table 2 : The different stages of the collective agreement

Step 1 : Each one conforms to R
Step 2 : Everyone believes that others conform to R
Step 3 : This belief gives everyone a good and decisive reason to conform li even to R
Step 4 : Everyone prefers general compliance with R
Step 5 : R is not the only possible regularity satisfying the last two conditions
Step 6 : The above conditions are common knowledge

Elaborated by the authors adapted from Orléan (2004, p.2)

Consequently, our previous work has been divided into three streams, each defending a distinct mode of governance.

a) Intervetionist paradigm

In this context, Porter (2000) considers that while clusters can emerge and develop naturally, but the state must support their expansion. Indeed, if the very existence of a cluster indicates that it only emerged due to a conjunction of factors favorable to its creation, the support of public power can

potentially increase its capacity. To this end, Uzinidis (2010) considers that the state has two tools at its disposal for investment and economic development policies: direct and indirect tools.

To this end, Lefevre (2016) noted in his thesis certain obstacles encountered by the cluster in managing and federating players around a common vision, in the face of multidimensional heterogeneity that is at once economic, political and local. Hence, the importance of state intervention, which seems to be decisive in providing the cluster the necessary means and legitimacy. On the other hand, Achermann (2017) has examined the case of Russian clusters, revealing the failure of cluster structures to achieve the objectives of this agglomeration. On the contrary, they have weakened rather than strengthened the competitiveness of the players involved, due to the inefficiency of local governance, which crucially depends on the state.

Furthermore, Bocquet and Mothe (2009) noted in their qualitative research that private governance alone is insufficient for ensuring the success of an SME (small and medium-sized enterprises) cluster. Instead, they found that this type of governance tends to hinder effective collaboration among members. They emphasized the critical importance of government involvement in fostering a cohesive dynamic and enhancing commitment among SMEs. In essence, government intervention is vital, as it provides SMEs with additional resources that can help them develop competitive advantages, particularly in the area of innovation. Moreover, Boustane (2023) noted the same findings in the case of the Ras Lma cluster, which ultimately failed due to the lack of consistent involvement by the State to deploy an effective governance helping to provide the cluster with the prerequisite resources needed for its start-up and growth.

According to Diallo (2006), countries that have made significant economic progress use clusters as a public device to offer various advantages to companies, particularly those operating in the ICT sector, such as access to manpower, reputation and visibility, establishment of territorial trust, training and scientific research, as well as innovation and technologies. In parallel, Doloreux, & Melançon (2006), have also demonstrated that the cluster's inadequate results are mainly due to the limits that public policy efforts must face, if they are not to turn the cluster into a public policy with no real effects on businesses. The main limitations are : the lack of sufficient resources dedicated to technology and innovation support for companies ; the lack of a varied range of financing options based primarily on venture capital ; and the lack of critical mass to foster more dynamic interactions within the cluster. According to the results of the study conducted by Kaoud (2018), the involvement of the State in the governance of the cluster favors the development of a well-developed technological infrastructure. This encourages large companies and private investors to take an interest in the cluster.

b) Evolutionary paradigm

Advocates of this approach argue that any type of public intervention is unnecessary, ineffective, and harmful to cluster development, which they view as a process, according to (Rosenfeld, 2001). This perspective emphasizes the role that private entities can play in fostering a territorial dynamic guided by private action, independent of state support. Boquet, Mendez, Mothe, and Bardet (2009) suggest that a commonly held vision among stakeholders is sufficient for an effective governance system that enables territorial networks to function optimally.

In this context, Bocquet and Mothe (2015) emphasize the need for an independent cluster structure that brings together participants around a strategic roadmap designed to guide small and medium-sized enterprises (SMEs) toward excellence. This approach focuses on acquiring and integrating knowledge while addressing technological challenges faced by less advanced small and medium-sized enterprises (SMEs). Likewise, Montargot and Férérol (2016) found in their exploratory study that a governance structure led by a group of participants is essential for establishing a shared vision and clear strategy. This structure aids in coordination and engagement with stakeholders.

On the other hand, the results of a thesis carried out in the Egyptian context attest to the underperformance of the clusters analyzed due to public governance, which has a negative impact on the development of innovation within the cluster. This is due to the bureaucracy that weighs on the effectiveness of actions (Kaoud, 2018).

However, large companies can take advantage of their weight in the cluster to turn it into a decision-making power that serves the interests of large, memberous companies to the detriment of small and medium-sized firms (Hu and al, 2021).

In addition, Gautier (2015), attests that the private governance could sometimes prevent the cluster from developing due to the lack of internal skills and manpower, and its dependence on the president. Indeed, this is another problem due to individualistic vision, which in some cases might not result in decisions and actions that serve the interests of all members. Hence the role of the State, which becomes crucial in federating the collective and aligning visions.

c) Middle paradigm

A third intermediate trend, referred to as “reengineering” according to Andersson, Schwaag-Serger, Sörvik, & Wise-Hansson, (2004) who recognize that although the market and private players are the main driving forces behind the emergence, growth and organization of clusters. Public policies can also play an important role in terms of support and accompaniment, as emphasized by (Rosenfeld, 2001; Roelandt, Gilsing, & Van-Sinderen, 2000).

In this respect, Bianchi & al (1996) state that government intervention and support, distributed throughout the economic landscape via a cluster structure, enhances access to specialized infrastructure and types of venture capital financing. Doloreux, & Melançon (2006), based on a qualitative analysis of the maritime cluster in Quebec, noted the cluster's inability to succeed in its actions given the heterogeneity of its players, rendering its mission meaningless and with no real impact on businesses. Consequently, the state could intervene indirectly through its role as facilitator and guarantor, which could not be satisfied without a public commitment giving access to impactful state support.

In this vein, Doré (2021) through his empirical observations indicates that clusters as structured and organized groupings can emerge in a variety of ways, whether through a public initiative or a private-sector initiative supported by an association. However, the state's lack of involvement and commitment to the cluster does not lead to a dynamic and solid membership. This calls for a rethink of how clusters are governed and financed, without making them dependent on state action, and also without privatizing them and making them totally autonomous.

Favoreu, Lechner, & Leyronas (2008) have analyzed the role of public authorities in the dynamics of cluster development, revealing that state support for clusters depends on their development phase and life cycle. It appears that the effectiveness, nature and legitimacy of public policies to support clusters vary according to their degree of development. What's more, certain phases (development and structuring phases) appear to be more favorable in terms of effectiveness and therefore more legitimate for public intervention than others.

This calls for a reassessment of state intervention and recognition of its role in resolving certain problems linked to the specific characteristics of the territory, which cannot be resolved without public action. The same authors noted the importance of the State in alleviating administrative procedures to accelerate the development of innovations, particularly for access to funding programs, as well as the procedures of supervisory bodies that do not encourage cluster companies to maintain partnerships with public bodies.

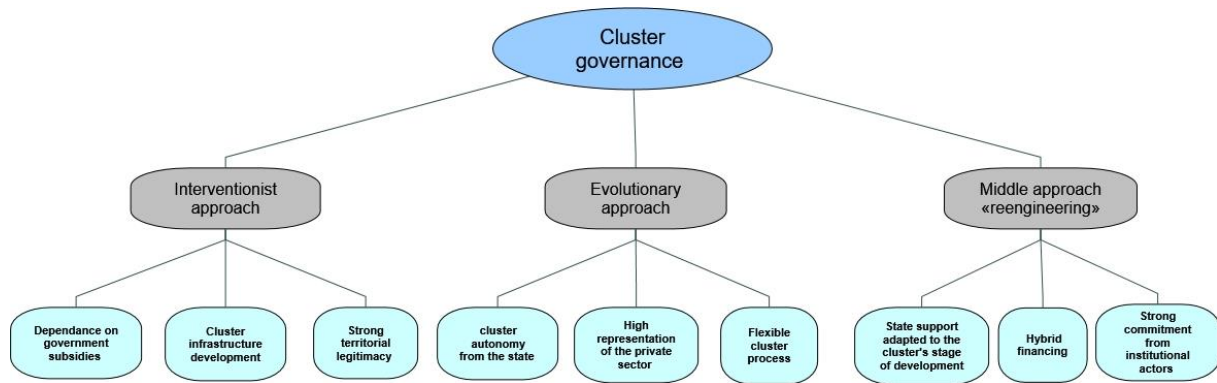


Fig.1 : Comparative overview of the benefits of governance models

Elaborated par the authors on NVIVO 12

We can see from this diagram that there are certain differences that distinguish each mode of governance. Indeed, Achermann (2017), reveals that the interventionist mode based on a strong involvement of the state in the governance structure, is likely to generate a certain institutional proximity stemming from the legitimacy of the cluster due to the state's commitment.

The interventionist mode is crucial because it supplies the cluster with the financial and infrastructural resources necessary for the development of its members. In this regard, Bocquet and Mothe (2009) found that small and medium-sized enterprises (SMEs) require state intervention to access the financial resources needed to support the cluster's innovation and research and development (R&D) activities. In the same vein, Gautier (2015), supports the proponents of the interventionist mode by demonstrating that the absence of the state in the governance structure generates a low level of stakeholders commitment, who see the state as a guarantor of the cluster's legitimacy.

Furthermore, the public intervention helps to strengthen the reputation of member companies, and the reputation of the cluster (Chabault, 2009; Messeghem and Paradis, 2009; Poivret, 2010; Bachmann and Inkpen, 2011). However, Montargot and F  r  rol, (2016), found that cluster success is closely linked to formal governance and a clear strategy. They deduced that a grouping of actors could achieve this without depending on state involvement. Besides, Favoreu, Lechner, & Leyronas (2008) found that public governance is likely to negatively affect cluster performance in innovation and synergy, due to a bureaucratic approach that makes the process of accessing funding and partnerships too complicated, especially for SMEs.

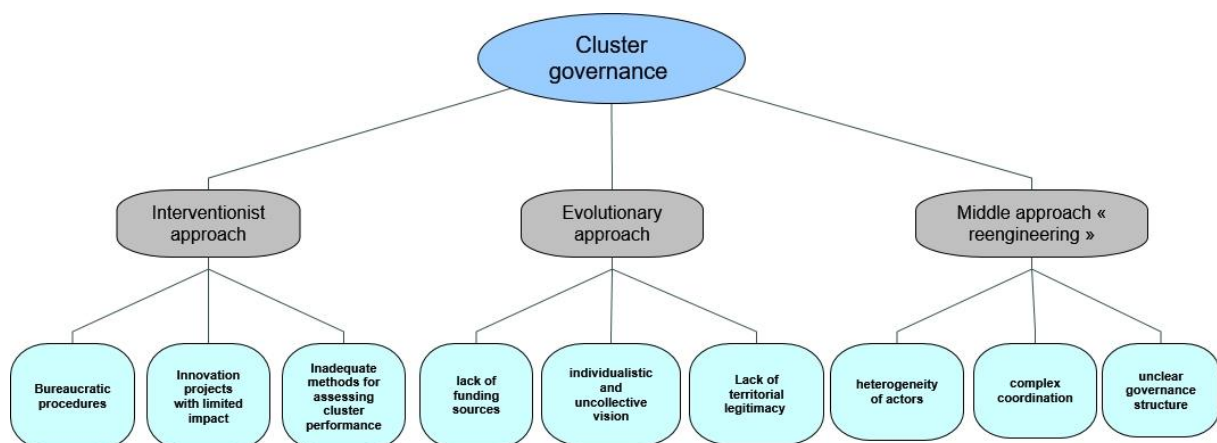


Fig.2 : Comparative overview of the inconvenients of governance models

Elaborated par the authors on NVIVO 12

On the other hand, Bouncken & al, (2020) support the same postulate demonstrating that a rigid and a centralized governance system could hinder the integration of family businesses into the ecosystem,

as it limits the flexibility they need to innovate. They see flexibility as a necessary condition in the governance system to stimulate innovation and the transfer of new knowledge.

Additionally, Cobben, Neessen, Rus & Roijackers (2023) found that the nature of the companies in the ecosystem affects the mode of governance. Consequently, the ecosystem based on family businesses requires a more flexible, less formal mode of governance, which has a positive impact on the links established between players particularly partnerships linked to innovation.

In this vein, Murray, Kuban, Josefy, & Anderson, (2021) ; Chod, Trichakis, & Yang, (2022) support the same postulate, arguing that decentralized governance makes it easier for investors to adhere to the ecosystem. Indeed, an increasingly decentralized governance system makes coordination and interaction between actors more fluid and rapid without depending on the intervention of a central actor such as the state (Catalini & Gans, 2020; Chen & Bellavitis, 2020).

Nevertheless, Cennamo, Dagnino, Minin, & Lanzolla, (2020) support the interventionist paradigm, stating that centralized governance prevents ecosystem fragmentation. In the same way, a centralized and transparent system of governance helps to establish a degree of trust between players. Particularly, in the case of highly technological ecosystems whose consolidation is achieved through dematerialized, intelligent platforms (Martino, Vanacker, Filatotchev & Bellavitis, 2024).

However, Ooms, Caniëls, Roijackers & Cobben (2020) have shown that the mode of governance should adapt to the challenges encountered in each phase of ecosystem development, which aligns with the postulate of the middle paradigm. Indeed, the ecosystem is a changing space that depends on the challenges faced by its stakeholders, hence the importance of taking into account the cluster's development phase to readapt the governance system to the needs and constraints of the current stage. For example, the initiation stage requires the federation of relevant stakeholders, while the growth phase requires more financial resources to fund the cluster's projects and actions (Ooms, Caniëls, Roijackers, & Cobben, 2020). To counter these structural blockages in governance, it would be appropriate to set up a participative governance system that facilitates decision-making and federates all stakeholders (Eremia & al, 2017).

From this literature review, we can conclude that the governance is now recognized as an essential element in fostering the development of effective territorial ecosystems, with a significant impact on the local economy. This leads us to consider the conditions for successful governance of territorial clusters, based on an in-depth benchmark of three international models.

2.3. The role of clusters in the digital and sustainable transition

Del Río-Castro, González-Fernández, & Uruburu-Colsa, (2021); Brenner and Hartl (2021) point out that all countries today face a dual challenge: sustainability and digital transformation. To this end, Cheng, Kamble, Belhadi, Ndubisi, Lai, & Kharat, (2022) found a causal relationship between digital transformation and the economic development of countries. This means that a country's ability to secure its place in the global market is closely linked to the digital transformation of its economic fabric to move towards an increasingly sustainable supply.

However, the positive impact of sustainable & digital transformation is not inevitable, it depends on the success of the governance system and the effectiveness of public policies to manage optimally this territorial, economic, social and organizational transition, while avoiding the risks of socio-economic imbalance (Brenner and Hartl, 2021; Flyverbom, Madsen, & Rasche, 2019; Ghobakhloo, 2020). Besides, Jungnickel and al (2022) have found that the integration of digital or sustainable practices in a sector or market is strongly linked to legal frameworks and political objectives. In other words, the structural and radical changes could not succeed without a paradigmatic anchoring (Caputo, Pizzi, Pellegrini, & Dabić, 2021).

To this end, Fura, Karasek & Hysa (2024) place public intervention and territorial governance at the heart of digital and sustainable transformation, stressing the importance of public intervention to accelerate technological transformation and strengthen digital infrastructure in order to achieve the SDG 2030. In line with this, territorial clusters are crucial for facilitating access to the local factors, and infrastructure needed for innovation (Ferretti & al, 2021). In other words, clusters help accelerate

the ability of players to innovate through regional platforms or “hubs” connected to national, continental or, more often, global scales enabling companies to access the necessary resources and skills and also to forge fruitful relationships with new partners (De Propriis and Hamdouch, 2013).

This system is essential for SMEs that are unable to invest in innovative projects that exceed their financial capacity and involve a high level of risk (Goerzig & Bauernhansl, 2018; Guinan, Parise, & Langowitz, 2019; Pelletier & Cloutier, 2019). The synergy generated by the cluster gives rise to impactful advantages enabling companies to access the knowledge and resources needed for innovation (Høivik and Shankar, 2011; Zaleśna and Predygier, 2021). Similarly, Li, Kenney, Patton & Abraham (2023) demonstrate that the geographical concentration of players leads to the creation of a dynamic ecosystem favoring innovation which attracts more venture capital. In this regard, Clayton, Feldman & Montmartin (2023), confirm the positive impact of participation in formal networks on companies' economic and financial performance. Likewise, Ben Amara and Chen, (2020) indicate that the open innovation is more beneficial, because it is based on inter-organizational partnerships facilitating access to new knowledge, expertise and complementary resources hence the importance of joining clusters.

However, Zaleśna and Predygier (2021), have noted the existence of certain socio-cultural factors that may escape governance, but have a considerable influence on the perception of sustainability and the commitment of actors to the success of these actions within the cluster. Thus, it is crucial to have an agglomeration that promotes players to adopt innovative and sustainable practices, through a federating form of governance based on a shared vision (Bonneveux and Gautier, 2019).

To this end, Kassandra (2024) emphasizes that for governance to effectively drive significant transformation within companies, it is crucial to engage influential economic actors within the cluster. This includes public authorities, government institutions, and financial organizations, as their involvement helps cultivate a rich ecosystem of interactions. This reasoning is in line with Porter and Linde (1995), who see political and public intervention as a fundamental condition for the success of clusters particularly industrial clusters. The aim is to move from a fragmented territory to an integrated one giving all companies access to local factors.

Moreover, Lipponen & al (2017) point out that digital and green transition require public investment that facilitates access to the necessary infrastructure, and an evolving regulatory framework that adapts to change. In line with the above, we can see that recent work underlines the important role of public authority involvement in cluster governance, as a facilitator of access to resources, and a federator of heterogeneous actors.

3. Research Methodology

3.1. Epistemological positioning

In an exploratory effort to deepen our understanding of the complex phenomenon of territorial cluster governance, we found it necessary to refer to an approach that aligns with our aim of understanding and exploring.

In this regard, interpretivism appears to be an appropriate epistemological approach aligned with the previous works that have demonstrated the relevance of this paradigm in analyzing the role of public policies and modes of governance in the success of territorial ecosystems (Berthinier-Poncet, 2012; Gautier, 2015; Kaoud, 2018; Bokov, 2021).

To this end, Berger & Luckmann (1966) emphasize the importance of interpreting social and individual interactions to deepen the understanding of a reality involving multiple individuals and actors. Additionally, Denzin & Lincoln (2018) note that interpretivism is crucial for understanding social contexts by considering the plurality of perspectives and experiences.

Considering the scope of our study, which aims to examine the governance system of territorial clusters by analyzing the differences, observed in different contexts, interpretivism is preferable due to its ability to analyze reality by highlighting contextual meanings, as emphasized by (Guba & Lincoln, 1994).

By choosing this approach, we are adopting a method that emphasizes experiences and factors specific to the context, enabling a deeper understanding of our research question in order to provide recommendations that highlight the divergences, and convergences observed among the three recognized clustering models known for their expertise, and consistent progress over time.

3.2. Sample selection

The value of a purely qualitative and exploratory benchmarking study is rooted in the careful selection of cases. According to Yin (2017), using multiple case studies in a benchmark allows for a deeper understanding of dynamics by cross-referencing results and identifying recurring patterns. In contrast, analyzing a single case has limitations that hinder the researcher from fully benefiting from qualitative analysis. In other words, the strength and usefulness of qualitative analysis are enhanced by the diversity and richness of the experiences being examined. To this end, we have opted for a benchmark of three carefully selected cases that have significant experience in the studied field aiming to draw comparative and in-depth insights. This approach allows us to explore diverse practices and identify common or divergent trends. By choosing these three cases, we aim to enrich our analysis by comparing distinct yet comparable contexts in terms of complexity and challenges encountered. Furthermore, these cases were selected not only for their relevance but also for the richness of the data they offer, facilitating a detailed and nuanced analysis. This comparative approach is essential for deriving recommendations based on proven practices, while considering the contextual specificities of each case studied.

For this purpose, we have selected Germany Spain and France due to the positive development of their cluster policies, and their position in the global economy, which enriches the contributions and results of our benchmark. Ultimately, analyzing a benchmark of three cases will allow us to draw stronger conclusions and propose solutions tailored to similar challenges faced by other countries in the field.

3.3. Data collection process

In this paper, we utilized a qualitative approach based on a triangulation of secondary data sources to achieve our objective. Our aim was to gain a thorough understanding of the different models of clusters evolving in various contexts. To analyze the specific features of the models studied and identify the key success factors of a successful governance system for a more effective territorial ecosystem, we employed a series of international reports as our secondary data sources. According to Miles & Huberman (1994), qualitative analysis of secondary data is crucial due to the flexibility it offers the researcher in re-examining the data in a new light, bringing more subtle perspectives to light. To this end, we have tried to follow a rigorous protocol, adapted to the nature of the secondary data and the exploratory objective.

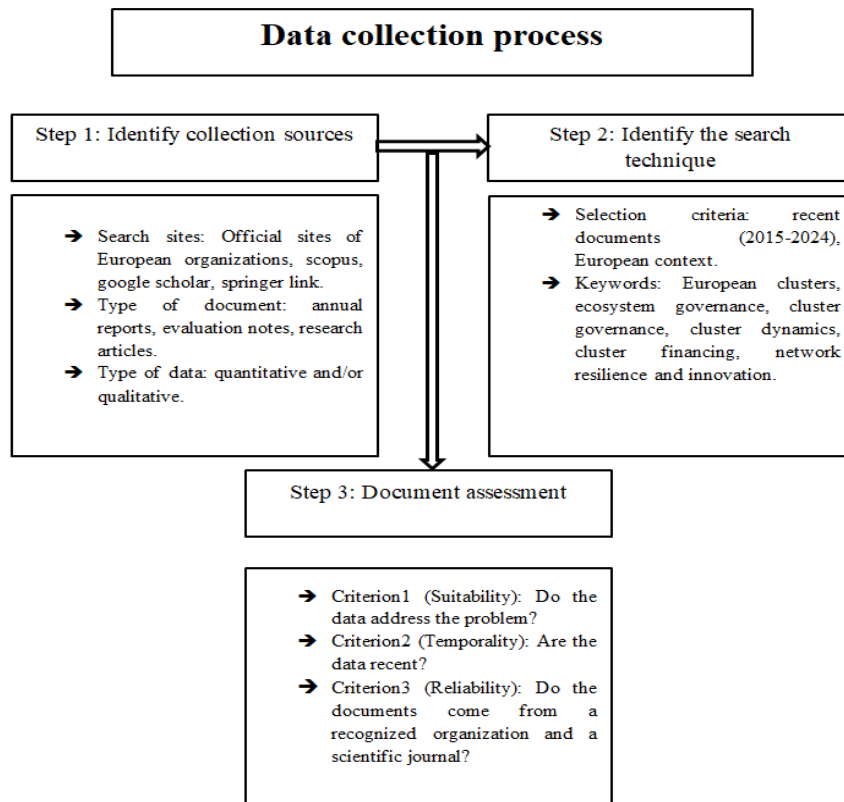


Fig.3 : Diagram of data collection process

Elaborated by the authors

First, we tried to identify a selection of public databases from which we could collect quantitative and/or qualitative data in the form of annual reports, evaluation notes and research articles. Also, the articles were sourced using a list of keywords related to the research object. Next, we selected papers that dealt with the European context, and had been published over the period (2015-2024). Finally, we adopted a third stage dedicated to evaluate all the documents to exclude or include them in the final selection according to 3 criteria presented in the form of objective questions:

- Criteria1 (relevance): Do the data address the problem?
- Criteria2 (Temporality): Are the data recent?
- Criteria3 (Reliability): Do the documents come from a recognized organization or scientific journal?

This approach refers to the constructs of Bryman (2016), who stresses the importance of the secondary data source evaluation step to check their quality against three criteria: relevance, reliability and timeliness. This process enabled us to avoid the risks and shortcomings of secondary data, which have certain limitations linked to their inadequacy or obsolescence (Kumar, 2019).

3.4. Coding processes and reliability measures

For data processing, we opted for a rigorous process that enabled us to reinforce the reliability of our qualitative approach and optimize the quality of the secondary data collected. Firstly, we referred to Lincoln & Guba's (1985) protocol for processing qualitative data, from which we were able to develop our own deductive coding protocol in order to propose a new process well-matched to a deductive coding approach, the nature of the secondary data, and a comparative analysis of three distinct cases.

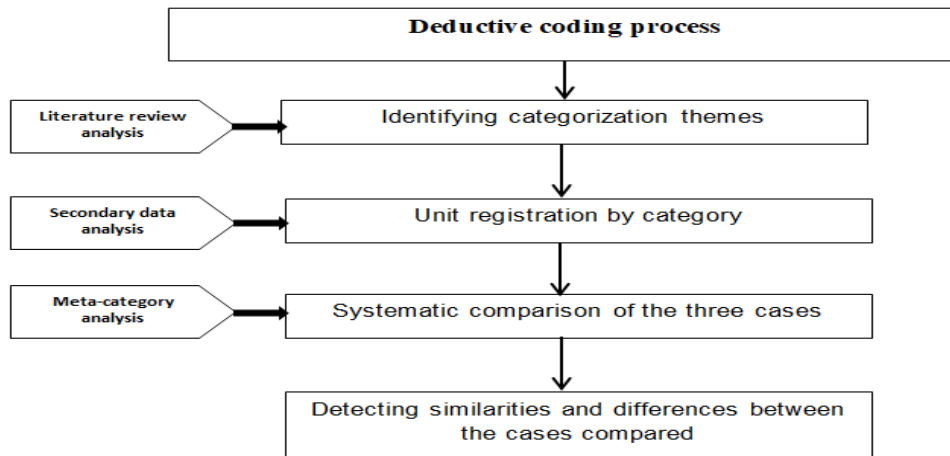


Fig.4 : Coding process diagram

Elaborated by the authors adapted from Lincoln & Guba (1985)

To do this, we deduced a series of categorization themes based on the constructs of the literature review. This involves defining a priori the codes that will host the text segments (Point and Voynnet Fourboul, 2006; Gavard-Perret and Helme-Guizon, 2008). Next, we began to analyze the data provided by the selected reports in order to assign to each theme the text units that align with its objective. To this end, we reduced the number of themes to the following list:

Governance system	Financing system	Innovation policy
<input type="checkbox"/> Involving the regions	<input type="checkbox"/> Exemptions	<input type="checkbox"/> Programs of innovation
<input type="checkbox"/> Territorial legitimacy	<input type="checkbox"/> Public funds	<input type="checkbox"/> Funds of innovation
<input type="checkbox"/> Public governance	<input type="checkbox"/> Private contribution	<input type="checkbox"/> Diversifying actors
<input type="checkbox"/> Approche top down or bottom up	<input type="checkbox"/> International funds	<input type="checkbox"/> collaborative projects
	<input type="checkbox"/> Région funds	

Fig.5 : List of coding themes

Elaborated by the authors

We then carried out a systematic comparison of all the categories to deduce the convergences and divergences of the three cases analyzed (Glaser & Strauss, 1967). Secondly, we put in place a rigorous procedure to verify the reliability of the coding system and rendering. To this end, we have mobilized the constructs provided by Weber (1990) to establish a process of reliability measurements that enables us to verify the quality of data processing based on qualitative and non-statistical measures of reliability.

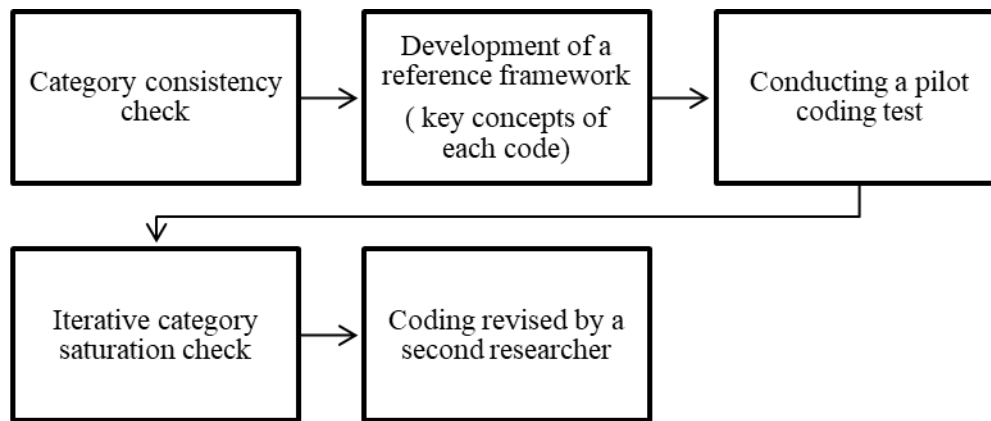


Fig.6 : Diagram of coding reliability measurements

Elaborated by the authors

This methodical approach of analysis enabled the research to be structured in a coherent way, and ensured the reliability of conclusions based on secondary data. Ultimately, this qualitative approach, supported by the use of NVivo software, enabled us to fully leverage the available data to achieve the study's objectives.

4. Results

Recent studies have highlighted the importance of governance and financing for the success of business clusters. Thus, public intervention is seen as crucial in addressing these challenges. In this respect, our research emphasizes the essential role of the State in establishing a sustainable financing system and effective governance. We have looked to European countries as a benchmark due to their expertise in this area. Catalan clusters, French “pôles,” and German “Kompetenznetze” are considered global benchmarks for cluster development, each relying on different instruments and public policies. Our findings outline the unique governance and financing methods of these three cluster models. It's important to note that these results are based on qualitative analysis using Nvivo software, and they offer valuable insights for our study's objectives.

4.1. The case of Germany

The German system, at federal level, is based on thematic “competence networks”, created in 1998 at the instigation of the Federal Ministry of Education and Research, before coming under the jurisdiction of the German Federal Ministry of Economics and Technology (BMWi) in March 2006. According to the “Clusterplattform Deutschland”, 435 cluster initiatives are active in Germany, covering 37 technology/application areas¹.

Germany's clusters are diverse and multi-faceted, characterized by a high density and balanced distribution throughout the country. They have dedicated structures in all industries and technological fields. We also found that the federal and state governments are involved in supporting and managing these structures through a multitude of programs and approaches. At federal level, German clusters are supported by two ministries: the Federal Ministry of Education and Research (BMBF), and the Federal Ministry of Economics and Technology (BMWi). Indeed, the development and support of successful regional innovation networks and clusters is a central concern of the German federal government's high-tech strategy 2025. In addition, there are numerous cluster networks financed by the Länder as well as by private funds.

¹ Vogle, B. (2020). Cluster initiatives in Germany: Common activities, organisational and financing model. German Economic Team. https://www.german-economic-team.com/wp-content/uploads/2022/01/GET_BLR_PB_05_2020_EN-1.pdf

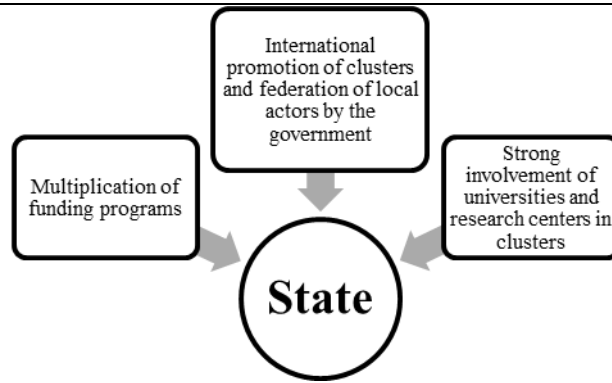


Fig.7 : German government intervention levers

Elaborated by the authors

The German model is based on consistent, supervised state support for innovation, plus international cluster promotion. The various measures taken by the state range from financial support for cluster management, to the promotion of innovation projects, continuing education activities and joint state-wide public relations work. In addition, innovation activities within German clusters are financed by programs launched by the line ministries, with direct funding subsidies focused more on supporting cluster animation and networking activities. Also, the total funding amounts to around €33.25 million, from national and European funds. The Participants can receive a maximum of 1.8 million euros, which means that self-financing of at least 20%² of total project costs is required. In fact, each cluster finances itself via different funding methods:



Fig.8 : Sources of funding for German clusters

Elaborated by the authors

As the bottom-up approach prevails in Germany, membership fees represent another very important source of funding. In this regard, to accelerate the development of innovation, the Land has reinvested the money recovered from privatizations in programs to support the development of the economy and innovation. Moreover, the German state adopts a policy of promoting excellence among clusters, as a necessary condition for benefiting from state funding via programs to select the best clusters by region. The ultimate aim is to encourage better cluster management in favor of cooperation between science and business. More recently, the German government launched the *Cluster4Future* program to boost the creation of innovation clusters. The program has a budget of around 650 million euros, financed by the German Federal Ministry of Education and Research. The aim is to finance and operationalize clusters of the future in three successive phases, during which the average proportion of self-financing rises from 20% to 35%, and then to 50%³. In contrast to France, the German federal government acts as a facilitator of cluster development through a range of regular programs all of which focus on innovation (Go cluster, clusters 4 future, Leading-Edge Cluster Competition).

² European Cluster Collaboration Platform (ECCP). (2024). European cluster panorama report 2024 https://www.clustercollaboration.eu/sites/default/files/document-store/Cluster_Panorama2024.pdf

³ European Cluster Collaboration Platform (ECCP). (2024). European cluster panorama report 2024 https://www.clustercollaboration.eu/sites/default/files/document-store/Cluster_Panorama2024.pdf

4.2. The case of France

The objectives of the cluster policy have gradually evolved since 2005. Initially focused on a well-defined territory, the clusters have broadened their scope to include companies from other regions, and their number has been sharply reduced from 71 in 2012 to 54 in 2021 with 80,000 companies organized in competitiveness clusters⁴. The fifth phase was launched at the beginning of 2023 with the announcement of the new list of selected clusters.

At the outset, French public policy tried to spread the clusters across the various regions of the country, before realizing that the clusters had developed a stronger territorial coverage that was not limited to the companies in their regions, but had broadened their scope to support companies outside the cluster's geographical perimeter. Each cluster is equipped with a management and leadership structure that benefits from public support through a system of subsidies from the State and local authorities. The State's contribution amounts to a total of 9 million euros in 2022 for all clusters, plus 20 million euros in 2022 from local authorities. In addition, the clusters have developed a self-financing capacity that comes from membership fees paid by cluster members or services invoiced to them. The majority of financing is now coming from private sources, currently accounting for 55% of the total.⁵

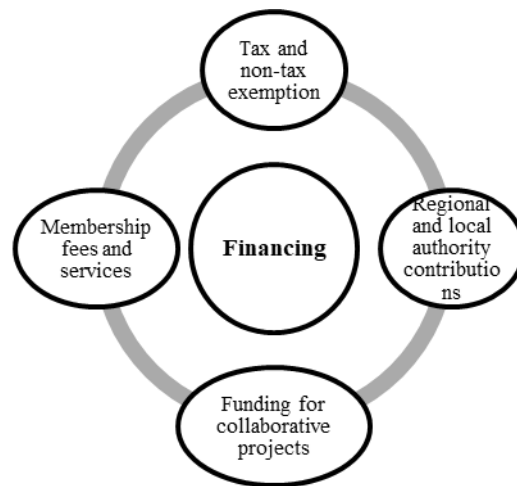


Fig.9 : Sources of funding for French clusters

Elaborated by the authors

Unlike in Germany, French clusters rely heavily on financial support from the French government. In 2005, the total budget earmarked for cluster funding by the French government was set at €1.5 billion for a 3-year period (2006-2008). Thus, following a positive assessment of the first phase (2006-2008) of the cluster policy, the French government has decided to allocate €1.5 billion to launch a second phase (2009-2011).⁶ This support comes from a variety of funders: Single Interministerial Fund, Deposit and Consignment Office, Local authorities and others. France's competitiveness clusters benefit from an unprecedented budget, with a variety of funding sources: direct subsidies to companies, in the form of aid for collaborative R&D projects or exemptions from social security contributions for researchers, and exemptions from corporate income tax, business tax and property tax.

⁴ Ministry of Economy, Finance, and Industrial and Digital Sovereignty. (2023). Competitiveness clusters: Status at the end of phase 4. <https://www.entreprises.gouv.fr/fr/etudes-et-statistiques/themas-de-la-dge/poles-de-competitivite-etat-des-lieux-la-fin-de-la-phase-4>

⁵ Ministry of Economy, Finance, and Industrial and Digital Sovereignty. (2023). Competitiveness clusters: Status at the end of phase 4. <https://www.entreprises.gouv.fr/fr/etudes-et-statistiques/themas-de-la-dge/poles-de-competitivite-etat-des-lieux-la-fin-de-la-phase-4>

⁶ Regional Council of Île-de-France. (2008). Global clusters: Cross perspectives on the theory and reality of clusters. Identification and mapping of major international clusters. https://www.institutparisregion.fr/fileadmin/NewEtudes/Etude_269/ClustersMondiaux.pdf

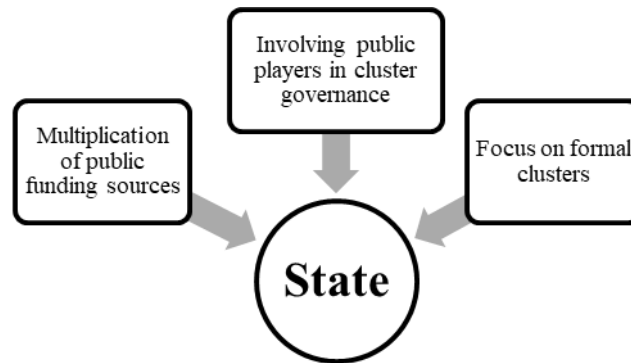


Fig.10 : French government levers of intervention

elaborated by the authors

In 2012, an evaluation of France's clusters “Pôles de compétitivité” revealed that €2.5 billion in public support had led to the launch of nearly 1,500 projects. Additionally, over €6.5 billion had been allocated for research and development funding. It's important to note that 80% of the 9,700 companies involved in the initiative are small and medium-sized enterprises (SMEs), which also received more than 50% of the funding provided by the Cluster Fund.⁷

As part of its strategy to strengthen R&D, public policy in France has progressively multiplied the number of organizations helping to accelerate clusters' R&D efforts. In addition to national players in public R&D funding, local authorities also contribute to the financing of cluster projects, as does access to European aid, an indispensable source of R&D funding.

In terms of governance, french clusters are organized as associations, with central government bodies such as the Interministerial Delegation for Regional Development and Competitiveness (DIAC) and the Directorate General for Competitiveness, Industry and Services (DGCIS). At the same time, local authorities are also involved in the operation and financing of clusters in their area, they are systematically members of the clusters, and thus participate in decision-making.

As a result, French clusters now have a common structure that federates them, guides their actions and represents them in their dealings with various players, particularly the public sector. This association, France Clusters, was set up in 1998 to bring together business clusters, competitive clusters, business networks and their public (State, local authorities), economic, scientific and financial partners.

4.3. The case of Spain

In 2006 the Spanish government issued a ministerial decree dedicated to the development of a new industrial policy to set up a support program for innovative business clusters. The aim was to promote business clusters by encouraging a sufficiently large number of companies to create a dynamic of territorial and sectoral innovation. Assistance under this program is provided in the form of grants to groups, associations and/or not-for-profit entities acting as facilitators. Appropriate public funding is limited to subsidies capped by decree at a maximum of 60% of operating expenditure, and 50% of capital expenditure. This mechanism has allowed for the registration of 165 clusters in the special EIG register of the Spanish Ministry of Industry. The total funding amounted to 32.4 million euros. Initially, most of the funds were allocated to the first two support modalities: 9 million euros for the preparation of strategic plans and 12.2 million euros for the establishment of management structures. Additionally, 11.2 million euros were designated for financing specific activities and cooperation

⁷ European Commission. (2016). Smart guide to cluster policy: Guidebook series on how to support SME policy from structural funds . [file:///C:/Users/pc/Downloads/GB11%20-%20Smart_Guide_to_Cluster_Policy%20\(1\).pdf](file:///C:/Users/pc/Downloads/GB11%20-%20Smart_Guide_to_Cluster_Policy%20(1).pdf)

projects. The GEI program utilized a combination of private financial resources totaling 60.3 million euros, alongside public funding of 32.5 million euros.⁸

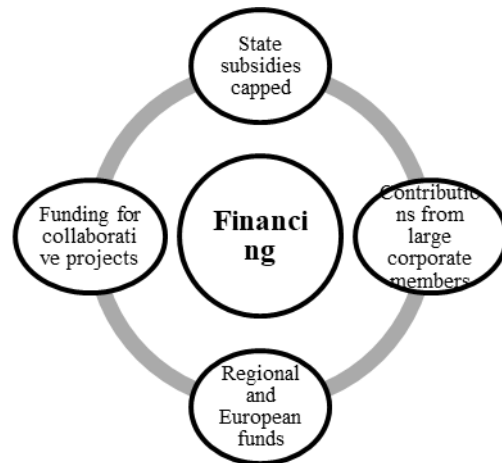


Fig.11 : Sources of funding for Spanish clusters

Elaborated by the authors

The resources allocated to clusters under this program are intended more to operationalize the structure in charge of cluster management and leadership, covering everything from strategic planning to the implementation of pre-established management structures. This funding consists of capped subsidies and does not include any special tax benefits for companies. Most cluster organizations operate with an annual budget ranging from 200,000 to 600,000 euros. Approximately 40% of this budget is financed through membership fees and public subsidies at the regional, national, and European levels.⁹

In 2023, Catalan clusters initiated approximately 100 collaborative projects, and 180 companies received a total of 2 million euros in subsidies to support these cluster initiatives. Additionally, the Ministry of Trade and Labor has increased the number of competitiveness enhancement projects by 60% to strengthen support for clusters.¹⁰ Within this framework, the Catalonia Cluster Program has dedicated a budget for the period 2021-2023 that could reach up to 3 million euros, with a renewable 3-year funding period, the program includes 27 clusters representing over 2,700 companies.¹¹

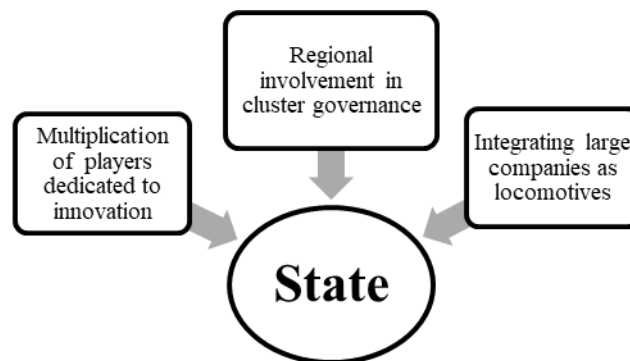


Fig.12 : Spanish government intervention levers

⁸ European Cluster Collaboration Platform (ECCP). (2024). European cluster panorama report 2024 https://www.clustercollaboration.eu/sites/default/files/document-store/Cluster_Panorama2024.pdf

⁹ European Cluster Collaboration Platform (ECCP). (2024). European cluster panorama report 2024 https://www.clustercollaboration.eu/sites/default/files/document-store/Cluster_Panorama2024.pdf

¹⁰ WeMind Cluster. (2024, September 26). Record figures for the Catalonia Clusters Program: the 27 Catalan clusters bring together 3,000 companies and environmental agents. Retrieved from <https://www.wemindcluster.com/en/xifres-record-del-programa-catalonia-clusters-els-27-clusters-catalans-agrupen-a-3-000-empreses-i-agents-dentorn/>

¹¹ European Cluster Collaboration Platform (ECCP). (2024). European cluster panorama report 2024 https://www.clustercollaboration.eu/sites/default/files/document-store/Cluster_Panorama2024.pdf

Elaborated by the authors

Within this framework, Spanish clusters have been able to benefit from the mobilization of several players who are called upon to play a supporting role in promoting innovation and knowledge development: semi-public foundations, not-for-profit establishments, or foundations with public and private participation created for the express purpose of responding to the call for support for GEI. This means that the State has played a catalytic role in innovation, by setting up the institutional ecosystem that promotes and facilitates the externalities expected from this clustering policy. The composition of the clusters has led to a diverse array of entities participating including private cooperative research centers, business associations, public and private foundations, and universities. Regional and local authorities, along with other actors in the regional innovation system, have played a vital role in this policy due to their significant involvement in these clusters. In other words, Spain has adopted a strategy of governance by regional governments in line with a uniform, predestined cluster promotion strategy. In fact, the regional authorities have a protagonist role in the governance of all clusters formed. In this regard, we can refer to the community of Madrid where all clusters are grouped under the Madrid-Network “umbrella” initiative, thus sharing common costs and resources.

Compared to research centers, universities tend to fall behind in promoting clusters. Many of these centers were established through the initiative of existing business associations, while others were created by technical universities or driven by regional development policies. In this Spanish-style cluster model, large companies also play a significant role and are acknowledged for their leadership and influence within the cluster. The following is a comparative summary of this benchmark.

Table 3 : Overview of key differences

	Germany	Spain	France
Initiation year	1996	1991	1999
Governance system	The State adopts a mode of governance based on supreme coordination and regulation through the promotion of excellence in cluster management. Private sector dominance with involvement of regional actors.	The State adopts a public mode of governance based on regional regulation. Diversity of players involved in governance (private sector, universities, public bodies), with strong involvement of regional actors.	The State adopts a public mode of governance based on territorial regulation. Public players predominate in cluster governance bodies (local authorities, ministries, research centers).
Financing system	Diversifying funding sources to ensure the cluster's autonomy (State, local authorities and companies, international funds, industry participation, various calls for tenders (on thematic projects))	State subsidies capped dedicated to the financing of the structure in charge of the governance and management of the cluster plus a significant part coming from private financial resources.	Heavy dependence on funding from the State, which provides subsidies in various forms (direct subsidies to companies, in the form of aid for collaborative R&D projects, exemptions from social security contributions on researcher posts, tax exemptions).
Innovation policy	Promoting clusters on the international stage and creating programs dedicated to innovation.	Mobilizing local and regional players for innovation.	Create organizations to support innovation.
Composition of the clusters	55% of members are SMEs	Made up of SMEs in the presence of large, leading companies	Made up of SMEs and GEs
Levers of intervention	Promote innovation and R&D. Boost clusters' international visibility. Develop inter-cluster cooperation on a national and international scale.	Promoting innovation and R&D. Boost clusters' international visibility. Unite for export, Unit players in the sector and, in some cases, speak with a single voice to The ordre givers, promote the transfer of knowledge.	Helping companies innovate. Promote collaboration and knowledge development. Help SMEs expand their markets.

Elaborated by the authors

5. Discussion

Our study reveals a number of differences in territorial cluster governance policies. The experience of the three cases analyzed (Germany, Spain and France) reveals that the involvement of the State through its ministries, regional players and public establishments is a key condition for consolidating the weight and efforts of clusters at territorial level. This aligns perfectly with the hypotheses of Moreno-Mondejar & al (2021), who emphasize the role of public policy in creating a dynamic ecosystem that encourages companies to innovate and join the green transition.

Indeed, the aim of this politically-driven scheme is to make it a territorial lever for better adaptation to the constraints of the industry and the demands of global markets. In this regard, Reis, de Moura, & Gomes, (2018) demonstrate the importance of local conditions and external environment factors in supporting the economic fabric, given that the challenge of competitiveness is now focused on innovation, which requires several factors namely institutional support, infrastructure adequacy, access to technologies, and new knowledge.

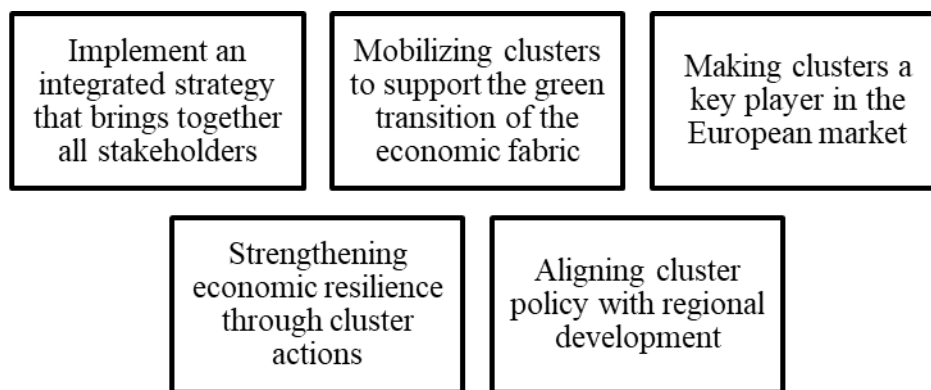


Fig.13 : Policy implications matrix

Source: Elaborated by the authors (adapted from European cluster collaboration platform report, 2024)

The involvement of public policies has given rise to panoply of initiatives, each contributing in its own way to the ongoing improvement of cluster levers. According to the ECCP report, European clusters have strengthened the resilience of companies and economies in the face of this crisis by implementing a range of actions to help restore balance within organizations.

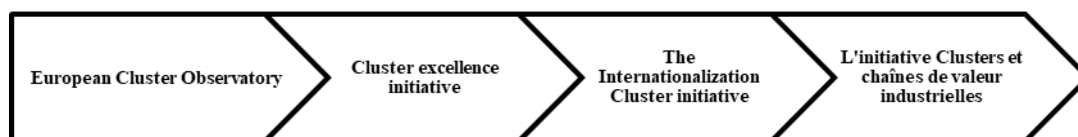


Fig.14 : List of European initiatives to support cluster development

Source: Elaborated by the authors

On other hand, to improve the resilience of firms and economy after the 2020 crisis, clusters have focused their actions plans and levers of intervention on two key areas: helping companies adapt to new technological and environmental laws and regulations, plus multiplying and consolidating more stable networks to link up new suppliers, commercial and production partners.

The German Saxony cluster is a case in point, bringing together various local players to help the transport sector adapt to new restrictions by setting up an integrated hydrogen-based transport system, which shows that clusters have made a major contribution to the resilience of economies and businesses during and after the 2020 pandemic.

5.1. Financing system

The way clusters are financed raises questions about their sustainability once government subsidy contracts expire. This observation encourages the French government to consider how to secure long-term financing for clusters without creating a dependency on state subsidies, as is currently the case in France.

The German and Spanish models serve as international benchmarks for promoting diverse funding sources for clusters, incorporating public and private, as well as national and international investments. However, the cases analyzed indicate that these clusters do not achieve total financial autonomy. In fact, both Germany and Spain continue to provide varying levels of subsidies to these organizations.

We observed a notable difference between Germany and Spain regarding the governance of funding programs. The German program operates in three phases, each lasting three years, with a total budget of €650 million, which is considered substantial. In contrast, Spain utilizes a three-year renewable funding contract¹². However, the Spanish approach to cluster funding is region-driven.

The analysis reveals that Spanish policy emphasizes the involvement of large companies in clusters to serve as engines that enhance the resources and skills of small and medium-sized enterprises (SMEs). The findings align with the studies conducted by Katila & al (2022), which emphasize the role of large companies at the center of clusters. These companies possess the necessary resources to enhance the organizational capabilities, human skills, and technical and financial resources of small and medium-sized enterprises (SMEs). Conversely, Hu & al (2021) challenge the validity of this cluster model, arguing that it may lead to an imbalanced ecosystem due to the interaction of various power dynamics.

5.2. Innovation policy

Promoting innovation through appropriate funding programs is crucial for enabling clusters to enhance the speed and quality of collaborative projects. In this regard, Germany has been increasing its investments in innovation funding programs. The country consistently develops a variety of initiatives to support clusters and small and medium-sized enterprises (SMEs). One notable example is the German ZIM program (Zentrales Innovationsprogramm Mittelstand), which aims to fund SME networks, helping these companies finance their innovative projects. German policy prioritizes the creation of high-tech clusters, aligning well with advocates of innovation clusters, who have shown that technology clusters facilitate knowledge exchange and information flows. This, in turn, positively impacts the level of innovation within companies (Ghinoi, De Vita, Steiner & Sinatra, 2023).

Both Spanish and French policies are actively involved in fostering innovation, though they approach it in different ways. Spain, in particular, promotes innovation by engaging various stakeholders to assist clusters in financing and supporting R&D and innovation projects. In 2023, Spain successfully supported 27 cluster organizations which included over 2,700 members and facilitated more than 100 collaborative projects each year.¹³

In this context, Oh and Al-Juaied (2024) emphasize that public policy should implement stronger territorial mechanisms to aid the industry in transitioning toward innovation and adhering to green industry standards. This highlights the importance of supporting clusters to enhance access to the necessary infrastructure, and accelerating the transition to comply with international regulations.

On the other hand, the results of French clusters remain mediocre due to insufficient public funding for green competitiveness clusters, which are unbudgeted (Depret and Hamdouch, 2015). Therefore, France has tried to multiply the organizations helping to accelerate clusters' R&D efforts with the French National Research Agency (ANR) dedicated to funding public research organizations

¹² European Cluster Collaboration Platform (ECCP). (2024). European cluster panorama report 2024 https://www.clustercollaboration.eu/sites/default/files/document-store/Cluster_Panorama2024.pdf

¹³ European Cluster Collaboration Platform (ECCP). (2024). European cluster panorama report 2024 https://www.clustercollaboration.eu/sites/default/files/document-store/Cluster_Panorama2024.pdf

(fundamental and applied research). Also, it has also involved Oséo in R&D financing for SMEs, through grants, interest-free loans and advances whose repayment is linked to the success of the projects supported.

5.3. Governance system

It becomes clear that there are certain similarities in the mode of governance adopted by the different cases. Indeed, Spanish public policy has adopted a regional governance approach based on the involvement of the region in the clusters, and the development of their strategies in line with the region's specific characteristics. It also carries out regular impact assessments to check whether clusters are succeeding in outperforming their peers (income growth, job creation, export performance and innovation).

In the same way, Germany invests in cluster support through its regions and local authorities, but they do not necessarily participate in the cluster governance structure. Its main aim is to federate local players in the service of clusters, for more effective territorial coordination. As for France, the State is heavily involved in cluster governance through its various players who intervene in governance as regulatory bodies for a unified, coherent and centralized cluster development strategy across the territory (local authorities, ministries, research centers).

We can conclude that state involvement is a crucial factor in effectively establishing clusters within a territory. Without this involvement, a cluster may merely function as a superficial mechanism that fails to create a positive and profound territorial dynamic. This situation can arise due to political, institutional, organizational, and relational inertia, which can obstruct cluster development (Llinas & Abad, 2019).

On the other hand, some authors question the effectiveness of clusters, which appear to be incapable of creating a profound transformation of businesses and an integrated territorial dynamic without the involvement of public authorities providing both financial support for carrying out actions within the structures, but also a certain pledge of trust from key players (Kassandra, 2024).

Despite the state's efforts to ensure successful governance and sustainable funding of clusters, the heterogeneity of players and a culture of distrust could lead to conflicts of interest, negatively impacting the effectiveness of clusters and the return on their actions (Rattle & Taylor, 2023; Rotterdam, Schneider & al, 2020). Thus, the massive growth of clusters whose members are geographically dispersed could lead to underperformance (Cisi & al, 2020) and lower efficiency (Rubino & Vitolla, 2018), calling into question European policy, particularly that of Germany and France, which encourages the creation of clusters without their being grouped geographically. Ultimately, the strategic governance and systemic coordination of clusters could weigh on the autonomy of companies, which focus more on the objectives of the collective to the detriment of their priorities and specificities (Massari & al, 2015).

Compared to German and Spanish clusters, French energy clusters develop an average of nearly 8 inter-cluster collaborations. However, these collaborations are limited to clusters located within the same territory and which are relatively close geographically, institutionally and cognitively.

This observation reveals one of the weaknesses of the French model, which reduces the growth of these clusters to their geographical or even political perimeter, unlike German and Spanish clusters which have opted for a public policy aimed at developing their clusters on an international scale by multiplying partnerships and collaborations with clusters that go beyond geographical barriers. This echoes the findings of Alka, Raman & Suresh (2024), who stressed the importance of maintaining relationships and partnerships with other countries in order to benefit from the knowledge and expertise of counterparts.

Cluster promotion at both national and international level has proven to be a key factor in helping clusters to enhance the value of their actions and to unite players around an ecosystem of cooperation and synergy. Similarly, Germany has successfully met this challenge through communication mechanisms that have turned the cluster concept into a territorial brand recognized for its legitimacy and credibility by all national and international players. As a result, a public communication effort

that has paid off for German policy. Following this analysis, we have compiled a list of the most relevant recommendations, leveraging the strengths of the three cases compared.

Table 4 : Matrix of recommendations

Recommendations	Reference case
Involve the region in cluster financing and governance.	Spain
Create funding programs dedicated to innovation to enable clusters supporting the evolution of the economic fabric.	Germany
Implement a clear, integrated cluster strategy, taking inspiration from the successful German model, which follows a visionary, longer-term approach.	Germany
Diversify cluster funding to ensure sustainability.	Germany, Spain
Create a brand image that enables clusters to better develop internationally.	Germany
Unite local players and strengthen institutional support to give clusters a stronger territorial foothold.	Germany, Spain
Differentiate between state involvement in strategic and operational governance systems.	Germany
Place big firms as key player in raising the skills and resources of clusters dedicated to SMEs.	Spain
Make the university an active partner in the development of R&D and innovation for the benefit of the cluster.	Germany
Make historical and geographical relationships an important lever for more dynamic clusters.	Germany, Spain
Do not reduce the substance of clusters to a formal structure, as in the case of French clusters, which have reduced the substance of clusters to a formal organization.	Germany

Elaborated by the authors

6. Conclusion

This comparative analysis of cluster governance models in Germany, France, and Spain reveals distinct approaches to cluster development and management. While all three countries recognize the importance of state involvement, they differ significantly in implementation. Germany's model emphasizes innovation and autonomous financing, France maintains strong centralized control, and Spain focuses on regional governance frameworks. Our findings suggest that successful cluster governance requires:

- (1) balanced state intervention that supports without creating dependency.
- (2) diversified funding sources combining public and private capital.
- (3) strong coordination between regional and national actors.
- (4) alignment with regional industrial strategies.

These insights contribute to both theory and practice of cluster governance. Theoretically, we extend understanding of how institutional contexts shape cluster governance models. Practically, we provide actionable insights for policymakers designing cluster initiatives. However, this work has certain limitations, which are essentially due to the constraints of the field and the shortcomings of the qualitative approach adopted. In fact, our results are based on secondary data from various public sources, which do not guarantee access to comparable information and data, given that some countries do not provide sufficient numerical information on the evolution of clusters.

First of all, we were led to focus on qualitative data in order to strengthen the relevance of the analysis, based on the researcher's interpretation and the variety of data collected. Consequently, our approach remains interpretative and does not display objective or standardized results. Secondly, our approach

is considered limited in the absence of a triangulation of secondary and primary data to better understand and analyze existing differences between the three countries, and to find in-depth explanations adapted to the countries' current constraints.

In this context, it would be appropriate for the future research to adopt a mixed approach, triangulating primary and secondary data, and quantitative and qualitative data, to arrive at more in-depth recommendations justified by the quantitative and quantifiable results for each country. In this way, it is strongly recommended to broaden the number of countries to a diversified selection that enables the effectiveness of European and Asian models to be compared, in order to propose a cluster model that identifies the strengths of both paradigms. Additionally, longitudinal studies of cluster performance under different governance models would further enhance understanding of optimal policy approaches.

Finally, Future research should examine how digital transformation and sustainability imperatives are reshaping cluster governance models and investigate the role of emerging financing mechanisms in cluster development.

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List of abbreviations

SMEs	Small and medium-sized businesses
SPL	Localized Productive Systems
OECD	Organisation for Economic Co-operation and Development
R	Regularity
P	Population
S	Situation
ICT	Information and Communication Technology.
R&D	Research and Development
SDG	Sustainable Development Goals
BMWi	Bundesministerium für Wirtschaft und Energie
BMBF	Bundesministerium für Bildung und Forschung
DIAC	Delegation for Regional Development and Competitiveness
DGCIS	Directorate General for Competitiveness, Industry and Services

EIG	Economic Interest Group
ECCP	European Cluster Collaboration Platform
ZIM	Zentrales Innovationsprogramm Mittelstand)
ANR	French National Research Agency

Extract from the coding process

