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Three Decades of Cluster Policy in Catalonia: What's Next?

The mood was festive among the close to 400 leaders from government and the private sector that entered the World Trade Center in Barcelona on December 16th, 2022. There was a clear sense that 30 years of cluster policy in Catalonia was something worth celebrating: few other policy programs had been sustained over such a long period of time, surviving through deep changes in political leadership and economic circumstances. And there were strong indications that this success in keeping the program active reflected the value it was delivering to Catalonia and its economy. Private sector leaders confirmed how engaging with the cluster activities had helped their businesses in critical ways. Additional government agencies wanted to engage on new cluster efforts.

With the anniversary event drawing to a close, the discussions in the leadership team of ACCIÓ, the Catalan Agency for Business Competitiveness, turned to the future. Should the program continue in its present form, or was there a need for change? Was the cluster approach still relevant 30 years on, given a fundamentally different economic context and a policy debate that was now considering ecosystems, societal missions, and "new" industrial policies? And was the cluster program playing its full potential role in addressing Catalonia's broader competitiveness issues, from dealing with a highly complex external economic context to nagging questions about whether Catalonia and its capital Barcelona were losing their touch[1]?

Catalonia

Catalonia was a region in the north-eastern part of Spain, bordering France, Andorra, and the Mediterranean Sea. It had a population of close to 8m and at roughly 225bn EUR (2022) an economy comparable in size to the economies of Finland or Romania. Barcelona, the region's capital and largest city was recognized as a leading European and global metropolitan hub. The Barcelona metropolitan area accounted for roughly 75% of Catalonia's population and economic output. Catalonia had a rich political, social, and economic history, with its own language and a strong sense of cultural identity. It was one of the few regions in the Mediterranean to participate in the industrial revolution of the 19th century. Some of its traditional industries with roots in the 18th century, such as textiles, flourished in this period. The Catalan economy had many small- and medium-sized companies, often family owned, with only a few truly large companies. Catalonia had a strong manufacturing tradition, but the

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economy had become increasingly more service oriented. By 2023, services accounted for more than 70% of GDP[2].

Catalonia was one of the largest of Spain's 17 autonomous regions, with the Statute of Autonomy of 2006 giving the Generalitat, the regional government, powers in a wide range of policy areas, including education, health, justice, environment, transportation, and commerce. Catalonia had limited autonomy over fiscal policy. Two large business associations and two trade unions played an important role in the debates around economic and industrial policies in Catalonia. In 2022, these four organizations signed the Pacte Nacional per la Indústria[3], which was considered as the Catalan government's main policy roadmap for economic growth.

The first decade of the Catalan cluster program: individual leadership

The first Catalan cluster efforts were launched in the early 1990s by Antoni Subirà i Claus, Minister of Industry, Trade and Tourism of the Catalan Government. Following Spain's transition to democracy in 1975, Subirà had been one of the co-founders of Convergència Democràtica de Catalunya (CDC), a center-right Catalan party favoring more regional autonomy that was to dominate Catalonia's politics for two decades. Subirà served as CDCs parliamentary whip before becoming Minister of Industry in 1990. He came from a family of business owners that had been active in the textile industry in a town north of Barcelona. After studying industrial engineering in Catalonia and management at MIT in the US he had joined the faculty of IESE in 1965, where he chaired the MBA program.

Spain's accession to the European Union in 1986 had triggered a massive transformation in the previously isolated and domestically oriented economy. Catalonia experienced strong growth at above 4% annually during 1986 and 1992. The 1992 Barcelona Olympics provided a significant stimulus through infrastructure investments, and an opportunity for Barcelona and Catalonia to present themselves to a global audience. The region attracted significant amounts of FDI, offering low wages and a labor force with a long industrial tradition. Japanese consumer electronics companies established Catalonia as a key manufacturing base to serve the European market, HP from the US invested in a site to manufacture and later develop printers, and both the automotive and chemical industry attracted large investments.

But while these investments propelled the economy, many existing businesses struggled to adjust to the new market conditions. The small- and medium-sized companies dominating Catalonia's economy lacked the resources and capabilities to enhance their operating practices and tap into new international opportunities. Minister Subirà had at the time become aware of Prof Michael Porter's work on clusters and competitiveness, which would in 1990 become published in "The Competitive Advantage of Nations". He commissioned a study of the Catalan economy that identified eight clusters with a significant presence and reviewed their competitive position.

Based on this analysis, Subirà launched a series of competitiveness reinforcement initiatives. These initiatives focused on so-called "microclusters", i.e., local clusters focused on distinct market segments. This approach made it possible to apply targeted industry structure analysis to assess the competitive position of individual firms. Subirà chose a range of microclusters located outside of Barcelona to pilot this approach; over time, more efforts in Barcelona and its neighboring Valles region were added. The Ministry contracted a specialized consulting firm to conduct a strategic analysis of the clusters, and to develop action recommendations[4]. The analysis followed a rigorous methodology that included industry and value chain analysis, helping Catalan firms to understand the rivals they were facing on the European and global markets. During the projects, company leaders were taken to visit peer clusters largely in Europe, especially Italy.

These studies enabled firms within the selected microclusters to reconsider their strategic positioning. Catalan SMEs were often stuck in less attractive segments of the market, with little potential to grow and enhance profitability. The competitiveness reinforcement initiatives identified pathways towards strategic re-positioning for a group of businesses. This could require collective actions within the cluster or public investments. In the La Sènia home furniture cluster, for example, the creation of a new vocational school enabled firms to compete on higher quality and the investment in new roads enabled more efficient access to export markets. The Catalan Centre for Quality (CCQ) played an important role in enhancing standards across a number of clusters that aimed to shift towards higher quality. LGAI (Laboratori General d'Assaig I Investigació), a test and certification laboratory owned by the Catalan Government, provided specific services to match the specific needs of the Consumer Electronics cluster. Minister Subirà was able to trigger the necessary investments by other parts of government, even though there were no dedicated financial support mechanisms to the clusters or their action agendas. Clusters could, however, apply for generally available funds which were allocated in a competitive process. The competitiveness reinforcement initiatives themselves had a limited budget of roughly 150,000 EUR per year, funding a small group of external consultants, managed by one senior official in the government with limited support from some project managers in the Ministry[5]. During the roughly ten years the program was in place supporting more than 20 initiatives were supported. According to estimated figures these initiatives reached over 3.000 companies and around 20% of total Catalan industrial jobs.

A concrete example of the impact achieved was the leather tanning industry in Igualada[6]: The industry had a long historical legacy but was facing severe competitive pressure. The competitiveness initiative led companies in the cluster to reconsider their market position, shifting from supplying the Spanish footwear industry to supplying luxury fashion labels in France and Italy. The initiative also eventually brought the companies together to finance a common water treatment plant, a critical necessity to enable the survival of the cluster in the face of rising environmental standards. The idea of the common water treatment plant arose during a benchmarking visit to the Arzignano leather cluster in Northern Italy. Rival clusters in France had been struggling to mobilize for such a joint investment, and many of these companies eventually did not survive as independent firms[7].

Looking back, Minister Subirà saw a main benefit of the cluster efforts in "the opportunity to better understanding the strategic challenges of the different sectors and, above all, the change in the dialogue with companies from a passive generic request for subsidies, into a more constructive interaction on the actual strategic challenges of the industry and how to solve it"[8].

Catalonia's broader economic development policy during this period was focused on strengthening infrastructure, internationalization, and investment attraction. An additional element in this policy approach was investment in research and development, driven by Prof Andreu Mas-Colell as the Commissioner and later Minister for Universities and Research between 1999 and 2003. Mas-Colell had previously been a Professor of Economics at Harvard University and had seen the powerful role of R&D capabilities in driving economic growth. He set out to establish Catalonia as the "Research Capital of Southern Europe" and in 2000 launched the Catalan Institution for Research and Advanced Studies (ICREA). Over the coming years, Catalonia was attracting top researchers to more than 50 research institutions across Catalonia.

The second decade of the Catalan cluster program: consolidation

In 2003, Antoni Subirà left the Catalan government and returned to IESE. Soon after, a decision was taken to undertake a comprehensive mapping of clusters across Catalonia[9]. This mapping identified 42

local industrial production systems – the term then used – accounting for 36% of Catalan jobs and 39% of Catalonia's GDP. This analysis focused on manufacturing-driven sectors, leaving services like tourism, transportation and logistics, financial services, and business services aside.

Within the government, the decision was made to create more robust structures around the delivery of the cluster program. The government decided to bring the capacity for strategic analysis in-house. In 2005, the Observatory for Industrial Foresight (OPI) was created within the Directorate General for Industry to identify clusters and analyze their strategic positioning. To act on the recommendations that emerged from this analysis, a department for business development was created at the Centre for Business Innovation and Development (CIDEM), the Catalan economic development agency. In total, about 18 employees in the government were working with the cluster program, and about 30 competitiveness reinforcement initiatives were active.

In 2007, a new Deputy Minister for Industry and Enterprise, Antoni Soy, took an overall interest in the development of the cluster activities. In 2010, CIDEM was merged with the Consortium for the Commercial Promotion of Catalonia (COPCA) to form ACCIÓ, the public agency for the competitiveness of Catalan enterprise. Both organizations had had sectoral teams that were combined to support the cluster efforts.

The New Business Opportunities program (NON) was launched as an operational tool to facilitate strategic change in small and medium enterprises[10]. It was a complement to the strategic analysis at the cluster level to help firms (usually the leading ones in a cluster) implement new strategies inspired by the analysis. NON provided grants of up to 60,000 EUR to develop new business plans, and co-financing of up to 100,000 EUR for training, technical support, R&D, and investment in fixed assets needed to implement a new strategy. Up to 4.2m EUR were made available annually through this scheme. During the first five years of operation, more than 500 projects were supported, with 75% of the supported companies having fewer than 50 employees.[11] One example of these projects was the support for a company that drew on these tools to transition from being a supplier to the automotive industry to produce medical devices. The company's CEO became an active leader in the medical device cluster, citing the feedback and guidance from within the cluster as highly valuable for the successful transformation. Another program called CLU had a budget of less than 1m EUR annually to support collaborative projects at the cluster level. Both NON and CLU required private co-funding, so the public grants triggered between 2-3 times additional private investments.

There were also some conceptual changes in terms of the type of clusters that the program focused on. The scope of the clusters analyzed moved beyond smaller, local microclusters to understand their role within the broader context of economic activities within these industries across Catalonia. While the focus on specific local hotspots remained, activities were designed to be open also for firms from other parts of the region. One new category of clusters was designated as "strategy-driven". Here the linkages between companies were mainly driven by the focus on a similar market or customer group, for example in the Kids cluster or the Sports cluster. Another category was emerging or potential clusters, i.e., sectors that were seen as structurally attractive where Catalonia had some incipient capabilities but lacked existing critical mass. Examples were photonics and renewable energies. A third category were location-based approaches that lacked a focus on a specific cluster or set of related industries.

A small team was dedicated to promoting international partnerships, and Catalonia soon become active in many cluster-focused networks and EU-funded projects. Minister Subirà and later other Catalonian officials played a significant role in the discussions about cluster-based policies in the European Commission. They were part of the Commission's High Level Advisory Group on Clusters,

that launched the "European Cluster Memorandum" in 2008[12]. The Commission then also published a Communication on Clusters, supported a range of cluster-based collaboration projects, and launched the European Cluster Observatory as a data infrastructure to map clusters across EU member countries. Catalan officials and consultants were also very active in TCI, the global network of professionals and organizations active in cluster-based economic development, that had been founded in 1998 and had its headquarters in Barcelona. In Spain, the national government launched a funding program for clusters in 2007, supporting around 30 clusters by 2010. Catalonian clusters were strongly represented among the entities selected, representing over 20% of the total[13].

The first decade of the 2000s had been a period of significant economic change. Growth rates in Spain and Catalonia were high, but increasingly driven by a debt-fueled real estate and infrastructure spending boom. The launch of the Euro as a common currency in 1999 had given Spanish borrowers more advantageous access to financial markets. Employment growth was particularly high in lower productivity sectors like construction and triggered significant inflows of low skill migrants. Productivity levels remained above the Spanish average but had dropped significantly relative to European peers since the mid-1990s. The competitive context for Catalan industry was being transformed. In 2004, the accession of 10 new EU members from Central and Eastern Europe brought a range of countries with a strong manufacturing tradition and low-cost levels into the EU. China was rapidly becoming the world's supply base following the country's accession to the WTO in 2001.

In 2004, Samsung moved manufacturing from Barcelona to Slovakia[14]. A few years later, Sony closed its remaining production site for television sets[15]. Catalonia continued to receive significant inward investment, even at a time when global FDI flows softened. Catalonia's share of Spanish FDI inflows increased from 8% in 2008 to 20% in 2013[16]. The focus of FDI shifted markedly away from building up manufacturing capacity towards services, especially knowledge-intensive services. The quality of life, Barcelona's strategic location, and the access to human capital were mentioned as key motives to invest in the region.

By late 2007 the period of global debt-fueled growth was coming to an end. The global financial crisis originated in the US but soon also engulfed Europe. Spain had relatively low public debt, but its financial system was highly exposed to real estate. When construction and real estate activity came to a halt as global liquidity dried up, government revenues dropped, the banking system required large bailouts, and rising unemployment put pressure on the social security system.

Catalonia's economic development approach continued to emphasize innovation. R&D spending in the region had increased from 0.9% in 1996 to 1.6% of GDP in 2008[17]. The aim was to increase this share to up to 3% by 2013; this was one of the key goals for the 1.4bn Euros that the European Regional Development Fund had allocated to Catalonia for the 2007-13 budget period[18]. Catalonia's industrial specialization pattern was one of the factors considered in the selection of science areas to invest in. In areas like biopharma research was closely connected to business and start-up activity, while in other areas it proved harder to make this connection. Two-thirds of Catalan R&D were conducted by the private sector. There were some concerns as to whether large local firms as well as MNCs present in Catalonia were sufficiently committed to R&D. A positive example was HP, the US technology company that had initially set up production facilities in Barcelona that then evolved into the global HQ and research hub for one of their main divisions[19].

A new effort around Technology Centres and Technology Dissemination Centres had been launched in 2004, and there were also around 25 technology and science parks around the region. TECNIO (Catalan Technological Network) had been launched as a common brand across five advanced centres, 15 technology centres and 80 innovation centres. In Barcelona, District 22@ had been

developed as an Innovation District since the early 2000s, attracting a number of foreign companies[20]. An OECD report in 2010 argued that Catalonia had made more progress on knowledge generation than knowledge exploitation and technology transfer[21]. The Catalan Agreement for Research and Innovation (CARI) signed at the end of 2008 aimed to balance both elements. CARI emphasized the role of clusters but focused on high-tech sectors of the economy, and the integration of ACCIÓs cluster efforts with Catalonia's innovation policy was limited.

The third decade of the Catalan cluster program: formalization

By 2011, the Catalan cluster program was coming under intense pressure. The deep economic crisis forced austerity on the Spanish public sector, and many government programs also in Catalonia were cut. When the Deputy Minister left the government early that year, the cluster program lost its most senior proponent in the political system. The importance of a program perceived to be focused on SMEs was being questioned. There were concerns that government officials had played a too dominant role in the clusters, and that the system of cluster organizations was overly complex.

With the future of the cluster efforts in the balance, it was the support from private sector leaders engaged in its activities that ensured its survival. Individual CEOs active in cluster organizations were critical in their support for the cluster efforts; the main industry associations did not get involved. The program survived, the budget was cut by 50% and about 1/3 of the cluster team at ACCIÓ was let go. The NON funding program was entirely canceled. All remaining funding was used to support collaborative projects proposed by the clusters. Elections in 2012 brought in a new government, and a new commitment to sustain the cluster efforts. This commitment came with a decision to create a formal cluster policy and address weaknesses that had been identified in the existing approach.

The Catalan cluster policy announced in 2014 established formal criteria for cluster organizations to be admitted to the official Catalan cluster program (named Catalonia Clusters). The nine conditions initially identified were grouped in three main types: quantitative criteria (number of members, minimum aggregate turnover, etc.), qualitative criteria (governance of the cluster organization, qualification of cluster manager, etc.), and a more discretional one with the perceived alignment to Catalan Government cluster policy. The first call for applications led to the admission of 20 cluster organizations to the program. Admission was granted for three years, after which new assessments were made. By 2017, 30 cluster organizations were in the program. These cluster organizations had a total of 80 employees, and there were about 12-15 employees in the cluster team at ACCIÓ.

ACCIÓs efforts to support cluster managers were well aligned with the priorities of the cluster programs by the European Commission. The European Cluster Policy Group had in 2010 suggested focusing more strongly on excellence in cluster management, and a range of efforts was launched in this direction. The European Secretariat for Cluster Analysis (ESCA) provided a certification of cluster organizations which ACCIÓ then applied in screening applications to its program. FEMAC, one of the oldest Catalan cluster organizations active in agricultural machinery, was among the first three cluster organizations to receive ESCA's highest "Gold" label. Catalan experts continued to play an important role in the discussions at the EU level.

ACCIÓs cluster program offered a community and technical services to its member. There was no automatic financing associated with being part of the program. Cluster organizations and their members could apply for individual and joint programs through the re-opened New Business Opportunities (NON) program which had an annual budget of 6m Euros. They could also apply for funding from the other existing government programs not specifically part of the cluster policy. The cluster team at ACCIÓ organized training and regular events for the cluster organizations, including

an annual international trip to learn from global best practice regions. A shared working place was opened for clusters, enabling more collaboration across cluster organizations. The cluster team at ACCIÓ provided strategic oversight to the cluster portfolio, and identified areas in which new cluster efforts might be useful or existing cluster efforts had become obsolete. In such cases, ACCIÓ reached out to private sector leaders to assess their willingness to get involved, and helped curate an effective mix of initial members. In some cases, ACCIÓ pushed for a merger of existing clusters. New cluster organizations launched between 2013 and 2015 included clusters related to lifestyle (e.g., Habitat), technology (e.g., Advanced Materials), and advanced services (e.g., Edutech). In the Habitat cluster, printing company HP became active: they viewed the cluster as a useful platform to test a new market for their latest printing technologies, which enabled home improvement companies to offer new designs and products.

In 2013, Catalonia developed its first Regional Innovation Strategy (RIS). These strategies were a requirement to unlock funding from the European regional policy instruments. Their strategic aim was to leverage research and innovation policies as tools to accelerate the renewal of mature sectors and drive the structural transformation towards higher productivity activities. RIS3CAT, the Strategy for the Smart Specialisation of Catalonia, identified research and innovation actions and launched several R&D support programs for the 2014-2020 funding period[22]. Over this period the EU provided 1.9bn Euros under the Regional Development Fund (ERDF)[23], with roughly 40% each earmarked for "knowledge and innovation" and "SME competitiveness". The strategy provided a comprehensive framework with sectoral specializations that linked to the Catalan cluster policy. It did not lead to any obvious changes in Catalonia's engagement with clusters or in ACCIÓs cluster support activities.

The economic environment was slowly improving after the European Sovereign Debt Crisis had started to recede. GDP decreased by 1.6% annually between 2007-13, before then growing at 2.9% per year between 2014 and 2019. Employment had significantly dropped during the crisis and was only slowly recovering afterwards. R&D spending had been falling since 2008, stabilizing after 2016. In politics, the discussions on Catalan independence became more vocal. The tensions with the central Spanish government flared up around referenda in 2014 and then 2017. The Spanish constitutional court had declared these votes illegal, and the Catalan officials that had organized them were subsequentially put on trial. While these political tensions dominated the headlines, the economic development activities within ACCIÓ and in the cluster organizations continued. However, there had been significant churn among top officials: between 2011 and 2018 there were five different Ministers and five different Director Generals at ACCIÓ in place.

Emerging from the pandemic: Catalonia and its clusters in 2023

By 2023, prosperity levels in Catalonia were close to the European average; they had been 30% higher than 15 years earlier before the Global Financial Crisis hit. An assessment of overall social progress put the region close to the EU average as well[24]. As a start-up hub, Barcelona rivaled Madrid in Spain and was ranked among the top ten cities in Europe[25].

The COVID-19 crisis had caused a dramatic drop in GDP of close to 12% in 2020, with the Catalan economy particularly exposed given its large tourism sector. Automotive, another sector strong in the region, was also hit hard, with the transition to electric cars another challenge to be managed. In 2020, Nissan had announced the closure of its Barcelona plant[26]; a local company had plans to produce electric vehicles at the site[27]. The economy rebounded in 2021 and 2022, but the path towards reaching pre-COVID employment levels was long. Unemployment was close to 10% and GDP on track to remain 5% below pre-COVID projections. The rise in energy prices and overall inflation in the wake of Russia's

invasion of the Ukraine in early 2022 constituted another shock, even though Spain and Catalonia were less affected than other EU members[28].

Catalonia's regional competitiveness[29] was assessed as among the highest in Spain, following the Basque Country and Madrid, and slightly above the average of EU regions. Wages remained modest compared to many peer locations[30]. Barcelona continued to be ranked among the top global cities.[31] In global assessments of regions by scientific activity Catalonia was ranked between 45 and 50; among the top 15 in Europe and at the top in Spain[32]. Spending on R&D was at 1.4% of GDP versus the EU-27 average of 2.2%[33]. A broader assessment of innovative capacity across Europe classified Catalonia as a "strong innovator" and 81st among 252 EU regions[34]. Catalonia's position had dropped relative to the EU average until 2021, but the 2023 report showed the trend reversing. Catalonia ranked high on the share of the population with tertiary education and scientific publications but relatively low on measures of company-level innovation. There were positive signs, like a recent investment of Microsoft in an R&D hub related to AI in Barcelona[35] and a new R&D hub announced by AstraZeneca in early 2023[36]. Barcelona ranked 5th in Europe and top in Spain in terms of start-up funds raised[37].

There had been a long-standing discussion about the region's lower performance on innovation than on research[38]. Some argued that this reflected a policy approach that was too "supply"-focused in driving research, which tech transfer activities then aimed at pushing research results into the market. Others saw a mismatch between the prioritized science areas and the region's industrial mix, and with the dominance of SMEs that led Catalan businesses to be less prepared to compete on innovation.

Catalonia had received close to 3bn Euro in 2022 and 1.5bn Euro in 2021 from the EUs Next Generation fund, a tool set up by the European Commission to respond to the economic challenges of the pandemic based on resources mobilized at the EU level[39]. The allocation of these funds had been primarily channeled through national governments, a structure criticized by Catalan officials[40].Among more traditional EU instruments, Catalonia had attracted more than 1.5bn Euro in competitive EU funds for research and innovation over the 2014-20 period, which accounted for more than 2.5% of the total EU Horizon funds (vs Catalonia's 1.6% share in the EUs GDP). Catalonia had done even better in the most prestigious programs of the European Research Council. Catalonian SMEs had also done very well in attracting EU funding for innovation[41]. Catalonia was preparing a new regional strategy, RIS3CAT 2030, as required by the European Commission, centered around Catalonia's industrial tradition, enhancing the quality of life, and the transformation of the Catalan economy into a green economy[42]. The strategy identified seven priority areas as well as six cross-cutting technology areas.

Catalonia had 41 cluster organization registered on the European Cluster Collaboration Platform, a central tool tracking such entities across Europe[43]. This made Catalonia the European region with the highest number of cluster organizations, ahead of Lithuania, Bavaria, and Baden-Württemberg. Catalonia was also the European region with highest number of cluster organizations that had received funding through the EU's Euroclusters program, a program with a total budget 3.7m EUR.[44]

The Catalan cluster program was by 2023 supporting 27 cluster organizations with more than 2700 members and over 100 collaborative projects per year. The regular impact assessment showed that the companies engaged in clusters performed better than their peers on a range of indicators, from revenue growth to job creation, exports, and innovation[45]. Clusters had on average more than 100 members, with a mix of SMEs, large companies, technology centers, and others. Membership numbers were growing. Most cluster organizations had an annual budget of between 200,000 and 600,000 Euros. Funding came to roughly 40% each from membership fees and grants from the public sector (regional, EU, national), with the remainder coming from paid services. Most of the budget went towards staff costs. The consolidation of cluster organizations had led to a rise in the average number of employees

per cluster to 5.6 FTEs. Cluster managers often had many years of experience. Their satisfaction with the support from the ACCIÓ cluster team was high.

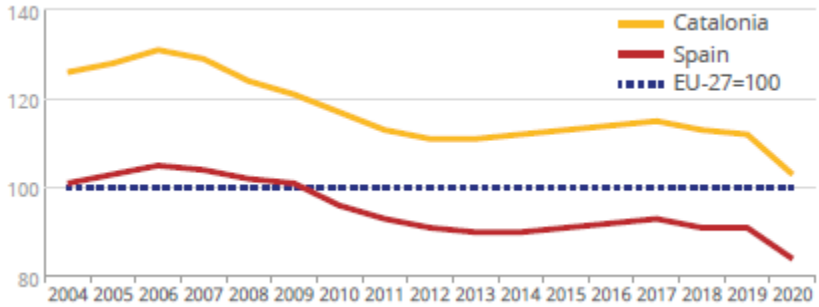
Other parts of the Catalan government had started to approach ACCIÓ about launching new clusters as a joint effort: Waste management and tourism tech were two such examples. And the Department of Labor worked with the cluster team in a 2-year project to identify the talent profiles needed by clusters firms and the design of publicly funded training programs. New topics had been brought to the attention of cluster managers. One was the Creating Shared Value (CSV) framework, which gave cluster leaders a tool to think about their impact on society beyond the direct benefits to individual firms. ACCIÓ provided training on CSV concepts and made CSV-oriented programs eligible under the NON scheme. By 2023, a total of 2.3m EUR had been awarded to projects with a CSV component.

The leaders of the Catalan cluster program were considering how to evolve the cluster policy further. Should they focus on more evolutionary adjustments to a program that seemed to be working well? Or was there a bigger play to make, leveraging the clusters more strategically to put Catalonia on a path towards higher competitiveness?

Exhibit 1 Catalonia as a region within the EU

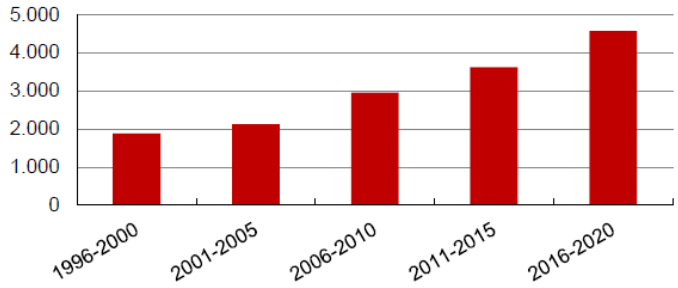
Source: Government of Catalonia (2022): Catalan Economy, Barcelona, March 2022.

Exhibit 2 GDP per Capita (Purchasing Power Adjusted)



Source: Idescat (2022), Figures of Catalonia 2022, Government of Catalonia: Barcelona.

Exhibit 3 Annual Average FDI inflows to Catalonia



Source: Government of Catalonia (2022): Catalan Economy, Barcelona, March 2022.

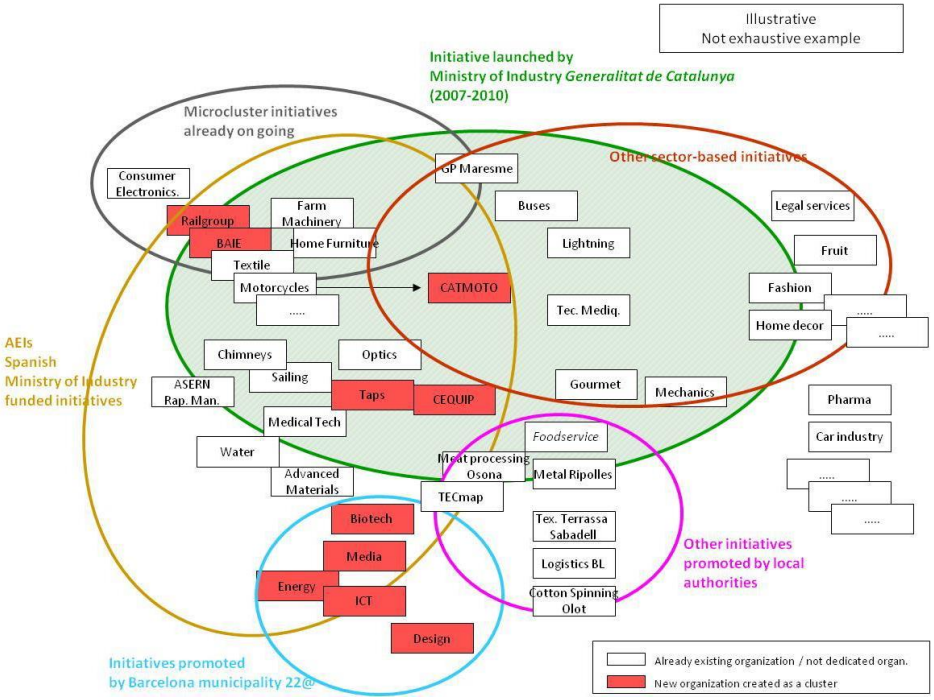
Exhibit 4 Gross value added (2020) and employment (2019) by sector, Catalonia

	Gross Value Added (m€)		Employment (tsd)	
	Absolute	**Share**	**Absolute**	**Share**
Agriculture, livestock farming, forestry and fisheries	2,267	1.20%	58	1.80%
Manufacturing industry	34,712	18.80%	468	14.30%
food, beverage and tobacco industries	6,274	3.40%	96	2.90%
textile, leather, footwear and clothing industries	1,906	1.00%	33	1.00%
chemical industries and oil refining	4,377	2.40%	41	1.30%
manufacture of pharmaceuticals	3,287	1.80%	23	0.70%
manufacture of fabricated metal products, exc. Machinery	2,935	1.60%	52	1.60%
manufacture of motor vehicles and other transport equipment	4,538	2.50%	44	1.30%
sewerage, waste management and remediation activities	2,191	1.20%	31	0.90%
Construction	10,069	5.50%	225	6.90%
Trade, transport and accomodation	44,129	23.90%	1,042	31.80%
sale and repair of motor vehicles and motorcycles	4,008	2.20%	54	1.60%
wholesale and intermediation, except motor vehicles	15,743	8.50%	249	7.60%
retail trade except motor vehicles and motorcycles	9,101	4.90%	308	9.40%
land transport and transport via pipelines	3,527	1.90%	97	3.00%
warehousing and support activities for transportation, postal activities	4,553	2.50%	69	2.10%
accommodation, food and beverage service activities	7,067	3.80%	254	7.80%
Information and communications	9,082	4.90%	110	3.40%
publishing and audiovisual services	1,796	1.00%	26	0.80%
telecommunications; computer programming and information services	7,286	3.90%	84	2.60%
Financial and insurance activities	7,726	4.20%	61	1.90%
Real estate activities	27,597	15.00%	55	1.70%
Professional, scientific and administrative activities	21,967	11.90%	508	15.50%

legal and accounting activities, consulting activities and technical services	7,933	4.30%	155	4.70%
research and development	1,508	0.80%	18	0.50%
advertising; other professional and technical activities; veterinary activities	2,993	1.60%	64	2.00%
administrative and support service activities	9,533	5.20%	272	8.30%
Public adm., education, health and social services	35,859	19.40%	657	20.10%
public administration and defence; compulsory social security	11,960	6.50%	170	5.20%
education	10,881	5.90%	202	6.20%
health activities	10,226	5.50%	174	5.30%
social service activities	2,791	1.50%	111	3.40%
Arts, recreation and other activities	7,930	4.30%	261	8.00%
arts, entertainment and recreation	2,704	1.50%	78	2.40%
TOTAL	**184,530**		**3,274**	

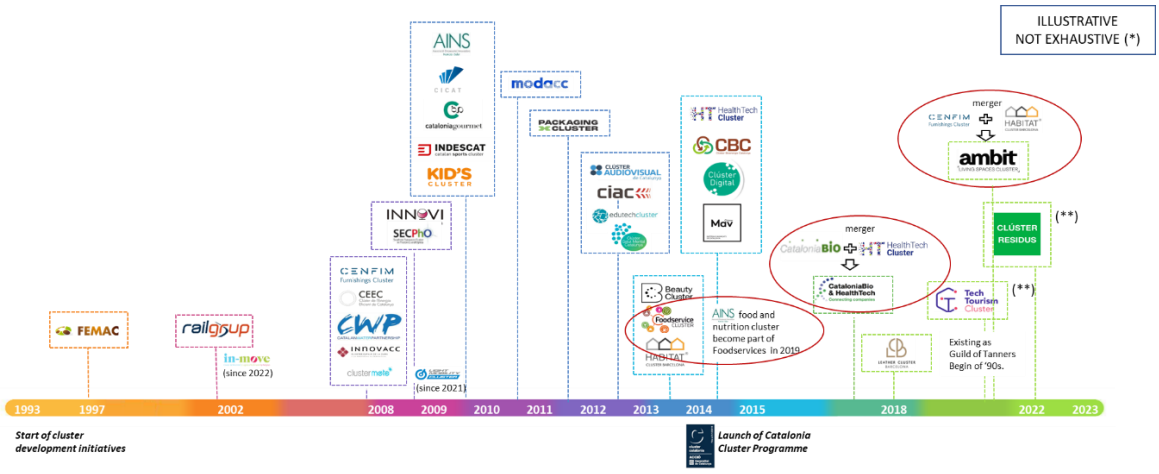
Source: Statistical Institute of Catalonia, 2022.

Exhibit 5 Overview of Cluster Initiatives in Catalonia, 2010



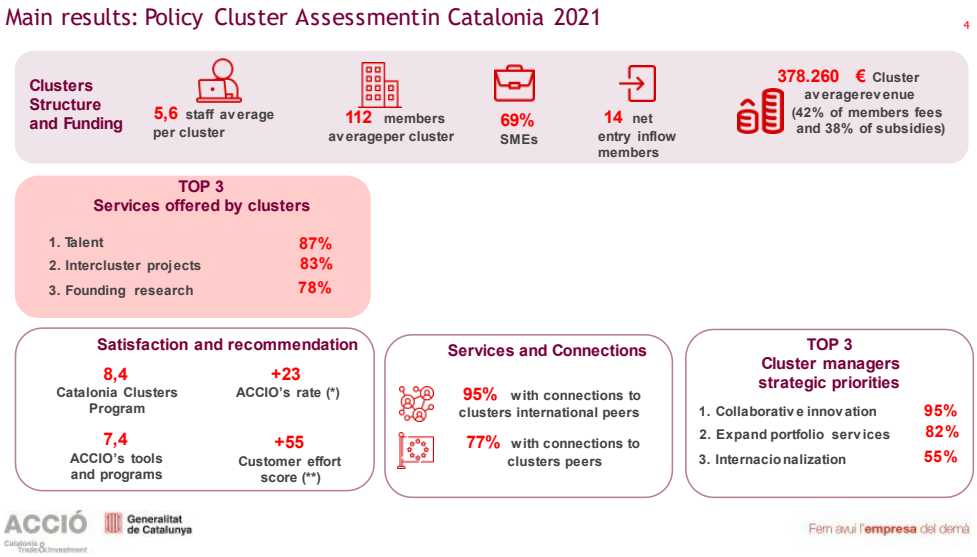
Source: ACCIÓ.

Exhibit 6 Timeline of Cluster Initiatives in Catalonia



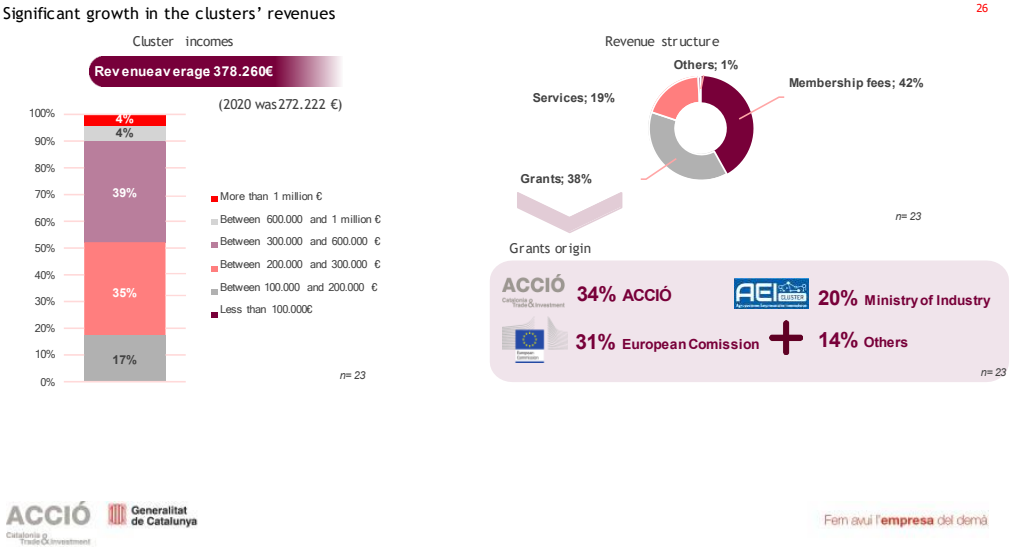
Source: ACCIÓ.

Exhibit 7 Evaluation of the Catalan Cluster Program, 2021



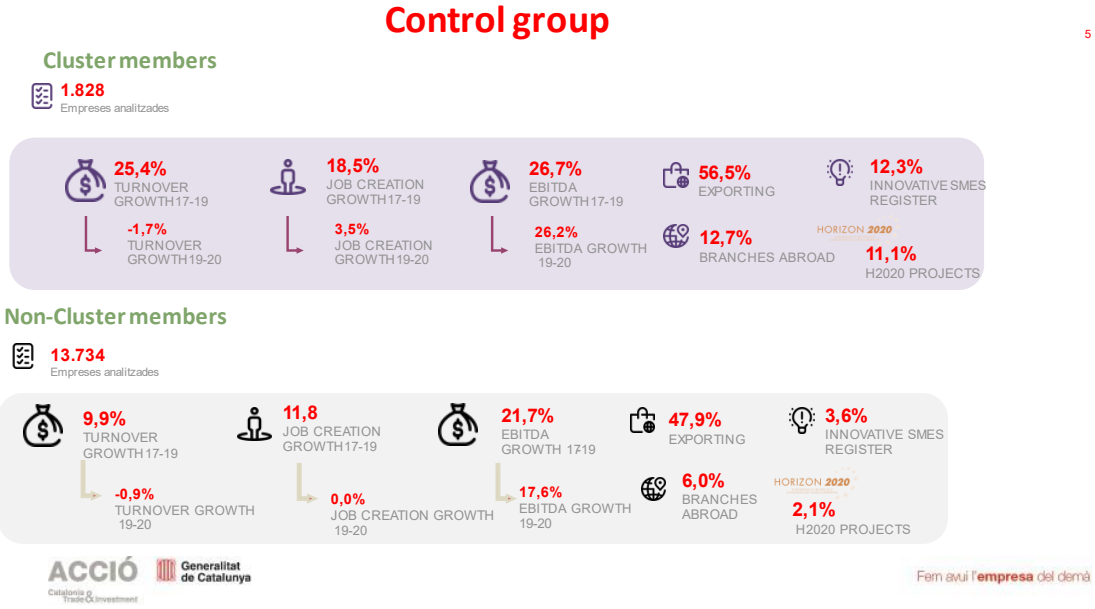
Source: ACCIÓ.

Exhibit 8 Financing structure of Catalan cluster organizations, 2021



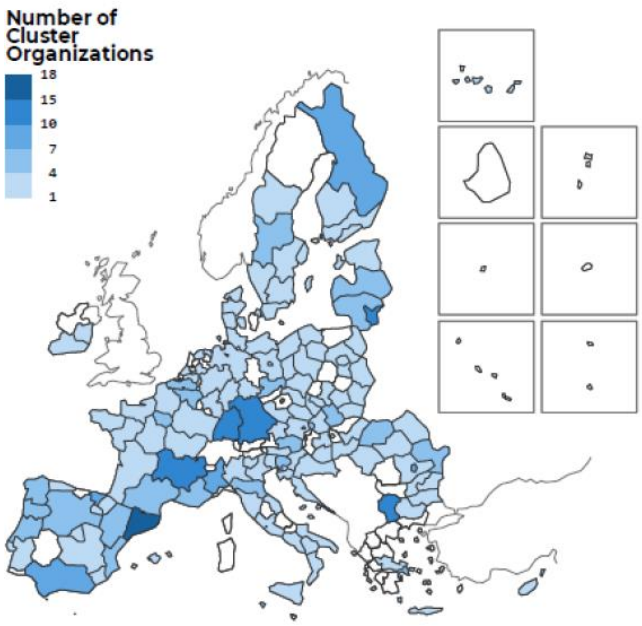
Source: ACCIÓ.

Exhibit 9 Performance of firms engaged in clusters vs peers, 2021



Source: ACCIÓ.

Exhibit 10 Number of cluster organizations by EU region, 2021



Source: European Cluster Panorama, 2021, © 2021 – European Union. All rights reserved, https://clustercollaboration.eu/sites/default/files/2021-12/European_Cluster_Panorama_Report_0.pdf. Licensed under Creative Commons Attribution 4.0 International (CC BY 4.0).

Exhibit 11 Employment and Specialization vs EU peers by Cluster Categories in Catalonia, 2019

Cluster Category	Employment 2019	Location Quotient vs EU Regions, 2019	Change in Employment, 2010-19
Business Services	227,317	1.048	50,397
Hospitality and Tourism	149,350	1.786	33,637
Transportation and Logistics	140,309	1.322	9,710
Distribution and Electronic Commerce	126,485	1.059	-82,035
Education and Knowledge Creation	92,154	1.212	14,782
Marketing, Design, and Publishing	64,285	1.856	17,003
Automotive	50,464	0.799	-3,570
Livestock Processing	33,936	2.086	11,592
Food Processing and Manufacturing	33,684	0.888	1,294
Biopharmaceuticals	28,064	1.897	7,005
Production Technology and Heavy Machinery	27,110	0.527	-2,189
Plastics	25,663	0.925	-2,433
Downstream Chemical Products	24,148	2.115	576
Insurance Services	20,039	1.024	-3,837
Printing Services	19,886	1.704	-3,108
Textile Manufacturing	18,698	1.277	524
Metalworking Technology	17,640	0.380	-10,846
Performing Arts	15,738	0.953	2,491
Construction Products and Services	14,541	0.672	-4,590
Information Technology and Analytical Instruments	12,922	0.496	-2,586
Water Transportation	12,911	0.860	1,972
Environmental Services	12,643	1.066	4,716
Lighting and Electrical Equipment	12,092	0.559	-2,243
Apparel	11,907	0.719	-1,780
Furniture	11,096	0.566	-5,233
Paper and Packaging	11,001	0.975	1,754
Wood Products	10,454	0.594	2,334
Recreational and Small Electric Goods	8,915	1.066	-637
Medical Devices	8,696	0.757	2,578
Downstream Metal Products	7,879	0.571	-6,694
Upstream Metal Manufacturing	7,172	0.314	-9,924
Upstream Chemical Products	5,620	0.802	1,409
Financial Services	5,587	0.370	-4,330
Vulcanized and Fired Materials	4,924	0.318	-3,236
Communications Equipment and Services	4,733	0.479	-5,463
Agricultural Inputs and Services	4,672	0.718	2,674
Electric Power Generation and Transmission	4,316	0.452	633
Fishing and Fishing Products	3,522	0.858	188
Video Production and Distribution	3,305	0.617	-2,597
Oil and Gas Production and Transportation	3,238	0.488	-1,705
Footwear	2,913	0.393	-2,509
Leather and Related Products	2,766	1.211	588
Forestry	2,650	0.287	-2,374
Appliances	2,133	0.479	146
Nonmetal Mining	1,691	0.455	-4,045
Music and Sound Recording	1,321	1.620	155
Jewelry and Precious Metals	1,175	0.612	-1,498

Cluster Category	Employment 2019	Location Quotient vs EU Regions, 2019	Change in Employment, 2010-19
Metal Mining	598	0.458	598
Coal Mining	540	0.079	-1,086
Tobacco	233	0.222	233
Aerospace Vehicles and Defense	21	0.002	3

Source: Author's calculations based on data provided by Orkestra/ECCP.

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