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TESIS DOCTORAL

RETOS EN EL DISEÑO E IMPLEMENTACIÓN DE POLÍTICAS DE INNOVACIÓN: LA FIGURA DE LOS EMPRENDEDORES POLÍTICOS

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Introducción

La participación cada vez mayor de la Unión Europea (UE) en políticas de innovación ha reforzado el actual proceso de regionalización de la arena política, dando lugar a una estructura de gobernanza "multinivel" que se caracteriza por la interacción continua en el proceso de formación de políticas de instituciones de la UE, gobiernos nacionales, agentes y autoridades regionales y locales, intereses privados y otros actores (Charles y Benneworth, 2002; Hooghe y Marks, 2001; Lyall y Tait, 2004; Fernández de Lucio et al., 2003; Yuill, 2005; Sanz- Menéndez y Cruz-Castro, 2005).

Esta compleja estructura multinivel y multi-actor se hace especialmente patente en el caso de las políticas de cluster que han ocupado en las últimas décadas un lugar predominante en "la caja de herramientas" de los policy-makers (Witt, 2003), como un elemento clave de sus estrategias para fomentar la innovación y la competitividad. En la actualidad, el desarrollo de clusters se identifica como parte de la estrategia Europa 2020 y se considera como una pieza fundamental en las estrategias regionales de especialización inteligente (Barca, 2009; Foray, David y Hall, 2009; European Commission, 2012C; Wolfmayr et al., 2013).Por lo tanto, los Estados miembros son capaces de apoyar la actividad del cluster a través de los fondos estructurales y de cohesión (Comisión Europea, 2008; Nam et al, 2012).

A pesar de su naturaleza heterogénea, estas intervenciones se han centrado generalmente en la promoción y creación de redes, el desarrollo y fortalecimiento institucional y la mejora del capital social (Boekholt y Thuriaux, 1999; Lagendijk y Charles, 1999; Morgan y Nauwelaers 1999; Raines, 2001; Landabaso y Rosenfeld, 2009) mediante el uso de instrumentos blandos que buscan afectar la participación de los actores seleccionados en el proceso de gobernanza (OECD, 2007; Flanagan et al., 2011; Aranguren et al., 2014).Entre estas iniciativas destaca, la creación de organizaciones de apoyo como asociaciones cluster (Conejos y Duch, 1995; Benneworth et al., 2003; Sölvell et al., 2003; Ketels et al., 2013; De la Maza et al., 2013) y centros tecnológicos (Hassink, 1996b; Pyke, 1994; Cooke y Morgan 1994; Hassink, 1997; Isaksen y Hauge, 2002;OCDE, 2004; Morgan, 2013). La justificación de estas iniciativas se basa en paliar las deficiencias asociadas con la falta de infraestructuras y proveedores de conocimiento y una dotación débil de instituciones de apoyo a la innovación (Amin y Thrift, 1994; Smith, 1999; Edquist et al, 1998; Isaksen 2001; Oughton et al, 2002; Tödling y Trippl, 2004).

Un ejemplo paradigmático en la utilización de este tipo de instrumentos es Andalucía, región en transición, antiguo objetivo número 1 de la Unión Europea (UE), que siguiendo el modelo de los llamados institutos tecnológicos de segunda generación de la Comunidad Valenciana (Vázquez-Barquero et al.

1999; Mas-Verdú, 2003; Ybarra, 2006; Molina-Morales y Mas-Verdú, 2008; López-Estornell et al 2014), ha creado en el período comprendido entre 2001 y 2010 veinte centros tecnológicos (CT) sectoriales, la mayor parte de ellos dedicados a sectores de bajo contenido tecnológico, tales como mueble, piedra natural, textiles, cuero, cerámica y productos alimenticios. Contrariamente a lo que podría sugerir su nombre, no sólo están destinados a apoyar y proporcionar el desarrollo de tecnologías y servicios intensivos en conocimiento a las empresas, sino también para actuar como cluster managers, es decir catalizadores del sistema productivo local (SPL) facilitando soluciones de valor añadido a través de la colaboración y subcontratación (RIM, 2012). La creación y potenciación de estos centros tecnológicos y la generación de economías de red entre ellos, ha constituido uno de los puntos centrales de la estrategia de desarrollo industrial de la Junta de Andalucía.

A pesar del despliegue de centros tecnológicos en Andalucía, muy poco o nada se conoce acerca de su eficacia y de los vínculos que establecen con los sectores productivos en los que operan. Esta falta de evidencia no es exclusiva de Andalucía ya que las evaluaciones son todavía escasas y están poco desarrolladas en Europa (Diez, 2002; Comisión Europea, 2008; Schmiederberg, 2010; Ybarra y Domenech, 2011; De la Maza et al., 2012; Aranguren et al., 2014). Además, muchos de los estudios realizados no son publicados, circulan como literatura "gris" (Barge-Gil y Modrego, 2011) o se utilizan meramente para fines "internos" y no son hechos públicos (Sternberg, 2010), tal vez para ocultar sus resultados decepcionantes (Hassink, 1996b). Asimismo, cuando son accesibles rara vez van más allá de la eficiencia en el uso de los recursos disponibles, y la autofinanciación como factor clave de éxito (Andersson et al., 2004; Ybarra, 2006; López-Estornell et al, 2014), descuidando por completo el complejo marco multi-actor y multinivel en el que estas políticas emergen y se introducen en la agenda política y como son diseñadas e implementadas (Borrás y Tsagdis, 2008; Fromhold-Eisenbit, 2008; Schmiederberg, 2010; Uyarra and Ramlogan, 2012; Sotarauta et al., 2012).Igualmente, estos estudios se han concentrado tradicionalmente más en la presencia o ausencia de actores e instituciones predefinidos, que en sus roles, relaciones y desempeño, sin mencionar la falta de discusión sobre la emergencia, evolución, reestructuración o incluso la desaparición de actores e instituciones (Uyarra, 2010 página 683).Este vacío no solo es evidente en las políticas de cluster, de hecho, en el análisis de políticas de innovación el proceso de formación de políticas, la agencia de los actores y el cambio institucional devienen una caja negra siendo de esta manera simplificados y dejando así de ser problemáticos (Flanagan et al.,2011; Sotarauta, 2012). En este contexto no es sorprendente que la figura de los emprendedores políticos (Kingdon, 2003), es decir actores intencionales dentro y fuera del gobierno que aprovechan las ventanas de oportunidad para mover sus soluciones en la

agenda política, esté ausente en la mayoría de relatos (Edler y James, 2015).Como resultado, hay una tendencia a asumir un determinado "modelo lineal" en la investigación y evaluación de políticas, que se caracteriza por un análisis racional de opciones y una separación clara entre las diferentes etapas del proceso: agenda-setting, formulación, implementación y evaluación. Una vez tomada la decisión, sólo queda ejecutarla o implementarla. La persistencia y el uso generalizado de este marco racional, a pesar de las frecuentes críticas recibidas (Lindblom, 1959; March y Simon, 1958; Simon, 1957; Cohen et al, 1972; Caracostas, 2007), es un claro ejemplo de dependencia de la trayectoria (Ramalingam et al., 2008),que reduce la acción política a un conjunto estático de actividades públicas definidas previamente, aplicadas mecánicamente en una estructura lineal y jerárquica y controlada a posteriori que no reflejan la realidad (Huber, 2011). De forma provocativa, Geels (2010) sugiere que esto puede ser sintomático del hecho de que esta área supuestamente interdisciplinaria, está en realidad dominada por economistas.

Explicaciones de fenómenos complejos, como el proceso de formación de políticas, basadas en una visión tan simplista, pueden venir a expensas de perder la forma en que estos resultados se producen y por lo tanto dificultar el aprendizaje de políticas. Para paliar esta situación se ha reclamado la necesidad de traer de vuelta a los actores en el análisis de políticas (Markussen, 1996) reconociendo su agencia en relación con los procesos a través de los cuales se identifican los problemas políticos, surgen soluciones y se ponen en práctica (Flanagan y Uyarra, 2016). Lo anterior requiere una comprensión empírica más rica de las "historias de políticas" reales que vaya más allá de la mera enumeración de actores e instituciones a través de un "enfoque narrativo" que siga a los actores, distinguiendo sus funciones, roles, relaciones y desempeño(Valdaliso et al. 2014; Uyarra y Flanagan, 2013; Sotarauta, 2012; Flanagan et al., 2011; Uyarra, 2010).El punto clave es encontrar un equilibrio entre la estructura y los actores, para no perder de vista las arquitecturas institucionales más grandes que configuran y limitan las elecciones individuales y que crean divisiones geográficas y discontinuidades dentro de la economía global (Gertler, 2010).

En respuesta a esta llamada, la presente tesis doctoral analiza y describe la emergencia, diseño e implementación de dos iniciativas cluster: i) El centro de innovación tecnológico del mueble de Andalucía (CITMA),creado por el gobierno andaluz en 2007 para dar apoyo tecnológico a las empresas del llamado sistema productivo del mueble de Córdoba, y disuelto en 2013. Este resultado es sorprendente dado que el proyecto había generado grandes expectativas entre los diferentes stakeholders y parecía cumplir los requisitos clave para tener éxito, como se destaca en la escasa literatura que analiza iniciativas similares: había encaje y arraigo institucional, ya que el centro tecnológico no empezaba desde cero sino que se basaba en el trabajo previo

llevado a cabo en el cluster por el líder del proyecto y el actor más valorado dentro del sector, la escuela-consorcio de la madera de Encina Reales (CEMER), un centro público de formación vocacional (OCDE, 1992, Hassink, 1997, Vázquez-Barquero et al., 1999).Las empresas del cluster se mostraron muy involucradas desde el principio en la gobernanza del centro, lo que garantizaba estrategias orientadas al mercado (Uyarra y Ramlogan, 2012). Y había un marco de financiación estable respaldado por el Gobierno Regional que aportaba el 80% de los fondos necesarios (Shapira, 1992, OCDE, 1999, Mas-Verdú, 2003, Olazarán et al., 2009;López-Estornell et al., 2014; Morgan, 2013).

ii) El centro andaluz del plástico técnico (ANDALTEC).Este instituto de investigación fue creado en 2005 por el Gobierno Regional, para apoyar el desarrollo tecnológico de las empresas situadas en una aglomeración monopsonista generada por inversión extranjera directa (IED). Hoy en día, ANDALTEC se ha convertido "de facto" en el departamento de I + D de la filial, jugando un papel clave en la atracción de actividades de valor añadido e inversiones intensivas en conocimiento de la sede de la multinacional, actuando como una barrera para evitar su deslocalización. En realidad la filial se ha convertido en un punto de paso obligatorio al controlar conocimiento crítico del que depende el resto de la organización (Mudambi y Navarra, 2004).

La disolución de CITMA y el aparente éxito de ANDALTEC nos pueden brindar la oportunidad de abordar un aspecto clave que ha sido particularmente olvidado en la literatura, la emergencia, diseño e implementación de las políticas de cluster (Borrás y Tsagdis, 2008; Nauwelaers y Wintjes, 2008; Sternberg et al., 2010; Uyarra y Ramlogan, 2012).

Nuestro objetivo principal es abrir la caja negra de estas organizaciones para entender los procesos políticos que subyacen a su aparición, desarrollo y desaparición con el fin de responder a dos conjuntos de preguntas principales de investigación relacionadas:

1) ¿Cómo y por qué surgieron estas iniciativas y llegaron a la cima de la agenda política?

2) ¿Cómo y por quién han sido diseñadas e implementadas?

El problema que se plantea, sin embargo, es cómo analizar fenómenos como el proceso de formación, diseño e implementación de políticas que son complejos e intrínsecamente de naturaleza política. En este sentido y aunque muchos idiomas, como el castellano, no tienen términos separados para "política" (policy) y "política" (politics) ya que la política es parte integrante de la

formulación de políticas, sin embargo, ésta es presentada como algo externo al proceso político, un "contexto" que debe ser "entendido" o "administrado". Tal actitud surge de una larga tradición de creer que la aplicación de criterios científicos "superiores" puede responder a las preguntas que actualmente se encuentran atascadas en el más bien desagradable ámbito de la política.

Para desenmarañar esta complejidad nos basaremos en la ontología del actor-red (ANT), que ofrece una descripción y explicación más inclusiva y realista de la dinámica de redes que los enfoques mono-dimensionales tradicionales (Callon, 1986a; Latour, 1987).El uso de ANT para abrir cajas negras implica volver trasparentes todos esos procesos que han conducido a la emergencia, desarrollo, éxito o fracaso de estas organizaciones. Significa, así, localizar y descubrir cómo los actores-red se forman y analizar cómo superan las resistencias y se fortalecen internamente, o se desmoronan. En resumen, consiste en explorar el proceso llamado traducción, es decir, la capacidad de los actores-red para mantener a otros actores-red implicados en el proyecto, interpretando y traduciendo sus intereses, necesidades, valores y esfuerzos en su propio lenguaje.

La caja negra de estas organizaciones se puede abrir solamente hablando con los implicados en su creación y desarrollo. Para construir estas narrativas (Kristensen y Zeitlin, 2005) hemos realizado 70 entrevistas semi-estructuradas en profundidad con los principales actores involucrados en la creación y desarrollo de estos centros tecnológicos: Gobierno Regional (diez),representantes de gobiernos locales (cinco), empresas de los clusters (veinticinco), patrones centros tecnológicos (diez); empleados (diez)organizaciones sectoriales (seis), sindicatos (cuatro). Un briefing con los objetivos y motivación de esta investigación fue enviado a cada participante previamente. Las entrevistas fueron contrastadas con las inscripciones disponibles en textos y publicaciones gubernamentales, actas de reuniones, memorandos, sitios web, foros de discusión y periódicos y revistas. Para apoyar estos casos (Eisenhardt, 1989; Yin, 1989), también nos hemos basado en las investigaciones previas llevadas a cabo por Caravaca et al. (2002, 2003) en el SPL del mueble de Córdoba, y Rodríguez-Cohard, (2002) y Rodríguez-Cohard y Muñoz-Guarasa, (2006) en la aglomeración de Martos.

Por último, vale la pena subrayar que la apertura de cajas negras utilizando ANT lleva consigo una serie de limitaciones. Si bien es cierto que describir cómo se construyen los macro-actores es relativamente sencillo, la respuesta a la pregunta 'por qué' sigue siendo más difícil de alcanzar. Los conflictos micro-políticos están llenos de ambigüedad y de interpretaciones divergentes. Además, los entrevistados a menudo son reacios a hablar de sus propias estrategias y de las de otros actores clave, así como de los conflictos interrelacionados para evitar problemas y mantener fuera del debate público las

posibles agendas ocultas. Por último y dado que el proceso de traducción es contingente, local y variable, cualquier intento de generalizar o comparar es inútil.

Hipótesis

Para hacer operativos nuestros objetivos de investigación nos proponemos contrastar la siguiente hipótesis:

H1: El éxito o fracaso en la implementación de estas iniciativas depende de la fortaleza o debilidad de los actores-red conformados por los emprendedores políticos.

Estructura de la tesis

La tesis doctoral se estructura en torno a 3 artículos:

1) Quesada-Vázquez, J. and Rodríguez-Cohard, J.C. (2014) Origin and evolution of innovation Policies in Andalusia. Arethuse 1/2 2014: Scientific Journal of Economics and Business Management, pp.71-94. Este artículo establece el marco general de las políticas de innovación y cluster en Andalucía, trazando cronológicamente su evolución y desarrollo, deteniéndose en el estudio de las dinámicas que han guiado su diseño y la posición de los actores clave.

2) Quesada-Vázquez, J. and Rodríguez-Cohard, J.C. (2015) Implementation challenges in cluster policy making: the case of the Andalusian Furniture Technology Centre. Prometheus, Vol 33 (2), pp. 113-137. Este artículo analiza los retos a los que se enfrenta el diseño e implementación de políticas de cluster. Con este objetivo narra la emergencia, diseño, implementación y disolución de una organización cluster: El Centro de Innovación Tecnológica del Mueble de Andalucía (CITMA).

3) Quesada-Vázquez, J. and Rodríguez-Cohard, J.C. (Forthcoming) Subsidiary upgrading and Regional innovation policies: the case of the Andalusian Plastic Innovation Centre (ANDALTEC).El artículo se encuentra en revisión en Environment and Planning C, Politics and Space, tras haber sido provisionalmente aceptado. Este artículo explora el impacto de las políticas regionales de innovación en la mejora de las filiales de empresas multinacionales (EM). Para ello analiza la emergencia, diseño, implementación y posterior desarrollo de una organización cluster: ANDALTEC (Centro Andaluz del Plástico).

Estos casos son particularmente interesantes ya que describen el complejo entorno multi-actor y multinivel en el que estas iniciativas emergen y se implementan. Además, por una parte el caso del CITMA analiza los factores determinantes de la disolución de una iniciativa que contaba a priori con todos los ingredientes recogidos en la literatura económica para tener éxito. Por otra parte, el caso de ANDALTEC representa un aparente éxito en la implementación de este tipo de iniciativas y traza el proceso de mejora de una filial ubicada en una zona periférica, desde un mandato inicial de explotación de competencias hacia uno de creación de competencias (Cantwell y Mudambi, 2005) a través de continuas inversiones de la sede central en I+D.

Origin and evolution of Innovation Policies in Andalusia

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Abstract

Notwithstanding the increasing investments in R&D&I during the last decades, Andalusia suffers the so called innovation paradox that is the limited absorptive capacity, despite a greater need to invest in innovation.

The chronological analysis of the main economic plans and programmes carried out by the Andalusian Regional Government offered in this paper shows an evolution in innovation policies from the initial academic orientation, based on the linear model, towards a more systemic approach focused on the SME's needs. Through this narrative we shall witness the lack of multi-disciplinary approach to innovation policy formation in Andalusia, where the science, technology, employment, industry, entrepreneurship and international promotion competencies had remained in different policy domains until 2012. As a result, innovation policy has been defined and implemented in a rather uncoordinated way. It also stresses the picking winner's strategy followed by the regional government since 2004, who in contrast to smart specialisation principles, prioritized the high-tech sectors while disregarding traditional low-tech industries which constitute an essential part of the Andalusian economy.

JEL classification: O20, O25, R58

Keywords

Andalusia, Innovation Policies, Regional Innovation Systems.

1. Introduction

In Europe, Spain is a paradigmatic case due to the fast development of *regional innovation policies* (Fernández de Lucio et al., 2003), which have been enhanced by the *regional innovation strategies* co-financed by the European Union (Yuill, 2005). The Regional Governments of Andalusia (Romero et al., 2004), Catalonia (Cruz et al., 2003), Madrid (Sanz Menéndez et al., 2001), Basque Country (Moso and Olazaran, 2001) and Valencia (López-Estornell et al., 2013) were the first ones to implement innovation policies in the early 80s. However, in contrast to what happened with the university system, the Spanish national Government did not transfer resources to the regional governments. Thus, in a context of scarcity of funds, the initial orientation of regional innovation policies was clearly

influenced by the national R&D plan which at the time followed basically the linear model (Sanz Menéndez, 1997), characterised by the hegemony of scientific interests and fundamental research and by the lack of coordination between the Ministry of Education and the Ministry of Industry. The influence of the national model was more evident in Andalusia, Valencia and Madrid as the isomorphism (Dimaggio and Powell, 1983) tends to increase when the same party governs at national and regional level. That was the case of the Socialist Party (PSOE), which governed the above-mentioned regions until the mid-90s.

This academic biased approach contrasted with the emerging scientific paradigms of the time, which changed the trends of innovation policies in Europe in the following years (Nelson and Winter, 1982; Aydalot, 1986; Lundvall, 1992).

The only exception to the academic orientation was the Basque Country where the connection between the Regional Ministry of Industry and the mobilised industrial interests led to policies in favour of creating a private R&D structure, albeit with strong government support, made of 5 technology centres (Moso, 1999). By its part, the traditionally industrialised Catalonia waited for eight years until the Spanish national Government transferred the competences and resources. As a result, the innovation policy there had a more academic approach (Cruz et al, 2002).

At present, the aforementioned self-governing regions are implementing a business-like and interactive model which has evolved together with the new strategic governance, the public management (Innerarity, 2006), and also with the ideas of collective learning (Cooke and Morgan, 1998).

Andalusia is a special case in Spain because, since it became a self-governing region more than 30 years ago, it has been governed by the Socialist Party either forming majority, minority or coalition governments. Therefore, the shift in Andalusian innovation policies, from the academic approach to the current business orientated model, was not because the Conservative Party (PP) came to power, as it was the case in Valencia (Ybarra, 2006) and Madrid, but it was due to the launching of the Lisbon Strategy 2000 and the changes that the Regional Government made to adapt to this new framework.

The academic approach of innovation policies in Andalusia until 2000 led to an institutional design characterised by a wide separation, lack of coordination and difference in terms of relevance of academic and business policies (Romero et al., 2004). In this sense, the Regional Ministry of Education and Science has been in charge of science policies, whereas technology policies have been designed by different regional ministries depending on which regional ministry was responsible for industrial policies (Merchán, 2010). Besides, science policies have always had a stable and specific political and legal framework, first with the Science Policy Programme and, from 1990, with the Andalusian Research Plan (PAI). In contrast, as Real (2001) pointed out, technology policies had different instruments and institutions and discontinuous implementation leading to, what has been defined as, a highly fragmented system (Alberdi et al., 2014). In fact, they did not have their own instrument of implementation until the Plan of Innovation and Technological Development of Andalusia (PLAIDIT 2001-2003) was elaborated.

In order to describe and analyse the origin and evolution of innovation policies in Andalusia, we shall follow the analytical model proposed by Sanz Menéndez (1997), who uses the ideas on innovation, the interests of stakeholders, and the institutions involved to attempt to explain the orientation and variance of these policies.

2. The beginning of technology policies in Andalusia (1982-1993)

In the early 80s, the System of Science and Technology was so weak or almost inexistent (Galán et al., 1992; Acosta and Coronado, 1992; Jordá, 1994) that Castells and Hall (1992) claimed that it was the Spanish System of Science and Technology applied in Andalusia. For this reason, in Andalusia, unlike in Catalonia or the Basque Country, tackling the dependence and economic under-development of the region was more relevant than cultural or identity issues during the process by which it was constituted as an autonomous region. After winning the first regional elections in 1982, the Socialist Party announced a policy of achieving development from within, highlighting endogenous forces as key growth factors. This policy went in line with Stöhr's approach (1981) that included development cases in Europe.

In this sense, Barzelay and O'kean (1989) pointed out that the expression "endogenous growth" evoked two nationalist ideas: firstly, that Andalusia could develop if it gave greater importance to its underused and hidden forces; and secondly, that the development would only be real if it was based on these forces, that is, on its own resources. Similarly, according to Montero (2004), the term intended to highlight the difference from the exogenous development, traditionally associated with the foreign-owned, export oriented chemical industry located in Huelva, the very symbol of the under-development of the region. In fact, these ideas were influenced by the results of the development poles policy, based on the growth poles theory (Perroux, 1955; Lasuén, 1969), implemented in the previous decades. The reason was that they had not met the expectations as the spreading effect of this policy had not had the time to be noticed against the concentrating effects that should appear first. Thus, when the endogenous approach arrived, there was a reaction against the policy in favour of external investment, which was thought to be the cause for the de-capitalization of strategic endogenous resources of Andalusia.

In this context, the Regional Ministry of Economy, Industry and Energy created two organisations in 1982 to promote the economic development of Andalusia: i) the Society for the Economic Conversion and Promotion of Andalusia (SOPREA), aimed to promote business development by investing in the capital of some companies of the region; and ii) the Institute of Industrial Promotion of Andalusia (IPIA), whose main objective was to help the private sector. Besides, the Regional Ministry of Economy, Industry and Energy also launched the Economic Plan for Andalusia (1984-1986). Although this plan did not include any specific programme to support business R&D, it did show that the Regional Government was going to implement measures to finance innovation due to the low innovation capacity of Andalusian companies.

During this period, the main task of the Institute of Industrial Promotion of Andalusia was the implementation of several initiatives called "Intervention Plans", which aimed to modernise the areas and the sectors with potential endogenous growth according to the studies carried out in Spain at that time (Vázquez Barquero, 1983; 1987a; 1987b). Until 1987, these initiatives were set up in sectors such as leather and chestnut in Huelva; furniture in the province of Granada; canning industry in Cádiz; ceramic industry and Cazorla, Segura and Las Villas Natural Park in Jaén; or the marble sector in Macael (Almería).

The main goal of the Institute of Industrial Promotion, which had been inspired by its first general director, Ricardo Sánchez de la Morena, was to involve the different stakeholders in the creation and implementation of a common competitive strategy. IPIA's role was to coordinate the process and to facilitate access of companies to finance by persuading public and private financial institutions to give credits and subsidies to the companies involved (Barzelay and O'Kean, 1989). Unlike in the previous period when the conditions for the local development had been given by agencies of the Spanish Government, these initiatives were welcome by the local companies and the local authorities. Furthermore, they were considered pioneers because their methods already included many of the precepts of the new public management (Barzelay, 1991). The bureaucratic problem solving model of IPIA, based on the voluntarism of an enthusiastic team, suffered however from the lack of political support, reflected in its budget. It was not surprising that, as Romero et al. (2004) pointed out, from 1983 to 1986 the Institute measures were mainly funded by the Ministry of Industry and Energy, by means of an agreement signed with the Regional Ministry of Economy of Andalusia in November, 1983.

In August, 1987, Sánchez de la Morena resigned, following the regional government decision to grant USD 100 Million in subsidies to Santana, a Japanese owned automobile manufacturer based in Linares (Jaén). Short after, IPIA and SOPREA merged creating the Institute for the Promotion of Andalusia (IFA), which has become the official agency of regional development in Andalusia. Since then, the first idea of endogenous development has never disappeared. However, it has evolved towards the wider concept of local development that also includes a model of exogenous development that promotes the arrival and settling of foreign companies in the region.

In 1988, the Regional Government of Andalusia also started to slowly create its own instruments to boost the low technological potential of Andalusian companies. On one hand, the Regional Ministry of Development and Employment launched the Andalusian Programme of Economic Development (Programa Andaluz de Desarrollo Económico, PADE 1987-1990) to foster and finance business research and development. In fact, this programme included a sub-programme to promote technological innovation[1] for

[1] It had, among other tasks, to encourage the creation of departments and R&D projects in the companies and also the creation of an Industrial Documentation Centre to offer information on R&D and new technologies.

Andalusian companies. However, as Romero et al. (2004) pointed out, this programme only received 260 million pesetas out of the total amount of 666,147 million pesetas that the Programme of Economic Development received. Furthermore, if compared with the Andalusian Research Plan (1990-1993), whose budget was 18,000 million pesetas, the proportion allocated to industrial technological development accounted for only 0.01% of the budget of the Andalusian science policy.

On the other hand, the Regional Government started to build what it was intended to be the "Silicon Valleys" of Andalusia. In 1985, the Regional Government commissioned the Japanese Consulting Company Technova to design a project to build a Technology Park in Málaga. Similarly in 1989, IFA asked Manuel Castells and Peter Hall to assess the viability of developing technology growth poles in the region which materialised in the so-called Research Project on New Technologies in Andalusia (PINTA). The main recommendations included in the project, highlighted the need to generate endogenous innovation capacity by creating technology-industrial complexes, "Technology Oasis", located in areas with specific infrastructures, organized functionally and socially, to make the most of technology synergies. The Project also suggested the creation of an organisation to coordinate the supply of technological services as well as the innovation policies of the Regional Government (Castells and Hall, 1992). These guidelines sought to strengthen the creation of external economies derived from the clustering of knowledge intensive industries to have spillover effects among workers from each cluster (Lucas, 1988).

In 1992 was inaugurated the Technology Park of Andalusia, located in Málaga with the intention of reinforcing the geographical clustering of innovative Andalusian industries and companies by means of an incentive policy. Similarly, in 1993 the Technology Park of Cartuja '93 was created, reusing the infrastructures built for the World Exposition of 1992.

There had been small attempts to create technological development policies for Andalusian SMEs, which were the basis of the economy. However, the industrial policy led by the Regional Government and implemented by IFA was based on the industrial restructuring and support given to big companies in crisis. This approach had basically been the one used by the Spanish Government during the 80s and 90s. In this sense, it is not surprising that IFA turned into something like a National Industry Institute[2] (INI) at regional level that is a sort of hospital for non-viable labour intensive companies operating in different sectors such as aviation, technology, textiles, transport and construction which tried to minimise the social impact of the industrial crisis of the 70s instead of fostering long term innovation processes among Andalusian companies.

[2] It was established on 25 September 1941 to promote the development of Spanish industry overrunning the effects of the setback due to the Spanish Civil War. INI was inspired by the Instituto per la Ricostruzione Industriale (IRI) the state-owned industrial holding company which had been founded eight years earlier in Italy. INI soon turned itself into the biggest industrial conglomerate of Spain, including a broad range of companies, from heavy and basic industries to "soft" services.

As a result of this strategy, In 1993, IFA owned completely or in part 61 companies which absorbed 83% of its 100 million € budget, excluding this way 99% of Andalusian firms from its activities.

The latter worsened the already distant relationship between IFA and the Andalusian Business Association (CEA). To solve the problem, in 1993 the Regional Government signed an agreement with the Andalusian Business Association and the Trade Unions (UGT and CC.OO) to promote the economic and social development of Andalusia in the framework of consensus policies. The agreement included for the first time the clear commitment of the Regional Government to create an industrial programme to foster the technological development of Andalusian companies[3].

The Socialist Party was re-elected in the fourth regional elections in June 1994. Their election manifesto showed the greater relevance that the technological development of companies had for the Regional Government. In addition, it included the commitment to create an industrial programme that would merge the processes of research, training, development and technology transfer. Thus, there would be a shift from the linear model of innovation to a more interactive approach, which would be in line with the innovative environment and the Learning Regions that considered the innovation a social process (Aydalot, 1986; Lundvall, 1992).

3. First Attempts to Change (1994-2000)

The first measure of the new regional government in terms of science and technology policies was the creation of the Regional Ministry of Industry, Trade and Tourism. It was led by Antonio Pascual, who had been responsible for the Regional Ministry of Education and Science. The clear commitment to coordinate science and technologies policies became true when the new Regional Ministry of Industry started to manage the Andalusian Research Plan, which had been managed by the Regional Ministry of Education and Science. The priorities were defined by the creation of the Industrial Plan for Andalusia (PAI 1994-1997) and the second Andalusian Research Plan.

The Structural Funds had a great impact in the regional budget. In fact, the new official approach, which emphasised the need to coordinate and to apply the research results in the productive sector, was mainly due to the influence of the European Commission, through the Directorate-General for Regional Policy (REGIO) which gave to innovation a new role in the regional development policies and its objectives were funded by 4th Framework Programme for Research and Technological Development (1994-98).

In this context of institutional cooperation, IFA created the Centre of Services for European Affairs in Andalusia (CESEAND) in 1995, which is a member of the Enterprise

[3] The agreement (Junta de Andalucía, 1993) showed that the Regional Government aimed to increase R&D finance and foster the technological modernization of companies.

Europe Network for Innovation. Its core purpose was to foster the innovation bringing research and technology closer to companies, especially the SMEs, and to facilitate the access of research centres and universities to European programmes. It provided expert advice and information and even helped to apply for all aids to finance research and innovation in Andalusia at European, national and regional level. In this task it worked in cooperation with the Directorate General of Universities and Research and the Andalusian Institute of Technology (IAT).

The Andalusian Research Plan of 1994 strengthened the role of the technological innovation policy as a horizontal policy to support competitiveness. Nevertheless, it was always a very limited tool used by the General Directorate of Industries, Energy and Mining. After one year in charge of the Regional Ministry of Industry, Antonio Pascual resigned and soon after the Regional Ministry of Education and Science started to manage once more the Andalusian Research Plan in an environment of pressure coming from the university system.

In the early regional elections of 1996[4] the Socialist Party was not elected by majority. However, it could form a coalition government with the Andalusian Party for the fifth term of office (1996-2000). The policies which had a more industry and business-like approach were consolidated.

On one hand, the Institute for the Development of Andalusia developed a double strategy going back, to some extent, to the endogenous trend of its predecessors:

- One of its ideas was to prioritise the arrival of high-tech multinationals. It tried to encourage them to settle in the region by means of the "Tractor Programme". It aimed to adapt the auxiliary industry to the needs of locomotive companies such as Valeo Lighting System in Martos which are the driving force of the region (Rodríguez Cohard and Muñoz, 2006).
- The second idea was to reinforce the previous activities of the Institute of Industrial Promotion of Andalusia by implementing the so-called "Network Programme". There were also two main goals:
  - At local level, the objective was to apply competitive driving forces (technology, internationalisation…) by promoting cooperation; and to make the most of external economies that could arise in the Local Production Systems (LPSs). This goal was in line with the theory of industrial districts (Becattini, 1979; Costa, 1992).
  - At regional level, the target was to reinforce the network of LPSs in Andalusia as key factor in ensuring a balanced endogenous development (Caravaca et al., 2003). To do so, different measures were implemented. A strategic plan for the local production of marble in Macael (Almería) was made in 1996 and it was approved by

[4] The Socialist Party won the elections by minority and was unable to govern due to the alliance between the Conservative party and the left wing party United Left- The Greens – Assembly for Andalusia (Izquierda Unida Los Verdes – Convocatoria por Andalucía). As a consequence, the President of the Regional Government dissolved the Parliament and announced early elections in 1996.

the Regional Ministry of Industry in the same year. It included the proposal made by the Marble Business Association of Almería (APEM) to create a technology centre to support the companies of the cluster. In 2000, a cooperation agreement was signed within the same programme by IFA and the Furniture Entrepreneurs Association of Córdoba (UNEMAC). This agreement aimed to design a strategic plan for the furniture industry in Córdoba (PEMC) and, as it happened with the marble sector, its leading measure was to create a Technology Centre for the furniture industry in Lucena (Córdoba).

These measures were reinforced by a wide variety of financial instruments, mainly incentives for companies and, more precisely, subventions, direct and shareholder soft loans, endorsements, equity stakes and subsidies to interest rates (Duran et al., 1999).

On the other hand, the Science and Technology policy of the late 90s had two main instruments:

1. The Second Andalusian Research Plan (1996-1999). This plan acknowledged that the first plan for research had focused on the university system. Moreover, it claimed that the small involvement of the private sector in the science and technology system was the main problem of the system. For this reason, this second plan for research included more measures to reinforce the capacity that the public R&D system had to produce research that could be applied in the productive sector. This plan had a budget of 34,404 million pesetas.
2. The Industrial Plan of Andalusia (Plan Industrial de Andalucía, PIA 1998-2000). It aimed to increase the importance of the industrial sector and also to improve the competitiveness, efficiency and efficacy of the industrial management. When compared to previous programmes, this plan shows a preference for horizontal policies. However, it states that protectionist policies must be avoided. In addition, it aims to prioritise the most competitive sectors and companies, which stand out for their position and differentiation in the market. The plan shows a clear adaptation to the increasing globalization that has led to the internationalization of the productive fabric of Andalusia since the mid-90s (Veltz, 1999). It includes three main strategies on technology policies:
   - To create an economic and social environment, which promotes entrepreneurial spirit and business activities in general.
   - To offer greater and clearer support to technological innovation.
   - To update technology by means of policies that support investment, that distinguish between endogenous and external investment, and that foster local and sectorial production systems using specific measures.

The three strategies had a budget of 33,043 million pesetas for the period 1998-2001. This amount was included in the total of 245,989 million pesetas given to the whole Industrial Plan for Andalusia. In other words, technology policies accounted for 13.4% of the funds allocated to the plan.

4. Adapting to the Lisbon Strategy (2000-2004)

After the elections for the 6th term of office, the Socialist Party and the Andalusian Party formed again a coalition government. In the new legislature there was a change of route in science, technology and innovation policies, clearly influenced by the new European paradigms, which gave more relevance to the role of innovation in the economic development and growth (Landabaso et al., 2001; 2003). The purpose of the shift was to go further in the development of the innovation system. Besides, it aimed to unify and coordinate the different lines of action. As a result, the Regional Ministry of Employment and Technology Development was created.

The Lisbon Strategy had two main axes. On one side, it aimed to increase productivity. To do so it was necessary to promote a knowledge-based economy in Europe (with explicit R&D and innovation measures); to go further in the restructuring of markets for goods and services; to complement the internal market; and to finish the liberalisation of sectors which had recently been opened up, mainly the network industries. On the other side, it intended to tackle unemployment by means of a reform in the unemployment benefit system; a flexibilisation of the labour market; and by promoting human capital investment.

The key concept that arises from the Lisbon Strategy is "industrial innovation", which includes technological innovation and a series of measures to improve non technological processes and products. To this end, it highlights the need to boost innovation among groups of co-located SMEs or among clusters of companies. Following Porter's postulates (1990 and 1998), which were widely accepted by European governments, the cluster promoting policy substitutes the traditional sectorial policies and becomes the cornerstone of industrial policies of European Member States.

In July 2001, the Plan of Innovation and Technological Development (PLADIT 2001-2003) was launched. It was the formal response to the Lisbon Strategy given by the Regional Government. It offered a general framework to coordinate the different actors and instruments involved in the Regional Innovation System, as it was expressed across Europe following the new approach given to innovation policies (Cooke, 1992). The Plan showed that it was paramount to offer advanced technology services that could reinforce the productive fabric of Andalusia. This was due to the imbalance between supply and demand of technological services faced by companies in Andalusia, which evidenced their need for an innovative spirit.

In this sense, the Plan encouraged the creation of infrastructures to support the productive sectors, mainly technology parks and technology centres which would facilitate the technological modernisation and update of the companies. In addition, they would promote the use of integrated management systems as well as tools to design and redesign products, processes and services in the companies. Besides, the plan gave great relevance to the need for Andalusian companies to use Information and Communication Technologies (ICT), especially those related to the use of Internet and e-commerce as there was risk of "digital divide" (Rodríguez Cohard and Bernal, 2002) in those areas.

Furthermore, the plan sought to foster the training of human resources to manage innovation and new technologies by offering courses and recruiting graduates to under-qualified companies. Finally, it encouraged Andalusian companies to take part in national and European innovation and technological development programmes, especially The National Scientific Research, Development and Technological Innovation Plan and the 4th Framework Programme for Research and Technological Development of the EU.

As a consequence, science and technology parks were created thanks also to the influence and support of the Spanish Ministry of Science and Technology. This Ministry started to devote a high proportion of the funds to build them and to provide scientific and technical equipment. By its part, the development of technology centres was clearly influenced by the experiences of Basque Country (Morgan, 2013) and Valencian Community (Mas-Verdú, 2003), where these support infrastructures were playing a key role in their regional innovation system.

Although not all technology parks had a sectorial approach, the technology centres had to be connected to and located in the LPSs which were well-established in the region. Some of them were linked to those sectors that, according to the Regional Ministry, were strategic for Andalusia such as food and agriculture, furniture, aeronautics, marble and biotechnology. Despite their name, the objective of the technology centres was not only to offer technology services, but also a wide range of services. They also had to be catalysts for the LPSs in order to encourage companies' cooperation to favour the creation of external economies. This approach followed Porter's postulates (1998).

The creation and promotion of technology centres and the development of network economies among them became one of the key aspects of the new strategy of technological development designed by the Regional Government and went in line with the R*egional Innovation System (RIS) theory* (Asheim et al., 2011). In fact, 20 centres were created from 2000 to 2007 to support the productive fabric. It must be pointed out that the Plan of Innovation and Technological Development clearly stated that the technology centres had to be financed mainly by the revenues obtained from the services offered to companies although they would also receive specific additional financing from the Regional Government. As it is the case of the second generation of the technology Institutes of Valencia that are limited to a business-like approach neglecting some objectives to develop innovation which are strategic in the long term but that are not valued immediately by the market (Ybarra, 2006).

In the same line, PLADIT includes the first initiatives to foster and promote clusters in Andalusia. The plan offered some financial aids to set up business cooperation networks with a minimum of five members. The aids could be used to set up the network, to design annual plans, to acquire technology, to seek expert advice or to hold events, and to manage the network.

In this sense, PLADIT formally incorporated cluster policies into the policy tool-box (Witt, 1997) being considered as a basic element to consolidate the culture of innovation. In addition, these policies were reinforced by the 3rd Industrial Plan for Andalusia (PIA III,

2000-2006), whose objectives included the programme of support to LPSs or clusters. This programme aimed to identify LPSs by mapping them, assessing their features and their potential activities (Competitiveness, 2003).

The Plan of Innovation and Technological Development of Andalusia had a three-year budget of 56,000 million pesetas. For the first time, 3,574 million pesetas of the total budget were allocated to technological development; whereas scientific, technical and applied research received 10,275 million pesetas. As Ferraro (2000) pointed out, the most relevant aspect of the plan was the economic incentives given to companies. This can be observed in the budgets for 2001 of the Regional Government and the Institute for the development of Andalusia, where more than 35,000 million pesetas were devoted to 91 credit lines including subventions, credits, endorsements, equity stakes, and subsidies to interest rates, which considered so many cases that all business activities could be financed.

Despite Regional Governments efforts to coordinate innovation policy, the Andalusian Research Plan (III PAI, 2000-2003) remained managed by the Regional Ministry of Education and Science, which implied a political fragmentation of the of the I+D+i process, adding an extra level to the already complex governance. In order to overcome this shortage and with a view to improving policy coherence and to incorporate Andalusia to the knowledge society, the Regional Council of Government approved in 2003 the Plan for the second modernisation of Andalusia (Junta de Andalucía, 2003). As a consequence, in 2004 for the umpteenth time, a new reorganization of the Andalusian government brought together under the same ministry Innovation, Science and Entrepreneurship competencies. However, employment was separated from the newly created ministry. Its objective was to coordinate and implement research, technological development and innovation policies. The new Regional Ministry was also responsible for the university system as well as technology transfer. In addition, it was the first time that policies related to universities were separated from vocational studies and non-university education, which continued being part of the Regional Ministry of Education. The idea behind this change was to use universities as a tool to innovate and achieve economic development, and to move towards a knowledge economy. This new approach was in line with the concept of the Triple Helix of university-industry-government relationships (Etzkowitz and Leydesdorff, 1997). For its part, IFA was renamed as IDEA (Andalusian Innovation and Development Agency), entrusted presumably with the mission to coordinate innovation policy.

5. Failed Plans: innovation and economic crisis (2004-2012)

The first task carried out by the new Regional Minister of Innovation, Science and Enterprise, Francisco Vallejo, was to create the legal framework to integrate the science and technology spheres in the innovation agenda of the region. In June 2005, the Council of Government launched the Plan of Innovation and Modernisation of Andalusia (PIMA

2005-2010), whose starting point was the strategies included in the Plan for the second modernization of Andalusia. PIMA established the framework for the research and innovation strategies of Andalusia. Furthermore, it detailed how the funds of the Regional Government and the funds transferred under the Operational Programme of the EU would be spent. The main goal of this plan was to connect the Andalusian system of knowledge, mainly the Universities, to the needs of the regional development by promoting the transfer of knowledge between public research institutions and the industry.

The key concept of PIMA was the Andalusian System of knowledge (R&D&I), whose aim was to incorporate all agents and organisations involved in processes of knowledge and technology production; in processes to transfer these resources to the cultural, social and productive sectors; and in processes to apply the resources to generate wealth thanks to innovation (Junta de Andalucía, 2006). This idea behind PIMA was the Regional Innovation System perspective, which has attained a hegemonic position within the innovation literature and policy practice during the 1990s and 2000s. According to Asheim et al. (2011) "At the core of the RIS approach is an emphasis on economic and social interactions between agents, spanning the public and private sectors to engender and diffuse innovation within regions embedded in wider national and global systems".

It seems, however that due to its co-evolution in academic as well as policy spheres, the concept of regional innovation system has acquired simultaneously a strong analytical and normative connotation, becoming widely used as a kind of ideal model applicable to all regions, including less successful ones (de Brujin and Lagendijk, 2005). Many researchers have expressed serious reservations over this practice not only because there is no best model due to regional uniqueness (Charles and Benneworth, 2002; Tödtling and Trippl 2005), but also because it has fostered a view of innovation as a predictable and standardized process (Fløysand and Jakobsen, 2011) that can be controlled and guided (Balzat and Hanusch, 2004; Lundvall, 2007). This focus on the identification and pursuit of chimerical 'optimal' innovation systems in the policy arena (Edquist and Hommen, 2008), is somehow ironic considering that in the evolutionary account of innovation, policies, just like innovations, are complex and uncertain and display irreversibility and path-dependency effects (Uyarra, 2011). In this context, the potentially successful policies are adaptive ones (Metcalfe and Georghiou, 1998; Witt, 2003), which are not designed to control a system but to provide opportunities for learning in order to accommodate changing circumstances (Folke et al., 2005).

The Plan of Innovation and Modernisation of Andalusia included 286 actions, classified into 31 strategic lines. It had 82 objectives and 6 lines of action. Its global budget was of 5,700 million euros, out of which almost half (2,600 million euros) was allocated to foster universities and knowledge based industries; whereas 1,823 million euros were used to encourage entrepreneurship in the region. The rest of the budget was divided into different blocks such as sustainability, environment and energy (560 million euros), information society (482 million euros), equal digital opportunities (93 million euros) and

smart management (55 million euros). With this approach the innovation policy was specifically oriented towards developing knowledge industries, information and communication technologies (ICT), biotechnology, energy, aeronautics and tourism. Traditional sectors such as the marble and furniture sectors, which had been considered strategic up to then, were left behind. This change in policy direction showed that the Regional Government wanted to prioritise the development of knowledge intensive industries despite their low contribution to the Gross Domestic Product (GDP) and to employment in Andalusia. This strategy neglected some recommendations made by innovation literature, which warned against the potential risks of carrying out innovation processes in the more underdeveloped regions; and which advocated focusing on what already existed to break the traditional non innovative trend, and to promote reliable processes in the networks and interactive learning (Morgan, 1997).

The Plan of Innovation and Modernisation of Andalusia established the creation of three new organisations to foster and coordinate cooperation between the actors of the Andalusian system of knowledge:

1) Technological Corporation of Andalusia (CTA). It financed R&D&I in the abovementioned strategic sectors.
2) Invercaria. It was a venture capital corporation created by the Andalusian Agency of Innovation and Development (IDEA) which incorporated the existing mixed venture capital companies.
3) The Andalusian Technology Network (RETA). It had two main objectives:
    a) To improve the governance and coordination of the RIS in general and, especially, of technology parks, technology centres and business and innovation centres.
    b) To guarantee equal opportunities of technological development to traditional small enterprises and to those located in technology parks.

This way, and in spite of the ambiguous tasks received from Regional Ministry, RETA[5], turned into the most relevant actor of the Andalusian innovation system, relegating IDEA mainly to the evaluation of the complex paper-work required by the new subsidies scheme. In effect, the most innovative measure was to include all innovation incentives in the Order of Incentives of July 5th 2005. This measure showed that the new Regional Ministry intended to promote the technology transfer between the public research centres and the productive sector. With this order the companies that benefited from public aids to innovate had to contract public research centres to carry out at least 15% of the project.

Since the Plan of Innovation and Modernisation of Andalusia was launched, the Regional Government made the regional planning coincide with the structural funds period 2007-2013 in order to ensure there was only one strategic script for the regional development and that it was in line with the European directives. As a result, the

[5] RETA is led by Felipe Romera, president of the Technology Park of Andalusia.

Competitiveness Strategy for Andalusia (ECA 2007-2013) was launched in 2007, turning into the reference for the programmes and plans that followed. It had a budget of 55,000 million euros and it classified the main areas of public expenditure on economic development into 8 categories: development and knowledge economy; business innovation and development; environment; natural surrounding and water resources; regional balance; accessibility and energy; local and urban development; welfare and social cohesion; increase and improvement of human capital; and food, agriculture, fishing and rural development (see annex).

The rest of programmes and plans of this period should be considered within this general framework. In 2007, the Andalusian Plan for Research, Development and Innovation (PAIDI 2007-2013) was implemented. Two different plans merged into it: i) the Andalusian Research Plan (III PAI); II) and the Plan of Innovation and Technological Development (PLADIT) PAIDI, which went in line with the Plan of Innovation and Modernisation of Andalusia, aimed to strengthen the cooperation between industries and universities, regarded as the key factor for regional development. In addition, it gave aeronautics, biotechnology, bioengineering, health sciences, ICT, nanotechnology and tourism the role of top priority research fields in the region. Besides, it classified and established the role of the key actors in the innovation system of Andalusia as follows: technology areas (science and technology parks); knowledge creation institutions (universities, public research centres, private R&D laboratories); knowledge transfer institutions (advance technology centres, technological innovation centres and knowledge transfer offices); and coordination and management institutions (Andalusian Agency of Innovation and Development, Andalusian Technology Network, Technological Corporation of Andalusia, Invercaria).

PAIDI, together with the Territorial Planning Scheme of Andalusia[6] (POTA), included also different actions to foster strategic alliances among companies of the same sector or the same area. These strategic alliances were reinforced by the Andalusian Plan of Industrial Development (PADI, 2008-2013) whose core purpose was to integrate the LPSs in the international production and trading networks. It used the concept of specialized productive area as a unit of analysis and reference to design and implement policies to support industries. Besides, apart from going further in the identification of Andalusian clusters, it also promoted specific roadmaps, and established coordination units.

To meet this goal, IDEA created the Directorate for Clusters in 2008 which was led by Gerónimo Sánchez. In addition, it was entrusted with the coordination of the sectorial technology centres. This task had been assigned to RETA by the Plan of Innovation and Modernisation of Andalusia. However, the truth is that IDEA had continued being in

[6] The Territorial Planning Scheme of Andalusia (Plan de Ordenación del Territorio de Andalucía, POTA) approved by the Decree 206/2006 of November, 28th and published in the Official Bulletin of the Andalusian Regional Government (Boletín Oficial de la Junta de Andalucía, BOJA) on December, 29th 2006 included in the recommendation 34.3a to carry out development strategies for LPSs.

charge of it. In 2009 7 specific plans were prepared for the following clusters: natural stone (Macael), furniture (Lucena), ceramic (Bailén), metalworking (Linares), biotechnology (Granada), agriculture auxiliary industry (Almería), Christmas bakery in Estepa (Seville).

At the beginning of 2010, the economic crisis was starting to seriously affect Andalusia. Due to economic cuts, the Directorate for Clusters disappeared two years after its creation within the Andalusian Agency of Innovation and Development. Moreover, there was a large restructuring of the Andalusian Technology Network. The institution, which had been designed to be a network, had become a heavy superstructure. On one side, its ambiguous mission to coordinate the different agents involved in the regional innovation systems had not been fulfilled due to its lack of authority, which caused continuous conflicts of competence with other entities such as IDEA. On the other side, RETA had tried to nurture innovative activities in traditional companies located in rural areas by recruiting almost 100 innovation agents who according to Marchese and Potter[7] (2011, p. 165) "most of them had just graduated from engineering and science degrees. In addition, although they may have been well qualified, they were unlikely to have the aptitudes and experience needed to understand the problems and needs of traditional SMEs". In 2010 these innovation agents were dismissed and the competences of the Andalusian Technology Network were restricted to innovative companies. Surprisingly, the aforementioned report recommended transferring the task of promoting innovation among traditional enterprises to another foundation of the Regional Government: Andalucía Emprende. Created in 1999, already had 215 centres which supported business development (CADES), nevertheless, its employees, just like RETA's innovation agents, lacked the experience and tacit knowledge required to perform properly in these traditional sectors.

In March 2010, the Regional Ministry of Innovation, Science and Enterprise merged with the Regional Ministry of Economy. This reinforced the key role that the technology transfers and the cooperation between public universities and private companies had in the Government's strategy to boost economic growth. Finally, when employment policies were transferred to the new Regional Ministry in 2012, ironically, vocational and continuous training competences were transferred to the Regional Ministry of Education.

6. Conclusions

Over the last decades there has been a sharp increase in R&D expenditure reaching 218.5% since 2000. This increase is well above the average expenditure in other Spanish regions (155.1%). In fact, Andalusia is in the third position in terms of higher relative

[7] This report was commissioned by the Andalusian Technology Network within the LEED programme, established by the OECD.

increase. As a result, it has gone further towards the technological convergence with Spain. According to the Spanish Statistical Office (INE, 2012), the R&D expenditure in Andalusia reached 1,726.8 million euros in 2010. It is 9.4% more than the previous year, whereas the expenditure hardly increased (0.1%) in the other self-governing regions. Regarding technological effort i.e. R&D expenditure as a percentage of GDP, Andalusia stood at 1.2% in 2010, it was therefore the fifth largest R&D performer in Spain. Compared to 2000, Andalusia has gained 4 positions in the ranking of technological effort by region, from the ninth position in 2000 to the fifth, ahead of Aragón, Murcia, Valencia and Asturias.

While it is true that R&D in Andalusia has increased with regards to the Spanish total, from 10.3% in 2006 to 11.6% in 2010, however, this is still much lower than the first two regions, Madrid and Catalonia, although both reduced their totals from 29% to 26.5% and 22.2% to 21.9%, respectively. The latter clearly indicates the lagging starting point of Andalusia in the 80's.

In relation to Europe it is worth noting that according to EUROSTAT (2014), the share of GDP spent on R&D in Andalusia is higher than that of 10 EU countries. Furthermore, while the EU and OECD's technology efforts have remained largely stable over the past two decades, in Andalusia there has been a gradual increase multiplying the level of expenditure on GDP by 2.9 since 1987, the date from which data are available.

Most of this investment has been financed through the different operative programs of the European Regional Development Fund (ERDF) and Cohesion Fund. So, for example, on 2007, the European Commission approved an Operational Programme for Andalusia for the period 2007-2013, which comes under the "Convergence Objective" and has a total budget of around 9.84 billion euros. The financing provided by the European Union out of ERDF is almost 6.84 billion euros, representing some 19.4% of Community contributions for the benefit of Spain under the 2007-2013 cohesion policy. The national contribution provided for amounts to some 3 billion euros and may be partly met by Community loans from the European Investment Bank (EIB) and by other lending instruments.

Notwithstanding the increasing investments, Andalusia suffers the so called innovation paradox that is the limited absorptive capacity, despite a greater need to invest in innovation. According to Ougthon, Landabaso and Morgan (2002), in the context of the less-developed regions, such Andalusia, the most important factor contributing to this paradox is the fact that regional firms, often family-owned and competing among themselves in relatively closed markets, do not have a tradition of co-operation and trust in the regional RTD infrastructure, particularly universities.

As highlighted, the Regional Government has carried out an extensive and intensive planning of the economic activity in general and of the industrial system in particular which started before Andalusia was constituted as a self-governing region and has continued since then. The chronological analysis of the main economic plans and programmes offered in this paper shows an evolution in innovation policies from the initial academic orientation, based on a linear model of innovation, hegemonic at the

time, which has evolved in line with the new trends and ideas towards a more systemic approach. In parallel, it can be observed an evolution of the agency of regional development. First, the Institute of Industrial Promotion of Andalusia (IPIA) focused on the development of endogenous factors. Second, the Institute for the development of Andalusia (IFA) followed a model to support the industrial sector based on the restructuring spirit of the Spanish Industrial Policy of the 80s and 90s. Currently, the Andalusian Agency of Innovation and Development (IDEA) is more of a facilitator aimed at promoting and supporting innovative enterprising initiatives.

The new Regional Ministry of Innovation, Science and Enterprise has been in charge of science and technology since 2004. Nevertheless, the general secretariats and the departments have continued working separately. This separation has been evidenced by the policies implemented by each of them and by the lack of coordination instruments. Hence, as Merchán (2010) pointed out, science policies still apply offer-based models. For instance, projects of excellence and grants are made without establishing priorities. In addition, the Regional Ministry is influenced by the pressure and demands of the university system.

There has been a wide variety of tools and measures to develop and apply the programmes of the industrial policy. However, the most relevant ones have been offering incentives, providing industrial infrastructure, investing on human resources training or business services. Regarding incentives, Ferraro (2000, p. 92) claimed that "As a result of the wide variety of financial aids and the big sums of money which could be used to finance many different types of activities, the development policy was identified with economic incentives. This has developed a subsidy culture according to which the aids are a kind of right to which companies are entitled just because they produce goods in underdeveloped regions or just because they are creating employment. Thus, it is believed that this economic aid is one more feature of the Welfare State. In other words, industrial development policies are thought to be the same as social policies and, hence, are not thought to promote the creation of external economies or competitiveness but to redistribute." These statements go in line with the difficulties that technology centres and universities find to cooperate with the productive system. This is due to the fact that the system is hardly unable to absorb the knowledge that can be applied to the productive processes. In addition, it finds it extremely difficult to carry out generalised innovation processes. However, this situation must be seen in the context of a long adaptation that this region is undergoing towards a more and more globalised economy in the developed world. Innovation is the only way to maintain the socio-economic level if the region does not want to rely on regional subsidies to redistribute wealth at Spanish and European level.

The science and technology parks and the sectorial technology centres have had a key role when promoting knowledge exchange and transfer because technology intensive companies could be located in those areas. However, some have been more successful than others. Although the parks offer excellent facilities and infrastructures, there are few companies located in most of them (except the one located in Málaga). This is especially

the case of the so-called "ghost park" Geolit, located in Jaén. Besides, companies do not feel that being located in those areas has encouraged the cooperation and exchange of knowledge among them. By the same token, 20 sectorial technology centres have been created since 2000, albeit they have enrolled few trustees and have lacked the necessary stable funding to fulfil their mission. As a result, they have given priority to providing services to bigger companies that do have the resources needed to use their services. This policy outcome is precisely the opposite of what they were created for.

Through this narrative it has been revealed the lack of a multidisciplinary approach in innovation policies formation in Andalusia, where different regional ministries were in charge of science, technology, employment, industry, enterprise and international promotion policies until 2012, led to a lack of coordination when designing and implementing innovation policies. As a consequence, the effect of programmes and instruments was fragmented and vague. Furthermore, a dense network of organisation to support innovation was created and this led to some competence overlapping among them.

In addition, the Regional Government has followed a "picking winner's" strategy since 2004 instead of giving priority to the most widely spread productive fabric. This strategy goes against the present trend of smart specialization (Foray, 2013), which is in line with the European Strategy 2020 (Comisión Europea, 2010). The strategy followed by the Regional Government gives priority to knowledge intensive sectors despite their small contribution to GDP and regional employment. As a result, traditional sectors which are paramount for the economy of the region have been left behind.

ANNEXE 1

REGIONAL MINISTRIES IN CHARGE OF INNOVATION IN ANDALUSIA AND PROGRAMMING TOOLS LAUNCHED

Periods	1982-1984	1984-1986	1986-1990	1990-1994	1994-1996	1996-2000	2000-2004	2004-2010
Regional Ministry	Economy, Industry and Energy	Employment, Industry and Social Security	Development and Employment	Economy and Inland Revenue	Industry, Commerce and Tourism	Employment and Industry	Employment and Technological Development	Innovation, Science and Enterprise
PROGRAMMING TOOLS	-Economic Plan for Andalusia (1984-1986) -Intervention Plans	-Intervention Plans	-Andalusian Programme of Economic development (PADE 1987-1990)	- Research Project on New Technologies in Andalusia (PINTA) - Andalusian Programme of Economic development (PADE 1991-1994)	-I Industrial Plan of Andalusia (PIA 1994-1997) -4th European Framework Programme (1994-98).	-II Industrial Plan of Andalusia (1998-2001) - Andalusia Horizon 2000 Programme (1998-2000) - 4th European Framework Programme (1994-98).	- Plan of Innovation and Technological Development of Andalusia (PLADIT 2001-2003) -Economic Plan for Andalusia in the XXI Century (2002-2005) - III Industrial Plan of Andalusia (PIA III 2002-2006) -6th European Framework Programme (2002-2006)	- Plan of Innovation and Modernisation of Andalusia (PIMA 2005-2010) -7th European Framework Programme (2007-2013) - Andalusian Plan for Research, Development and Innovation (PAIDI 2007-2013) - Territorial Planning Scheme of Andalusia (POTA) - Competitiveness Strategy for Andalusia (ECA 2007-2013) - Andalusian Plan of Industrial Development (PADI 2008-2013).

Source: In-house compilation.

ANNEXE 2
SCIENCE AND TECHNOLOGY PARKS IN ANDALUSIA

Name	Province	Date of Creation	Established Companies	Employment
Science-Technology Park of Almería (PITA)	Almería	2002	24	106
Agribusiness Science and Technology Park of de Jerez (PTA)	Cádiz	2007	20	277
Tecnobahia Technology Park	Cádiz	2003	58	1.670
Science and Technology Park of Córdoba (Rabanales 21)	Córdoba	2001	25	68
Health Sciences Technology Park (PTS)	Granada	1997	64	1.200
Science and Technology Park of Huelva	Huelva	2008	9	-
GEOLIT, Science and Technology Park	Jaén	2000	26	167
Technology Park of Andalusia (PTA)	Málaga	1992	538	14.695
Cartuja Science and Technology park	Sevilla	1993	344	14.380
Dehesa de Valme Research and Development Park	Sevilla	2004	-	-
Aerópolis, Aerospace Technology Park of Andalusia	Sevilla	2002	47	1.394

Source: In-house compilation based on Regional Government data.

ANNEXE 3
TECNOLOGY CENTRES IN ANDALUSIA

Name	Province	Date of Creaion	Orientation	Activity	Number of Trustees	Employees
TECNOVA	Almería	2001	Sectorial	Agriculture and associated Industries	114	15
ADESVA	Huelva	2001	Sectorial	Agri-Business Industry	42	16
CTAP	Almería	2002	Sectorial	Natural Stone Industry	56	44
CITOLIVA	Jaén	2002	Sectorial	Olive Oil		13
CITIC	Málaga	2002	Sectorial	Information and Communication Technologies	38	73
TECNOTUR	Cádiz	2004	Sectorial	Tourism, Leisure and Quality of Life	12	7
ANDALTEC	Jaén	2005	Sectorial	Plastic and associated Industries	31	59
INOVARCILLA	Jaén	2005	Sectorial	Ceramic and related Industries	47	12
MOVEX	Cádiz	2006	Sectorial	Leather and related Industries	25	6
CITTA	Córdoba	2006	Sectorial	Textile Industry	19	9
TEICA	Huelva	2006	Sectorial	Meat industry	20	6
Andalucía-Lab	Málaga	2006	Sectorial	Tourism	25	8
CICAP	Córdoba	2007	Sectorial	Agri-Food	13	20
CITMA	Córdoba	2007	Sectorial	Furniture	39	8
CETEMET	Jaén	2007	Sectorial	Metalworking and Transport	28	20
CATEC	Sevilla	2007	Sectorial	Aerospace industry	8	34
CTAER	Almería	2007	Sectorial	Renewable Energy Industry	22	14
CTAQUA	Cádiz	2007	Sectorial	Aquaculture	27	9
GARUM	Huelva	2008	Sectorial	Sea Fishing Industry	6	4
HABITEC	Málaga	2009	Sectorial	Habitat and Sustainable Construction	18	10
IAT	Sevilla	1989	Horizontal	Engineering and Knowledge Management	19	132
SURGENIA	Córdoba	2007	Horizontal	Design	39	18

Source: In-house compilation based on Andalusian Regional Government data.

ANNEXE 4
INVESTMENT AXES IN THE COMPETITIVENESS STRATEGY FOR ANDALUSIA (in million euros)

INVESTMENT AXES	2007	2008	2009-2013	2007-2013	%
1-Knowledge based economy development	574,1	617,1	838,6	4.914,5	8,9
2-Business development and innovation	410,1	439,7	594,6	3.495,1	6,3
3-Environment and water resources	835,5	889,6	1191,1	7.042,3	12,8
4-Territorial balance, accessibility and energy	1004,6	1.078,5	1.461,1	8.582,9	15,6
5-Urban and local development	926,2	984,3	1.303	7.741,2	14,06
6-Welfare and social cohesion	674,4	722,1	975,6	5.735,7	10,4
7-Enhancement of human capital	1.361,4	1.464,8	1.997	11.688,6	21,24
8-Agri-Business, fishing and rural development	700,2	744,3	970,9	5.817,8	10,57
TOTAL	6.485,5	6.940,4	9.3331,9	55.018,1	100

Source: In-house compilation based on the Competitiveness Strategy for Andalusia (ECA 2007-2013).

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RESEARCH PAPER

Implementation challenges in cluster policy making: the case of the Andalusian Furniture Technology Centre

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This article analyses the design and implementation of a cluster organisation, the Andalusian Furniture Technology Centre (CITMA). The case of CITMA illustrates how policy processes are inherently political and far more complex than portrayed in conventional accounts based on the linear model of innovation. Policies are, in fact, unpredictable and fraught with uncertainty, opportunity and local specificity. However, acknowledging this complexity is not enough; it has to be unpacked to foster policy learning. To this end, we have opened the black box of the organisation to understand the political process underlying its creation and dissolution. Through this narrative, we shall witness how the technology centre, initially conceived and approved as a publicly funded organisation with the aim of raising SME's absorption capacity by providing technological services, turned into a semi-public consulting firm focused on selling business services to big companies. The outcome of this policy was precisely the opposite of what had been intended with this initiative and the consequence or the result of a top-down policy approach in which the regional ministry failed to take into account the needs, interests and resistance of the different stakeholders by unilaterally changing the project and the funding model approved by its predecessor. The CITMA case highlights the lack of a multi-disciplinary approach to innovation policy in Andalusia and the fact that innovation policies have been defined and implemented in a hierarchical and siloed fashion with little attempt at policy alignment across different areas and levels of government.

Introduction

In the past few decades and especially since the launching of the Lisbon agenda in 2000, many European regions have implemented a large number of policies and initiatives aimed at supporting industrial clusters as a key element of their strategies to foster innovation and competitiveness. Among them, the creation of support organisations, such as cluster managers and associations (Conejos and Duch, 1995; Benneworth *et al*., 2003; Sölvell *et al*., 2003; De la Maza-y-Aramburu *et al*., 2012; Ketels *et al*., 2012) and technology centres (Pyke, 1994; Hassink, 1997; Mas-Verdú, 2003; OECD, 2004; Morgan, 2013), has dominated the policy maker's tool box.

A prime example of this is Andalusia, where 20 sectorial technology centres have been established over the period from 2001 to 2010, most of them devoted to low technology industries, such as furniture, marble stone, textiles, leather, ceramics and food products. Contrary to what the name might suggest, they are intended not only to provide technology development and business services to firms, but also to act as

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cluster managers, facilitating added-value solutions through enhancing collaborative work and subcontracting (RIM, 2012).

Despite the deployment of technology centres in Andalusia, very little, if anything at all, is known about their effectiveness. The only mention found is the announcement of dissolution in 2013 of one of them: the Andalusian Furniture Technology Centre (CITMA), established in 2007, specifically at the request of cluster companies (Ariza Montes and Fernández Portillo, 2004).[1] This policy outcome is surprising given that the project raised high expectations among the different stakeholders at the time and seemed to meet the key requirements to succeed, as is highlighted in the scarce literature analysing similar initiatives. There was institutional embeddedness in that the technology centre did not start from scratch, but was built upon current work carried out in the cluster by the leader of the project and the most highly-valued actor within the sector, CEMER, a publicly funded training institution (OECD, 1992; Hassink, 1997; Vázquez-Barquero *et al.*, 1999). The cluster companies were strongly supportive and involved from the beginning in the centre's governance, which secured market-oriented strategies (Uyarra and Ramlogan, 2012). And there was a stable funding framework backed by the regional government, which requires that at least 80% of funds should be entirely public (Shapira, 1992; OECD, 1999; Mas-Verdú, 2003; Olazarán *et al.*, 2009; López-Estornell *et al.*, 2014; Morgan, 2013). The dissolution of CITMA provides us with the opportunity to address a key aspect that has been particularly overlooked in the literature, the actual implementation of cluster policies (Borrás and Tsagdis, 2008; Nauwelaers and Wintjes, 2008; Sternberg *et al.*, 2010; Uyarra and Ramlogan, 2012). In order to fill this gap, the paper analyses and describes the implementation of the CITMA initiative. Our main objective is to shed light on how and why this initiative has failed.

The question that arises is how to analyse complex phenomena, such as policy processes, which are inherently political (Mooij, 2003) and rarely linear or logical (Ramalingam *et al.*, 2008; Hallsworth *et al.*, 2011). Indeed, policy making is by no means a top-down and rational activity, as is often claimed in the literature (Sutton, 1990; Uyarra and Haarich, 2002; Hallsworth *et al.*, 2011). Rather, it should be seen as the result of complex interactions among interdependent actors in policy networks (Kenis and Schneider, 1991). In order to unpack this complexity, we shall draw on insights from actor–network theory (ANT), which uses a relational understanding of power to offer a more inclusive and realistic description and explanation of network dynamics than traditional single dimensional approaches (Callon, 1986a; Latour, 1987). The remainder of the paper is structured as follows. A review of the literature on clusters and cluster policies is followed by an explanation of the conceptual framework and methodology employed. The case of CITMA follows and then some conclusions are presented.

Literature review

The concept of cluster is broad and vague (Markusen, 1999; Martin and Sunley, 2003). It encompasses various overlapping theoretical developments around the long-observed phenomenon of agglomerations of similar and related industries in particular places. Although the starting point for conceptual considerations of spatial clusters is Marshall (1890), it was not until the late 1970s that the notion of industrial district was highlighted again in economics. Becattini's (1979) work introduced

the idea of embeddedness as a key analytical concept in understanding cluster functioning. Since then, research efforts devoted to analysing and explaining spatial clustering have seen something of a boom, helped by the success stories of the so-called 'holy trinity': Silicon Valley (Saxenian, 1994), the third Italy and Baden-Württemberg, and the impact among policy makers of the cluster concept as developed by Porter (1990, 1998).

The review of this vast literature shows a shift from an initial emphasis on transaction costs (Scott, 1988; Storper, 1995), flexibility (Brusco, 1982; Piore and Sabel, 1984) and increasing returns to scale (Krugman, 1991) as a means of explaining the emergence and sustainability of agglomerations. The shift is towards a growing interest in how innovation is generated, used and disseminated in systems of interrelated economic activity. In this regard, an increasing number of academics have stressed the importance of systemic connectivity, path dependency and the role of institutions to explain the clustering of innovative activities. These approaches, though heterogeneous, are underpinned by evolutionary economic theory (Nelson and Winter, 1982), and share a common conception of innovation basically understood in broad Schumpeterian terms as an interactive learning process surrounded by uncertainty and thus unpredictable. The learning process is socially and territorially embedded and culturally and institutionally contextualised (Lundvall, 1992).

Two key contributions can be highlighted: (i) the innovative milieu concept (Aydalot, 1980; Maillat, 1995), which emphasises the role of networking in a particular socio-cultural context and the importance of dynamic collective learning processes in supporting innovation (Camagni, 1991); and (ii) the systems of innovation approach, which attained a hegemonic position within the innovation literature and policy practice during the 1990s and 2000s. In fact, its development cannot be understood separately, since some of the most relevant pieces of research have been conducted either by public bodies or commissioned by them, especially the European Commission and the Organisation for Economic Cooperation and Development (OECD) (Mytelka and Smith, 2002; Sharif, 2006). This perspective analyses the network of relationships among firms and the broader institutional setting that supports their innovative activities. While much of the early research on innovation systems was conducted at the national level (Freeman, 1987; Lundvall, 1992; Nelson and Rosenberg, 1993), some considered the region as the appropriate unit for analysis (Asheim and Isaksen, 1997, 2002; Braczyk *et al.*, 1998; Cooke and Morgan, 1998) and for policy design and delivery. Definitions of 'regional innovation system' vary, but the most widely accepted one is that of Asheim and Isaksen (2002) – a regional cluster surrounded by supporting knowledge organisations.

The rationale for economic policy directly deduced from this approach refers to strengthening and improving the performance of the regional innovation system by tackling systemic failures (Dodgson *et al.*, 2011; Havas, 2014), considered deficiencies in the rules or infrastructure that underpin interactive behaviour and in the actors that interact within the innovation system (Carlsson and Jacobsson, 1997; Edquist, 1997; OECD, 1999; Smith, 1999; Woolthuis *et al.*, 2005). Therefore, the main task of the public policy maker has become that of facilitating the clustering process and creating an institutional setting which provides incentives for market-induced cluster formation (Morgan, 1997).

Cluster policies

While the cluster approach remains subject to debate in academia (Pitelis *et al.*, 2006; Duranton, 2011; Martin *et al.*, 2011a, 2011b; Brakman and van Marrewijk, 2013), cluster policies continue to be extremely popular among policy makers worldwide, as reflected in the ever growing number of initiatives implemented in support of clusters at supranational, national, regional and even local level (OECD, 1999, 2007; Isaksen and Hauge, 2002; Sölvell *et al.*, 2003; Oxford Research, 2008; Ketels *et al.*, 2012). Cluster development is identified as part of the Europe 2020 strategy and is considered an important tool in regional smart specialisation strategies for improving business environment, especially for SMEs (Barca, 2009; Foray *et al.*, 2009). Member states of the European Union are able to support cluster activity through structural and cohesion funds (European Commission, 2008; Nam *et al.*, 2012).[2]

Under the umbrella term 'cluster policies', a wide diversity of policies emanating from science and technology, industrial and regional policy domains have traditionally been implemented. These initiatives have ranged from facilitating and traditional framework policies, which are influenced by the cluster concept, to specific cluster programmes (Nauwelaers, 2001; OECD, 2007; Feser, 2008). For the European Commission (2008), strictly speaking only those development policies aiming at creating, mobilising or strengthening a particular cluster category resulting in specific sectoral cluster initiatives should be labelled 'cluster policies'. Even so, specific cluster programmes are highly context specific and differ considerably among European countries in terms of their objectives and rationales, the instruments used, their approach and their level of governance (Boekholt and McKibbin, 2003; Uyarra and Ramlogan, 2012).

Notwithstanding their heterogeneous nature, cluster policies have generally focused on promoting networking, institution building and enhancing social capital (Boekholt and Thuriaux, 1999; Lagendijk and Charles, 1999; Morgan and Nauwelaers 1999; Raines, 2001; Landabaso and Rosenfeld, 2009) by using soft instruments which seek to affect the participation of selected actors in the governance process itself (Flanagan *et al.*, 2011). The OECD (2007) differentiates instruments directed towards actors' engagement, which have been by far the most widely used, from those which focus on the provision of collective services and the promotion of collaborative research. Given the hybrid nature of the CITMA initiative, as a cluster organisation centred on actors' engagement as well as a technology centre aimed at providing advanced services to companies, our research analyses these two dimensions separately.

Cluster organisations

One of the most widespread instruments, initially focused on engagement of actors, has been the establishment of cluster organisations to take responsibility for fostering and coordinating cluster activities (Conejos and Duch, 1995; Lagendijk, 2000; Benneworth *et al.*, 2003; Sölvell *et al.*, 2003; Del Castillo *et al.*, 2012). The European Commission (2008) refers to cluster organisations as 'the legal entity engineering, steering and managing the clusters, usually including the participation and access to the cluster's premises, facilities and activities'. The rationale behind these interventions is tackling failures in coordination (Giuliani *et al.*, 2014), weak ties

(Carlsson and Jacobsson, 1997) and governance (Jessop, 2000) which hamper interactions between the actors involved, including the regional government, municipalities, businesses and business associations, labour organisations, the financial sector and knowledge providers (e.g. universities and technology centres).

Even though there are no official statistics of the number of these organisations, the European cluster observatory has listed some 1400 of them. Ketels *et al.* (2012) conducted a survey of these with 254 respondents, mostly from Germany (37), Spain (34), Denmark (20), Sweden (18) and Poland (14).[3] These cluster organisations are devoted mainly to such sectors as IT (41), food processing (16), automotive industry (14), energy (16), health care (15) and green technology (14). Half of these organisations have three or fewer employees and their origins vary from sectoral associations, which have been restructured into cluster coordinators, to technology centres. Given the shortage of studies analysing these organisations and the large study sample, the previous outcomes are very helpful in providing a general overview of these initiatives.

Cluster organisations are public–private partnerships that follow, on average, a 60/40 rule with 60% public financing coming from regional (24%), national (17%) and international (13%) bodies. Incomes are obtained primarily from membership fees (25%) and service provision to companies (9%). The private sector dominates organisations' boards (59%), with academia second (17%) and public sector officials third (15%), while the financial sector has a very limited presence (2%). Interestingly, half of these initiatives emerged in 2007 or later, being equally triggered by public (40%) and private (41%) initiatives. A critical aspect is the potential mismatch between the often short-term programme funding schemes and the largely long-term objectives of most of these initiatives (Uyarra and Ramlogan, 2012), which becomes particularly evident when analysing public sector exit strategies (Raines, 2001; Svetina *et al.*, 2009).

The formulated goals of these organisations are often broad and vague, seeking generally to enhance competitiveness and innovation capacity through a variety of instruments. Of most importance tend to be building an identity, a strategy and a brand for the cluster, as well as enhancing innovation through collaboration and joint R&D projects. Business development objectives, such as joint purchasing and export promotion, attract less attention.[4]

The main role played by cluster organisations is that of network facilitator or broker, promoting cooperation among members by providing support in the search for partners sharing common interests. This role usually involves organising meetings and participating in fora as a way of creating channels that enable dialogue with companies, administrations and similar organisations elsewhere. Although networking is an end in itself (OECD, 2007), these activities are often a starting point for more specific initiatives, such as participation in projects for cooperative research, transnational alliances and the implementation of new services (Ybarra and Doménech, 2011).

Despite the popularity of cluster organisations, very little is known about their effectiveness since evaluations are still rare and, when available, the applied methods – asking cluster coordinators about the success of their own activities – do not yield objective information. There is broad consensus on the difficulty of evaluating the impact of such instruments in that it is impossible to establish a causal relationship between the intervention and its outcome because of the indirect nature of the support measures, their long-term orientation and the range of instruments used (Díez, 2002;

European Commission, 2008; Schmiedeberg, 2010; Ybarra and Doménech, 2011; Uyarra and Ramlogan, 2012).

A good example of this difficulty is provided by De la Maza-y-Aramburu *et al.* (2012) and Aranguren *et al.* (2014), who evaluated the effectiveness of Basque cluster organisations in meeting their specified aims, formulated in terms of productivity and competitiveness. They constructed a matched sub-sample of non-cluster associates with statistically-identical characteristics as their cluster counterparts. Although the results suggest that simply being part of a cluster organisation does not imply higher productivity growth, cluster associations appear economically relevant because of their role as knowledge brokers. In fact, the aim of these authors is to urge caution when using statistical analysis to evaluate policy outcomes because of the analytical difficulties in establishing simple cause–effect relationships in systemic, relationship-oriented policies. To overcome these limits, they argue for the importance of nesting empirical analysis within a contextual understanding of the policy. This provides a basis for discussing both tangible and intangible outcomes of such policy (Aranguren *et al.*, 2014).

Technology centres

Since the mid-1980s, many European regions have set up technology centres in industrial districts in order to support the endogenous potential of innovation (Hassink, 1996; OCDE, 2004) through the provision of advanced knowledge services (KBIS) to companies (Miles *et al.*, 1995; Muller and Zenker, 2001; Doloreux *et al.*, 2010). These instruments are intended to overcome infrastructure failures (Edquist *et al.*, 1998; Smith, 1999) and organisational thinness (Amin and Thrift, 1994; Isaksen 2001; Oughton *et al.*, 2002; Tödtling and Trippl, 2005) associated with the shortage of knowledge providers and the weak endowment from innovation-support institutions. Illustrative examples of this are the centres managed by ERVET in Emilia Romagna (Italy) and the IMPIVA technology institutes network in Valencia (Spain) (Pyke, 1994; Hassink, 1997; Cooke and Morgan, 1998; Isaksen and Hauge, 2002; Mas-Verdú, 2003). According to Pyke (1994), the ERVET and IMPIVA systems have several features in common: (i) both are coordinated and partly financed by quasi-governmental agencies; (ii) they work with a mix of sectorally-dedicated and generically-oriented institutes; and (iii) they can both be regarded as a sort of public–private partnership attempting to promote a decentralised bottom-up approach with active involvement of the firms they serve.

Given that Andalusia has clearly mirrored the Valencian experience in that both regions are characterised by local production systems of SMEs mainly in mature manufacturing industries, we shall focus on the IMPIVA network to describe technology centres. Renamed IVACE in 2012, it is composed of 14 technology institutes and 1540 employees, which provide services to their 5961 associated companies and 12,248 customers. The centres are well embedded in the social and economic fabric while being, at the same time, well connected to similar international centres. Hassink (1997) notes that IVACE's institutes hire industry-experienced technicians, who carry out onsite interviews with managers, technicians and workers to help firms formulate their needs. Most of these centres are sector-oriented and located close to the industries they serve: shoes, ceramics, wood and furniture, textiles, toys, etc. Other institutes provide business services to more distributed industries, such as

metal-mechanical and plastics, while the rest are 'horizontal' centres dealing with such industries as optics, packaging, biomechanics, computation and energy.

Technology centres are also public–private partnerships, which may take different legal forms, non-profit association being the most popular (Mas-Verdú, 2007). Their main governing body is the board of trustees, mainly composed of firms' representatives along with the regional government, the university and sectoral associations. IVACE institutes apparently constitute a real network rather than just an infrastructure (Hassink, 1997; Mas-Verdú, 2003). In 2001, they created their own association, REDIT (Network of Technology Institutes of the Region of Valencia), aimed at strengthening and fostering close cooperation between them, as well as defending their positions against the regional government and Spanish public administration (López-Estornell *et al.*, 2014).

Although funding models vary in Europe, technology centres frequently have three main sources of financing: (i) direct public funding that aims to cover a part of the running costs; (ii) competitive public funding obtained through calls and proposals; and (iii) income from services provided to companies and membership fees (Modrego-Rico *et al.*, 2005; Mas-Verdú, 2007; Fernández de Bobadilla, 2009). According to the data provided by REDIT, in 2012, 53% of their income came directly from companies while the rest was obtained entirely through regional competitive calls (33%), national programmes (5%) and European Union projects (8%). In the period between 2009 and 2012, Valencian institutes raised 85 million euro in competitive public funds, helping their company clients to access 231 million euro in public funding.

It is clear that governments effectively control technology centres through funding instruments (Åström *et al.*, 2008). Being self-financing is increasingly seen as the key indicator of success. A clear example of this tendency is evident in Valencia, where direct non-competitive funding from the regional government has declined dramatically since the conservative party (PP) came into power in 1995, forcing technology centres to seek alternative funding sources in the market (Ybarra, 2006), and to move away from their initial public service mission of raising the awareness of SMEs (Vázquez-Barquero *et al.*, 1999).

In this sense, López-Estornell *et al.* (2014) point out that the dichotomy of public versus self-financing is a false dilemma in a framework of public–private partnership which involves two types of risks: (1) the concentration of knowledge-intensive services in larger companies; and (2) the tendency to deal with services with lower value-added, but more explicit, demand. An additional risk is highlighted by Morgan (2013), who identifies a process of institutional cannibalism as technology centres compete with other organisations, such as universities and training institutions, for certain activities and resources. This move threatens to duplicate the work already being done by other actors.

The stated goal of Valencian institutes is to increase the competitiveness of firms by providing advanced services. Vázquez-Barquero *et al.* (1999) identified five main activities performed by institutes: offering information and documentation; technical studies; laboratory tests; consultancy and technology transfer; and human resources. The initial focus on technical aspects have broadened to include marketing, export, distribution questions and brokering activities as well, such as supporting firms' research projects and mediating research competence from other knowledge providers (OECD, 2004). In this regard, the activity-based income structure published by REDIT may give us an idea of the importance of each task: research and

development projects (50%); innovation projects (28%); laboratory tests (14%); training (4%); information services (0.8%); and others (3.2%).

In relation to the innovation process, KIBS play a key role as strategic business partners in the development and marketing of new products, processes and services (Muller and Doloreux, 2009). They perform two main functions: (i) sources and facilitators of the innovation process that takes place within the firms (García-Quevedo *et al*., 2013); and (ii) intermediaries acting as 'bridges' to connect businesses with external and internal sources of knowledge (Molina-Morales *et al*., 2002). Therefore, KIBS operate as catalysts in innovation systems (Castellacci, 2008).

As with cluster organisations, the evaluation of technology centres and of the links they establish with the productive sectors is, in general, remarkably underdeveloped. In addition, many of the studies carried out are not widely published, maybe to hide their disappointing results (Hassink, 1996), or circulate as grey literature (Barge-Gil and Modrego, 2011). In the Valencian case, some authors have provided evidence of the positive impact of technology centres on company level of innovation (Molina-Morales and Mas-Verdú, 2008) and export activity (Mas-Verdú *et al.*, 2008). García-Quevedo *et al.* (2013) analyse the typology of Valencian firms that acquire R&D services from universities, technological centres and consulting firms. Their research highlights that 61% of these firms had used these services, technological centres being the most important supplier (37% of firms), whereas 25% and 23% of the firms had bought R&D services from consulting firms and universities, respectively. Two of their results seem particularly relevant: (i) the existence of a threshold in terms of firm size, age and absorption capacity (Cohen and Levinthal, 1990) to make efficient use of KIBS; and (ii) the fact that innovation policy, specifically R&D subsidies aiming at increasing relationships between the different agents of the regional innovation system, has a significant influence on firm decisions to hire R&D services from technological centres.

Summing up, Valencian technological institutes are often presented as a story of relative success because of the following factors: (i) their governing bodies are composed of firm representatives; (ii) the centres are well embedded in the social and economic fabric while at the same time being well connected to other similar international centres; (iii) the institutes hire industry-experienced technicians; (iv) the institutes apparently constitute a real network rather than an infrastructure; and (v) their operations are increasingly self-funded.

Conceptual framework

Popularity and the widespread use of cluster policy contrast sharply with the little progress made with regard to learning in cluster policy making and cluster policy learning (Nauwelaers and Wintjes, 2008). Indeed, despite the European Commission and the OECD increasing emphasis on evaluation, assessment practices are still scarce and weakly developed. Moreover, monitoring, when available, rarely goes beyond efficiency in the use of given resources (Andersson *et al.*, 2004), while completely neglecting the complex multi-actor and multi-level framework in which these policies are designed and implemented (Borrás and Tsagdis, 2008; Fromhold-Eisebith and Eisebith, 2008; Schmiedeberg, 2010; Sternberg *et al.*, 2010; Uyarra and Ramlogan, 2012). This gap is not unique to cluster policy studies. In fact, as noted by Flanagan *et al.* (2011), much of the literature on innovation policy attempting to

deal with this complexity considers policy makers to be translators of theoretical rationales into action, denies agency to actors in relation to policy change, remains focused on a superficial analysis of instruments (despite the supposed emphasis on the mix and interactions), and considers policy interactions to be designed out of existence by 'better' coordination. As a result, there is a tendency to assume a linear model of policy making in policy analysis and evaluation, characterised by a rational analysis of options and a clear separation among the different stages of the process: agenda setting, policy formulation, implementation and evaluation. Once the decision is made, there is only execution or implementation left. Explanations of complex phenomena (such as the policy process) based on such a simplistic view may come at the expense of missing the way in which these results are produced. Thus is policy learning hindered.

The persistence and the widespread use of this rational-comprehensive framework, despite the serious critiques often made (Simon, 1957; March and Simon, 1958; Lindblom, 1959; Cohen *et al.*, 1972; Caracostas, 2007), are a clear example of path dependence at play (Ramalingam *et al.*, 2008), which reduces policy making to a static set of public activities defined *ex ante*, implemented mechanically in a linear and hierarchic structure, and controlled *ex post* that do not reflect reality (Huber, 2011). First, there is nothing natural or automatic in a policy process. On the contrary, policy processes are inherently political and their outcome is influenced by a range of interest groups that exert power and authority over policy making and affect each process stage, from agenda setting to evaluation (Mooij, 2003). There are at least two ways in which policy processes are political: (i) they are bargaining processes in which actors struggle with bounded rationality to negotiate policy outcomes (Scharpf, 1978); and (ii) they are structured by particular discourses and ideas that assume a role beyond representing well-articulated interests becoming the glue that articulates them (Witt, 2003).

Second, policy processes are rarely linear or logical (Young and Mendizabal, 2009). In fact, policy problems and policy solutions frequently emerge together, or even before the need to act has been identified, rather than one after the other (Hallsworth *et al.*, 2011). A clear example is provided by Kingdon (2003), who emphasises the role of policy entrepreneurs inside and outside government who take advantage of agenda-setting opportunities, known as policy windows, to move their solutions, already in hand, onto the political agenda. Third, the stages of policy making not only often overlap, but are commonly inseparable. In addition, policies change many times as they move through bureaucracies to the local level where they are implemented (Lindblom, 1980). One of the most dangerous effects of the division between policy making and implementation is the possibility for policy makers to avoid responsibility. That is because, in case of failure, the blame is often laid not on the policy itself, but rather on a lack of political will, poor management or the shortage of resources for implementing it (Clay and Schaffer, 1984; Juma and Clarke, 1995). Policy implementation, however, should be seen as an ongoing, nonlinear process that requires consensus building, participation of key stakeholders, conflict resolution, compromise, contingency planning, resource mobilisation and adaptation (Grindle and Thomas, 1991).

A much more realistic view of policy making is offered by a related variety of network approaches. Rhodes (2006) groups these under the generic term of 'policy network', which includes iron triangles (Ripley and Franklin, 1981), policy subsystems (Howlett and Ramesh, 2003), advocacy coalitions (Sabatier and Jenkins-Smith,

1993), social fields (Fløysand and Jakobsen, 2011), relational fields (DiMaggio and Powell, 1983; Clegg, 1989) and epistemic communities (Haas, 1992). Although these various notions do not refer exactly to the same phenomena, they do focus on the analysis of power distribution among public and private actors in policy making (Jordan, 1981; Atkinson and Coleman, 1989), and they assume that the structure of these complex interactions explains policy outcomes (Kenis and Schneider, 1991). According to Bressers and O'Toole (2005), the basic characteristics of network relations are: (i) interconnectedness or the intensity of actor interactions, which refers both to contacts in the relevant policy formation process and also to relationships between these actors outside the actual policy process at any particular time; and (ii) cohesion or the extent to which individuals, groups and organisations empathise with each other's objectives insofar as these are relevant to the policy field. To an extent, interconnectedness can be seen as a structural characteristic and cohesion as its cultural counterpart (Ostrom, 1991).

The emphasis on networks in policy research derives from a fundamental question: governmental actors, despite their hegemonic position, depend on the cooperation and support of others (that they do not control directly) to deliver policies successfully. However, this cooperation is by no means simple or spontaneous; network construction and consensus building are required to deal with resistance.

Methodology

Cluster initiatives have emerged around concepts of networking and institution building. Therefore, the challenge lies in analysing the process by which these networks are created and brokered, and how the institutions are built. To this end, and in order to answer our research question – how and why the CITMA initiative has failed – we shall draw on the insights provided by actor–network theory (ANT). According to ANT, everything – people, organisations, technologies, politics, social orders – is the result of heterogeneous networks.[5] As opposed to conventional social network approaches, this analytical framework is not concerned with mapping interactions, but with analysing the connections between heterogeneous actors, focusing on network builders as the primary actors to be followed and through whose eyes we attempt to interpret the process of network creation. An actor-network is simultaneously an actor whose activity connects heterogeneous elements, and a network that is able to redefine and transform what it is made of (Callon, 1987). It seems rather obvious that not all actor-networks become macro-actors – only those who are successful in mobilising and enrolling enough actors in favour of their project, making them act and speak as one by 'black-boxing' them (Latour, 1987). 'Punctualisation' here refers to the process by which complex actor-networks are black-boxed and linked with other networks in order to create larger actor-networks. Through this process, the node which acts as an intermediary or spokesperson for the other actors in the network becomes an obligatory point of passage, which may exercise control over resources and is able to claim responsibility for the success of the network (Law and Callon, 1992). The stability of a network is precarious as it is under constant challenge. Conflicts arise when actors attempt to establish themselves as a point of passage or, as we shall see in our case, when the entry or exit of actors produces changes in alliances that can cause the black boxes to be opened and their contents to be reconsidered (Tatnall and Gilding, 1999).

Using ANT to open black boxes means thus tracing and discovering how actor-networks are formed and analysing how to overcome resistance and strengthen internally, or fall apart. In short, it consists in exploring the process called translation that is the ability of actor-networks to keep other actor-networks involved in the project by interpreting and translating their interests, needs, values and efforts into their own language.

For the purposes of our research, the question which arises is how to analyse actor-networks when the process of translation is contingent, local and variable. In addition, macro-actors wipe away any traces of their construction, presenting themselves through their spokespersons as being indivisible and solid (Czarniawska and Hernes, 2005). Callon (1986b) outlines a four-stage process of translation that may serve as a guide:

1. *Problematisation* or how to become indispensable. Initial actor-network defines a problem in such a way that others also recognise it as their problem. The goals are making the new definition recognisable for others, making its acceptance an obligatory passage point for entering the network and becoming indispensable in the process.
2. *Interessement*. At this stage, actors are convinced to join an actor-network characterised by the specific context.
3. *Enrolment*. The actor-network enlists, coordinates and gets other actors to carry out their roles through negotiation, persuasion, co-optation, inducement and reward.
4. *Mobilisation*. The network begins to speak as a single entity and to operate as a recognisable actor.

The black box of CITMA can be opened only by speaking with those involved in its creation and dissolution. To this end, we conducted 22 semi-structured, in-depth interviews with the key actors of this technology centre (five), regional and local government representatives (six), cluster firms (two) and sectoral organisations (nine) (see Appendix 1 for a list of acronyms). A briefing containing the objectives and motivation of this research was sent to each participant. Interviews were cross-checked with the inscriptions available in texts and communication artefacts, such as policies and plan documents, government publications, meetings minutes, memos, websites, discussion forums and newspaper clippings. In order to support this case study (Eisenhardt, 1989; Yin, 1989), we have also drawn heavily on the insights provided by Caravaca *et al.* (2002, 2003), who analysed the furniture system in Cordoba at the time the technology centre project was undertaken. Lastly, it is worth stressing that opening black boxes by using the ANT model carries an unavoidable set of drawbacks. While it is true that describing how macro-actors are assembled is straightforward, the answer to the 'why' question remains more elusive.

The case of CITMA

In 1993, the Regional Ministry of Employment created the Wood Consortium – School of Encinas Reales (CEMER) to support the furniture sector in Andalusia by providing vocational and continuing training.[6] CEMER promoters knew from experience that the only way to succeed was to involve all stakeholders effectively in the design of training programmes. To that effect, the CEMER board of directors was

created not only from government and trade union representatives, but also from the newly-created furniture entrepreneurs association of Cordoba (UNEMAC), which included CEMER in its direction committee in exchange. It was the first time that a public organisation had become a member of the board of directors of an employers association in Andalusia.[7]

Within a short period, CEMER became the top-rated institution in the Andalusian furniture sector, expanding its activities beyond training and evolving into a *de facto* sectoral technology centre (TC) (Caravaca *et al.*, 2003). CEMER built trust among companies by speaking their language; that is, by using cognitive proximity (Boschma, 2005; Torre and Rallet, 2005), and following two basic principles: (i) strictest confidentiality in the projects developed with other companies; and (ii) equal access to services regardless of firm size, which could be granted because of its 100% public funding. Companies saw in CEMER exactly what the furniture sector needed, since UNEMAC was a political lobby rather than an active player pursuing companies' interests. In 1996, a reorganisation of the regional government brought CEMER and the regional development agency (IFA) together under the newly-created Ministry of Employment and Industry, in charge of innovation policy.

Problematisation: becoming indispensable

In that new context, policy entrepreneurs seized the opportunity to turn *de facto* into *de jure* and they designed a project to create a fully-fledged sectoral technology centre with similar characteristics to those of the furniture and wood technology institute of Valencia (AIDIMA), sole provider of the specific product tests required by Andalusian companies. CEMER was frustrated after its unsuccessful attempts to negotiate special rates with AIDIMA, which, being an obligatory point of passage, had discretionary power to fix high prices. The activities of the new technology centre would range from laboratory tests, quality certifications, and applied research in technical improvements for production processes to the development of quality programmes, new products and markets. It was considered that the best way to stimulate demand of these services was by subsidising its use, which at the same time would raise companies' awareness of their specific needs. To that end, funding was to be entirely public, although they expected to obtain between 20% and 30% of funding through competitive calls.

Interessement and enrolment

In 2000, the Andalusian furniture sector encompassed around 3000 companies and 25,000 employees, distributed in four main areas: Cordoba (25%), Seville (22%), Jaen (15%) and Malaga (13%). Despite having the highest share of firms (17.8%) and employment (13.5%) in Spain, Andalusia is responsible for only 11.2% of national turnover, 10% of added value and 6.9% of exports (Jiménez, 2004). At that time, the numerous furniture business associations were becoming increasingly aware of the misrepresentation of Andalusia in national furniture manufacturers' federations, key influences in central administration in policy making and design. Valencian and Catalan companies, which accounted for 28% and 20% respectively of Spanish furniture exports, controlled these organisations and this control allowed them to attract central government investment.

Once the TC project was designed, CEMER presented it to UNEMAC, then the largest entrepreneur association in Andalusia with over 250 associates. UNEMAC immediately saw in the TC an excellent chance to bring the Andalusian furniture sector into sharper focus, thus gaining increased representation in national associations. More importantly, the TC project was a win–win deal for companies since they were not expected to support the centre financially. At this stage, another actor became interested in the project, the city council of Lucena. The furniture sector was by far the main engine of the economy in the town, accounting for 49% of total companies registered, 53% of employment and 54% of installed power. The local economy had been fostered by tourist development in neighbouring Costa del Sol (Malaga) in the 1960s. The furniture sector grew rapidly during the 1990s with a business creation rate of 286%. In 2000, there were approximately 400 furniture manufacturing companies, 160 auxiliary firms and 5500 employees, with an estimated turnover of €575 million.

With the intention of turning Lucena into the 'City of Furniture', the city mayor visited CEMER after his first term election in 1999. He quickly understood the TC project was not only an opportunity to raise the visibility of Lucena, but also an electoral asset and committed to granting public lands for the TC building. In addition, the mayor made his political network, including the president of the regional government, available to CEMER. Director positions were assigned as follows: UNEMAC was appointed to chair the TC; the TC management was assigned to CEMER, while the city council of Lucena would be part of the TC's highest governing body (in which companies were asked to participate as members in exchange of a reduced membership fee).

Mobilisation

While work was underway on the TC presentation to government officials, the narrow window to which Kingdon (2003) refers, the window that gives an issue a place on a governmental agenda, opened. Two major developments paved the way for the technology centre. First, IFA proposed that UNEMAC elaborate on the strategic plan of the Cordoba furniture system (PEMC). Although – surprisingly – IFA did not involve CEMER in the project, UNEMAC commissioned CEMER to interview cluster companies to identify their needs. They saw the creation of a technology centre as critical (Ariza Montes and Fernández Portillo, 2004). Secondly, the Lisbon Strategy was approved in March 2000, which stressed the need to promote cluster policies and knowledge transfer between public research organisations and industry. In order to meet these goals, the regional ministry of employment and technological development launched the master plan for innovation and technological development (PLADIT 2001–03) in July 2001, which formally incorporated cluster policies into the overall strategy (Witt, 2003). PLADIT included among its main objectives the development of entrepreneurial networks to promote the creation of sectoral technology centres. The emphasis on such support infrastructure was further influenced by positive experiences in the Basque Country and especially the autonomous community of Valencia, where technology institutes were playing a key role in industrial districts.

Shortly after the PEMC was concluded, CEMER submitted the TC project and its public funding model to the newly appointed regional minister, who approved it. Furthermore, with the aim of ensuring the highest level of political endorsement, the

project was presented to the president of the regional government of Cordoba with the invaluable help of the mayor of Lucena. The presentation event brought together not only high-level authorities, but also over 150 entrepreneurs, showing the mobilisation capacity of the CEMER actor-network.

Between 2001 and 2004, the CEMER actor-network seemed cohesive and appeared to be gaining momentum. The furniture sector, together with aeronautics, the marble stone and biotechnology sectors, was considered of strategic importance by the regional ministry. In June 2001, the Spanish government granted CEMER the distinction of 'office for the transfer of research results' (OTRI), which allows CEMER to participate in competitive calls for proposals.[8] In addition, CEMER was commissioned to monitor the TC, whose design was put out to tender.[9] In 2003, a CEMER branch specialised in furniture upholstery was set up in Villa del Rio (Cordoba). CEMER was well on the way to becoming a macro-actor and an obligatory point of passage within the Andalusian furniture sector. Only various delays in the land expropriation process, which caused the technology centre inauguration to be rescheduled to the second half of 2005, overshadowed the success of CEMER.

Opening CITMA black box

Despite the efforts made by the regional government to coordinate innovation policy, the management of the Andalusian research plan (PAI III 2000–03) remained within the regional ministry of education and science, which added an extra layer to already complex governance and caused the political fragmentation of the R&D process. In order to overcome this shortage, the umpteenth reorganisation of the Andalusian government brought innovation, science and entrepreneurship competencies together under the umbrella of the same regional ministry in 2004. Employment, however, remained separate from the new ministry, resulting in unexpected consequences for CEMER. IFA, in turn, was renamed IDEA (Andalusian innovation and development agency) and was entrusted with the coordination of innovation policy. The first task carried out by the newly appointed regional ministry was the development of the necessary regulatory framework for the research and innovation agenda.

In June 2005, the innovation and modernisation plan for Andalusia (PIMA 2005–10) was adopted, orienting innovation policy towards the development of the knowledge industry, biotechnology, information and communication technologies, energy, aeronautics, space and tourism.[10] Traditionally, such industries as marble stone and furniture would have been excluded, unveiling the regional government's intention to allocate its resources to knowledge-based industries, despite their irrelevant contribution to regional GDP and employment. In order to improve the governance and coordination of the regional innovation system, the Andalusian technology network (RETA) was created, becoming the most relevant actor and relegating IDEA to the mere evaluation of the complex paperwork required by the new subsidy scheme.[11] Similarly, CEMER was left in a weak position since it remained attached to the ministry of employment, which had no stake in the new innovation policy arena.

Conflict arose when the new regional ministry decided to review the policy regulating technologies centres, and particularly their funding. After the creation of the technology centre of stone (CTAP) and the green light was given to CITMA in 2001, TC initiatives had mushroomed to the extent that 15 of them, namely devoted to traditional sectors, were about to become operational. All these initiatives, despite

being based on different funding models, relied heavily on public funding and the regional ministry considered them not only an unbearable financial burden but also an unwanted heritage. In order to establish a common funding framework for Andalusian sectoral technology centres, the regional ministry used CTAP (which had secured nearly half of the financing to companies the previous year), as a yardstick. This called CITMA into question and opened its black box.

CEMER and officials of the regional ministry held several meetings to agree a new funding model, but positions were entrenched. On the one hand, CEMER stuck to the following non-negotiable principles: (i) to maintain the link between CITMA and CEMER; and (ii) to have a stable funding framework by which at least 80% of funds should be entirely public. On the other hand, the regional ministry offered a 10-year decreasing model, at the end of which CITMA should be able to self-finance its activities. In addition, the TC should operate under the legal form of a non-profit private foundation, in which companies had to pay an initial membership fee of €15,000. Faced with this reality, CEMER finally gave up and resigned from leadership of the project. Although in private UNEMAC and the mayor of Lucena asked CEMER to reconsider this decision, no one supported CEMER publicly. Such support might have jeopardised their relationships with the most powerful ministry of the government. UNEMAC associates were dependent on the generous subsidies granted by the regional ministry, and the Lucena city council was hoping to attract a technology centre devoted to renewable energy.

Thus it was that the CITMA actor-network was depunctualised and detached from CEMER, changing in the process to the extent that UNEMAC found itself compelled to adopt the unwanted role of network builder. This left the entrepreneur association in a very difficult position. It was not only CITMA's promoter and ultimately responsible for its success or failure in the eyes of stakeholders, but also a member of the CEMER board of directors. In order to avoid conflicts in the future, CEMER and UNEMAC reached a tacit agreement by which CITMA would refuse to interfere with training activities.

The new CITMA actor-network (2007–13)

In May 2007, eight months after its official opening and at an approximate cost of €5 million, CITMA opened its doors with a twofold objective: (i) to support the innovative activities of Andalusian furniture firms by providing business-related services; and (ii) to act as cluster manager, that is, as catalyst of the furniture production systems of Cordoba. To achieve these goals, CITMA was left to its own devices without the necessary financial support from stakeholders. Finally, laboratories were not equipped and the regional ministry paid only initial running costs. The worst case scenario of UNEMAC was that CITMA would attract at least 100 members, yet only 20 companies (18 of which were part of the furniture system of Cordoba) and 10 institutions became trustees. Furthermore, it was decided not to provide extra funding to support the centre beyond the initial capital, which under no circumstances was to be used to finance its activities. This way, the board of trustees rapidly became an ineffective body whose members were limited to attending meetings (as the saying goes, 'keeping their friends close and their enemies even closer'). Additionally, after the general manager appointment, the CITMA president, co-owner of one of the largest local companies, confined himself to representative functions, avoiding managing responsibilities.

Against this background, TC employees, led by the general manager, took over the reins of the TC to secure their jobs. Their background determined the CITMA business model, which focused on the needs of large companies, and especially on the provision of international trade and information and telecommunications services, which were highly subsidised. CITMA also began to compete with UNEMAC by offering the same services to its partners at lower prices, such as the management of the different subsidies granted to the furniture sector. In 2008, the trade promotion agency of Andalusia (EXTENDA) entrusted CITMA with the management of the international promotion plan for the furniture sector in Andalusia, which had been reserved for UNEMAC. Even though CITMA received only €15,000 each year for the plan management, this was a stepping-stone to offering customised services. Such a step intruded on the responsibilities of EXTENDA. By the end of 2009, EXTENDA had announced the termination of the promotion plan because of its poor performance, seriously questioning not only CITMA representativeness, but also its role within the sector.

The lack of support from companies was explained not only by the fact that CITMA had little to offer, but also by its employees, who were seen as outsiders with poor, if any, knowledge of company needs. Besides, most of the services it provided had to be subcontracted to consulting firms or freelancers because CITMA lacked qualified personnel. In-house services, such as design, did not succeed either since companies refused to entrust product development to an organisation that was chaired by a competitor.

Between 2007 and 2010, amidst the bursting housing bubble, only nine companies joined the foundation. During the same period, funding reached a peak of 19% of income, helping to hire 15 employees. During the budgetary cuts between 2010 and 2013, the situation worsened. In 2012, as a result of a reorganisation of the Andalusian government, the regional ministry for economy, innovation and science was created and the regional minister began to dismantle RETA and the IDEA cluster directorate. In the same year 21 sectoral TCs were opened – and the regional ministry announced the termination of TC basic funding, which covered the running costs of centres. At the end of 2013, technology centres unable to self-finance their activities were advised ‘to find a wealth partner to merge with’.

In May 2013, the board of trustees announced its dissolution and the merger of CITMA with the Andalusian technology institute (IAT), located in Seville and dedicated to engineering and knowledge management, which had no relation whatsoever with the furniture sector. Shortly after, UNEMAC, once the largest furniture entrepreneur association in Andalusia, entered into a voluntary arrangement with creditors, discontinuing its activities. Ironically, CEMER was transferred to the regional ministry of education in 2012, precisely when the new regional ministry in charge of innovation finally took over responsibility for employment and training.

Conclusions

The case of CITMA illustrates that policy processes are inherently political and far more complex than portrayed in traditional linear accounts. Policies are, in fact, unpredictable and fraught with uncertainty, opportunity and local specificity. Being aware of this complexity is not enough; it has to be unpacked to foster policy

learning. To this end, and in order to explain how and why the CITMA initiative failed, the present research has analysed and described its emergence, development and dissolution. This narrative shows how the TC, initially designed and approved as a publicly funded organisation aimed at raising SMEs' absorption capacity by providing technological services, turned into a semi-public consultancy that provided big companies with standard business services. The opening of the CITMA black box has revealed that this policy outcome arose from a traditional top-down approach to policy making in which the regional ministry failed to take into account the needs, interests and the resistance of the various stakeholders by unilaterally changing the project and the funding model approved by its predecessor. Consequently, this unexpected financing shift triggered the dissolution of the alliance and the exit of CEMER from CITMA management. In this context and in the absence of stakeholder support, CITMA employees were unable to build a solid and durable actor-network, remaining trapped in the vicious circle of low demand and poor supply. Moreover, the provision of international trade and training services, which was their only remaining option, was blocked by two obligatory points of passage, EXTENDA and CEMER respectively.

The main lesson to be drawn from the case of CITMA is that, despite its popularity, cluster policies face further problems than those often foreseen in policy circles. They are not only designed and implemented in extremely uncertain and complex multi-actor and multi-level environments, but also orchestrated across several policy domains. Therefore, their actual impact may depend as much on the way the policy is implemented as on whether the rationale for its use is correct (Uyarra and Ramlogan, 2012). The case of CITMA highlights the lack of a multi-disciplinary approach to innovation policy formation in Andalusia, where science, technology, employment, industry, entrepreneurship and international promotion competencies were continuously redistributed among different policy domains until 2012. As a result, innovation policies have been defined and implemented in a hierarchical and siloed fashion with little attempt at policy alignment across different areas and levels of government. This is evident in the extensive network of support organisations competing to provide similar subsidised services to companies. At this point, a pertinent question for future research is whether such balkanisation of semi-public, highly-subsidised support organisations is crowding out the private sector by providing basic business services to big companies rather than stimulating the innovative performance of SMEs.

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Notes

1. Published in the Andalusian official gazette (BOJA), 22 July 2013.
2. The new Horizon 2020 action, *Cluster Facilitated Projects for New Industrial Value Chains*, launched in 2015, will provide 24.9 million euro to finance projects that involve clusters. It is aimed at defining new industrial value chains to support European growth. Clusters will play a key role in channelling these funds to help enhance the innovation capacities of SMEs and fund large-scale demonstrator projects.
3. Launched under the European Commission's Europe INNOVA initiative in June 2007, it is a service created to inform policy makers, cluster practitioners and researchers, and innovative enterprises about European clusters and national and regional policies and programmes related to innovation and clusters. The project results and the methodology used are available at the website of the European Cluster Observatory, www.clusterobservatory.eu.
4. According to Isaksen and Hauge (2002), the most frequent activity carried out by cluster organisations has to do with government relations, i.e. lobbying governments and coordinating public–private investments. The second most frequent activity is training, which is also a little more frequent in science-based clusters. R&D is the third most frequent activity coordinated by cluster organisations, and it is of equal importance in both cluster types. Beyond that, cluster organisations coordinate a variety of activities among firms in clusters, such as marketing and sales, production (most important in science-based clusters) and inputs.
5. The ANT incorporates what is known as a 'principle of generalised symmetry': human and non-human elements (e.g. artefacts and organisation structures) should be integrated into the same conceptual framework and assigned equal amounts of agency. The importance of both, human and material elements, in constituting organisations becomes evident when we consider what a technology centre needs to fulfil its mission – scientists, laboratories, equipment.
6. The hosting of the organisation was first offered to the city council of Lucena, which declined the offer. The organisation was eventually established at Encinas Reales, 14 km away.
7. CEMER has followed the same strategy with most furniture entrepreneur associations in Andalusia, such as Pilas, Valverde del Camino, Sanlucar de Barrameda, and Ecija.
8. The OTRI is a technical office with two main goals: (i) to promote effective relationships and to catalyse the exchange of knowledge through R&D services with high added value; and (ii) to conduct joint R&D by contracting or by means of competitive funding from public funds.
9. In 2002, the scale model was ready for the visit to Lucena of Prince Felipe de Borbon to inaugurate an industrial park, which was named after him. He was impressed by the building design and asked the mayor to inform him about further development of the project.
10. Aimed at associating the growth of the Andalusian knowledge system, especially universities, to regional development needs, the plan comprised 286 actions grouped into 31 strategic lines, with 82 goals and six lines of action. PIMA had an overall budget of €5700 million, of which nearly €2600 million was assigned to support knowledge-based industries and universities and €1823 million was used to foster entrepreneurship. It was reinforced in 2007 by the Andalusian plan for research, development and innovation (PAIDI 2007–13), which set out the role and functions of the key actors of the innovation system in Andalusia.
11. All subsidies related to innovation were grouped under the incentive order of 5 July 2005, which establishes that any company benefiting from public aids to encourage innovation should contract at least 15% of the total project to public research centres.

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Appendix 1. Acronyms

ANT	Actor–Network Theory
APEM	Marble Entrepreneurs Association of Almeria
CEMER	Wood Consortium – School of Encinas Reales
CITMA	Andalusian Furniture Technology Centre
CTAP	Technology Centre of the Stone
EXTENDA	Trade Promotion Agency of Andalusia
IDEA	Andalusian Innovation and Development Agency
IFA	Andalusian Development Agency
LPS	Local Production System
PEMC	Strategic Plan of the Cordoba Furniture System
PIMA	Innovation and Modernisation Plan for Andalusia
PLADIT	Master Plan for Innovation and Technological Development
RETA	Andalusian Technology Network
RIS	Regional Innovation System
TC	Technology Centre
UNEMAC	Furniture Entrepreneurs Association of Cordoba

Abstract

This article explores the impact of regional innovation policies in the upgrading of multinational subsidiaries. To this end it analyses the design and implementation of a cluster organisation,the Andalusian Plastic Technology Centre (ANDALTEC),created in 2005 by Regional government to support the technological development of firms located in a FDI-generated agglomeration. Nowadays, ANDALTEC has "de facto" turned into the R&D department ofValeo lighting Spain,playing a key role in the upgrading of the subsidiaryand acting as a barrier to avoid relocation.Through this narrative we shall witness how subsidiary managers, as policy entrepreneurs, enrolled and mobilized local actors to promote into the political agenda the creation of the innovation centre.The case illustrates that cluster policies are far more complex than portrayed in conventional accounts based on the heroic policy maker. They are designed and implemented in extremely uncertain and complex multi-actor and multi-level environments easing the way to customization or capture by special interests.

Keywords: Multinational corporations, Subsidiary managers, Policy entrepreneurship, Regional innovation policies, Capture.

JEL: O31, O38, R58, L62, F23

bibliografía

1. Introduction

In the last decades Regional Development Agencies (RDA's) have implemented a large number of policy initiatives aimed at upgrading the operations of the subsidiaries located in their territories. Such activities include technology transfer between research infrastructures, universities and industry, local sourcing and training programmes, financial assistance, corporate lobbying (Guimón, 2009; UNCTAD, 2007; Crone, 2002) and more recently, as a result of increasing foreign ownership observed in productive agglomerations (Dunning, 1996 and 1998; McCann and Mudambi, 2005; De Propris and Driffield, 2006) cluster-oriented programmes (European Commission 2012c). The abundance and prevalence of support for multinational enterprises (MNEs)subsidiaries contrast however sharply with the lack of qualitative knowledge on the impact of regional policies in supporting their development (Fuller, 2005; Wolfmayr et al., 2013). In fact, there are increasing concerns about the limited capacity of regional governments to effectively influence the upgrading of the subsidiaries operating in their territory, since the main decision-making arrangements occur

beyond the confines of the RDA–subsidiary relationship (Asheim and Coenen, 2004; Rutherford and Holmes, 2008; Narula and Dunning, 2010).

In this regard, it has been argued that there is a need for clinical studies and context-sensitive analysis of subsidiaries' evolution in terms of the links between regional policy and MNE's subsidiary dynamics (Birkinshaw and Hood, 1998; Tavares and Pearce, 1999 and 2001; Tavares and Young, 2005),including their relations with external resources and institutions(Phelps and Fuller, 2015; Clark and Geppert 2011). In response to this call the paper analyses and describes the emergence and development of the Andalusian technic-plastic innovation centre (ANDALTEC). This research institute was created in 2005 by Regional government within the cluster policies framework, to support the technological development of firms located in a FDI-generated agglomeration. Nowadays, ANDALTEC has "de facto" turned into the research and development (R&D) department of the subsidiary, playing a key role in the attraction of added value activities and increasing knowledge intensive investments from headquarters, acting as a barrier to avoid subsidiary relocation.This case is particularly interesting because it traces the upgrading process of a MNE subsidiary located in a peripheral area, from an initial competence-exploiting mandate towards a competence-creating one (Cantwell and Mudambi, 2005). Besides, it takes places in a monopsonistic cluster. The asymmetric governance structure of this type of agglomeration is such that strategic decision-making powers lie solely with the MNE (De Propris, 2001) and local firms are a means to an end, rather than a resource whose potential contributions to regional innovation need to be fostered (Christopherson and Clark, 2007).

The apparent success of this initiative providesus with the opportunity to addressat the same time a key aspect that has been particularly overlooked in the scholarly literature and the policy practice; the actual design and implementation of instruments to deal with existing foreign-owned affiliates (Borrás et al, 2007; Guimón, 2009)and of cluster policies' (Borrás and Tsagdis, 2008; Nauwelaers and Wintjes, 2008; Uyarra and Ramlogan, 2012). Our main objective is opening the black box of the organization in order to answer two sets of related questions:

1) How and why did this initiative emerge and rose to the top of the policy agenda?And who designed it and implemented it?

2) How didthe subsidiaryforge local embedded ties with this public funded research infrastructure in the pursuit of new competences? And how does the establishment of such linkages contribute to the upgrading of the subsidiary?

The problem which arises however is how to analyse phenomena such as policy processes and alliances formation which are inherently political in nature and far more complex than portrayed in conventional accounts based on the heroic or idealised policy makerwhich basicallydenies agency to actors (Flanagan and Uyarra, 2016),neglecting this way the complex multi-actor and multi-level framework in which these policies are designed and implemented.As opposed to this trend, we shall draw on actor-network theory (ANT),which offers a more inclusive and realistic description and explanation of network dynamics thanthe delusive search for causes (Callon and Latour, 1992).The remainder of the paper is structured as follows. A review of the literature on corporate development policies is followed by the conceptual framework and an explanation of methodology employed. The case of Valeo and ANDALTEC follows and then some conclusions are presented.

2. Literature review

Multinational enterprises (MNEs) have turned into a sort of battlefield in which subsidiaries compete for existing and new mandates (Birkinshaw, 1996; Galunic and Eisenhardt, 1996) and repeated investment from headquarters (Phelps and Fuller, 2000) in order to protect their existing role and acquire new functions and greater decision-making powers to safeguard their survival (Delany, 2000; Becker-Ritterspach and Dörrenbacher, 2009 and 2011;Lampón and Lago-Peñas, 2013).

Given that mandates define the internal division of labour within a multinational corporation (Birkinshaw, 2000), the winning or losing of product mandates has significant implications for local economies, especially for the established positions of given regions within broader national and international spatial divisions of labour (Mackinnon and Phelps,2001). This is particularly relevant in less developed regions in which the role of MNEs is considered to becrucial for economic development (Pavlinek, and Zizalova, 2014; Meyer, 2004).In this context, RDA's have taken an active role in the corporate processes governing these "bidding contests" by supporting and encouraging subsidiary intrapreneurship (Ambos et al., 2010) in their drive to upgrade and develop their internal capacity through the provision of after-care services (Young and Hood,1994;Amin et al., 1994; Young et al., 1994; Peck and Burdis, 1996; Fuller et al., 2003; Fuller and Phelps, 2004) and policies for long-term embedding (Potter, 2007). More recently, within the Europe 2020 strategy, cluster policies are increasingly taking into account more explicitly the role of MNEs and their R&D affiliates. In this regard, European Commission (2012c) indicates that in order to strengthen the industrial commons and thereby increasing the attractiveness and ensuring that MNEs are well embedded in the EU economy, cluster policies are targeted to: a) increase the emphasis on specialised, location-specific assets; b) create clusters around MNEs; c) support collaboration and help MNEs creating linkages.The abundance and prevalence of support for MNEs' subsidiaries can be seen as a shift in EU policies from an initial focus on indigenous SME's firms and national champions, towards customization around foreign champions (Guimón, 2009).

Despite the large number of policies and initiatives implemented, the question of whether public support is effective to embed MNE subsidiaries is an open one. On the one hand, recent evidence provided by Wolfmayr et al. (2013) for the European Union highlights that backward linkages between MNEs and local firms are very limited, supporting the idea that MNEs are not sufficiently embedded in the local economies due mainly to the low absorptive capacity of firms and regions. However, on the other hand the promotion of forward linkages with local universities, training institutions and research institutes have been shown to have continuing influence in the upgrading of affiliates, by

providing host country managers with critical resources enabling them to build economically (Tavares and Young, 2004) the capabilities of the subsidiary (Howells, 1990; Dunning, 1997; Cantwell, 1995; Rugman and D'Cruz, 1997; Cantwell and Piscitello, 2005; Phelps et al., 2005; Santangelo, 2009; Guimón and Salazar, 2015), improving its credibility with headquarter office, and in the process providing a modicum of autonomy and resist headquarters (HQ) influence (Williams and Geppert, 2006). Such resources have been seen as 'anchors' that generate highly skilled graduates, spin-off start-ups and new, publicly available knowledge (Feldman, 2002; Wolfe and Gertler, 2004). MNE affiliates that continuously leverage these relations to create opportunities for upgrading and expanding their operations, are less in danger of relocation and more firmly embedded in that particular locale (Malmberg, et al., 1996).

While subsidiaries increasingly rely onpublic funded innovation centres to gain autonomy and influence vis a vis HQ to safeguard their survival,the dynamics through which such alliances are forged and how subsidiaries are able to tilt the research agenda of these centres towards their specific needs remains largely unexplored (Christopherson and Clark, 2007).In fact, the role of agency and the questions of what drives subsidiary management to take initiatives including the political dimension of this process areeither neglected or not fully explored. This is somewhat surprising, since constant calls have been made over the last two decades for greater understanding of MNCs as political systems in which actors or groups of actors try to secure options, realize interests and achieve success (Forsgren, 1990; Bélanger and Edwards, 2006; Bouquet and Birkinshaw, 2008; Dörrenbächer and Geppert, 2011).

Conversely, thereis increasing evidence that this technology offer model is clearly biased towards MNEsand did not attach enough attention to the needs of SMEs(Olazaran et al., 2009), as reflected in the mismatch between the services offered by these organizations and the needs of companies (Pyke, 1994; Hassink 1996), which has been aggravated by short-term character of funding and frequent changes in technology policy driven by politics rather than business needs (OECD, 1999;López-Estornell et al., 2014). In the context of less-developed regions, such Andalusia, the challenges facing technology centres are huge considering that in addition to the low absorptive capacity of

domestic firms they do not have a tradition of co-operation and trust in the regional research and development infrastructure (Pavlinek, and Zizalova, 2014; Tavares and Young, 2006; Landabaso and Mouton, 2003).

3. Conceptual framework

While we bury long ago the heroic innovator, the idealized policy maker persists in the innovation literature. Indeed, traditionallyinnovation policy research has paid little attention to how policies arise on the agenda, and how they are designed and implemented (Borrás and Tsagdis, 2008; Uyarra and Ramlogan, 2012; Sotarauta et al., 2012). In fact in innovation policy studies, agency, institutional change, and policy process, not to mention politics, tend to be black boxed and rendered unproblematic (Flanagan et al., 2011; Sotarauta, 2007 and 2012; Uyarra, 2010). As a result, there is a tendency to assume a linear model of policy making in policy analysis and evaluation, that reduces policy making to a static set of public activities defined ex ante, implemented mechanically in a linear and hierarchic structure, and controlled ex post that do not reflect reality (Huber, 2011).

Consequently, one of the central challenges is to bring back the actors from the shadows (Markussen, 1999), acknowledging their agency in relation to the processes through which policy problems are identified, solutions emerge and are put into practice (Flanagan and Uyarra, 2016) and to that end we also need to discover how various individuals and groups exercise power and aim to influence (Sotarauta, 2009). In this line two related concepts can be helpful. On the one hand, the notion of policy entrepreneurs (Kingdon, 1984), emphasises the role of purposive actors inside and outside government who take advantage of agenda-setting opportunities, known as policy windows, to move their solutions, already in hand, onto the political agenda. The model talks about three streams of policy process, the problem stream, policy stream, and politics stream. The three streams work along different, largely, independent channels until at particular time, which become a policy window, they flow together or intersect. On the other hand, Sotarauta and Pulkkinen (2011) put forward the concept of Institutional entrepreneurship which highlights agency, interests,

legitimacy, strategy, and power in the analysis of regional innovation systems. Institutional entrepreneurs are actors (organizations and/or individuals) who, first of all, have an interest to change particular institutional arrangements and who, second, mobilize resources, competences, and power to create new institutions or to transform existing ones actively participating in the implementation of these changes. The key point is to find a balance between structure and actor in order to not lose sight of the larger institutional architectures that shape and constrain individual choices, and that create geographical divides and discontinuities within the global economy (Gertler, 2010).

3.1. Methodology

The skill of the policy entrepreneur is to identify and open a window of opportunity to place their policy idea on to the policy agenda and to create a winning interest coalition (Edler and James, 2015). The challenge therefore lies in analysing how these complex processes develop and howalliances and coalitions are forged and brokered. In order to unpack this complexity we shall draw on actor-network theory (ANT), that provides an insight into what strategies, actions and tricks individual or collective actors undertake by exploring the process called translation, that is, the ability of actor-networks to keep other actor-networks involved in the project by translating and interpreting their interests, needs, values, and efforts into their own language (Callon, 1986a).An actor-network is simultaneously an actor whose activity connects heterogeneous elements and a network that is able to redefine and transform what it is made of (Callon, 1987). It seems rather obvious that not all actors-network become macro-actors, only those who are successful in mobilising and enrolling enough actors in favour of their project, making them act and speak as one by “black-boxing” them (Latour, 1987).Punctualisation here refers to the process by which complex actor-networks are black-boxed and linked with other networks in order to create larger actor-networks. Through this process, the node which acts as an intermediary or spokesperson for the other actors in the network becomes an obligatory point of passage, which may exercise control

over resources and is able to claim responsibility for the success of the network (Law and Callon, 1992).Importantly,in ANT, power is viewed as performative and network-based rather than due to any inherent structural capacities for one actor to have ‘power over’ another. Power is therefore relational and arises from making connections across space (Latour 1987).

Using ANT to open black boxes means thus tracing and discovering howactor-networks are formed and analysing how to overcome resistance and strengtheninternally, or fall apart. For the sake of our research, the question which arises is how to analyse actor-networks as the process of translation is contingent, local and variable. Callon (1986b) outlines a four-stage process of translation that may serve as a guide:

1. Problematization or how to become indispensable: Initial actor-network defines a problem in such a way that others also recognize it as their problem. The goals are making the new definition recognizable for others, making its acceptance an obligatory passage point for entering the network and becoming indispensable in the process.

2. Interessement: At this stage, actors are convinced to join an actor-network in a unique way characterised by the specific context.

3. Enrolment: The actor-network enlists, coordinates, and gets other actors to carry out their roles through negotiation, persuasion, co-optation, inducement and rewards.

4. Mobilization: The network begins to speak as a single entity and to operate as a recognizable actor.

To build this narrative(Kristensen and Zeitlin, 2005) we have conducted 28 semi-structured, in-depth interviews with the key actors involved in the creation of the technology centre: subsidiary managers, regional and local government officials, cluster firms, sectorial organizations, trade unions and university representatives.Interviews were crosscheckedwith the inscriptions available in texts and communication artefacts, such aspolicies and plan documents,

government publications, meetings minutes, memos and websites. In support and as input to the case study (Eisenhardt, 1989; Yin, 1989), we have also drawn heavily on the insights provided by Rodríguez-Cohard (2003), and Rodríguez-Cohard and Muñoz-Guarasa (2006), who have extensively analysed the local production system(LPS).

Lastly, it is worth stressing that opening black boxes using ANT comes with an unavoidable set of drawbacks .Micro-political conflicts (Bouquet and Birkinshaw, 2008b;Dörrenbächer, and Geppert, 2011) are full of ambiguity and divergent interpretations. In addition Interview partners are often reluctant to speak about their own and other important key players' political strategies and interrelated conflicts to avoid problems as well as to keep out of the public debate possible hidden agendas. Moreover, given that the process of translation is contingent, local and variable, any attempt to generalize or compare is futile.

4. The case of Valeo lighting Spain and ANDALTEC

In 1970French mega-supplier (Sutherland, 2005) Valeo, established a headlamps factory inAndalusia, classified as convergence region, formerly objective 1,in order to followRenault which had opened factory in Valladolid in1957 and in 1968 in Palencia. The location of the factory in Martos (22.637 hab) near Jaén, remains something of a mystery, especially considering that the locality wasdevoted to agriculture, notably olive oil,poorly connected and was 600km away from the Renault facility.The plant was initially conceived as a simple manufacturing unit,that is, a truncated miniature replica (Pearce and Papanastassiou, 1997),in which added value functions such as procurement, salesand design were based in Barcelona, where Valeoconcentrated most of its activities in Spainincluding another headlamps factorydedicated tothe Spanish manufacturerSEAT.Over the 70's and 80's the Andalusian plant grew exponentially propelled by the substantial development of automobileproduction in Spain which had become a low-cost export base forFrench, German, Japaneseand US manufacturers capable of serving the entire European market(Lagendijk, 1995). Due to the zeal and commitment of managers and employees, mainly locals,during this period the facilitygradually experienceda

process of in-situ upgrading by developingengineering capabilities in order to perform routine technical activities andthe customization of products for the different OEM's(Hakansson, 1990; Vázquez-Barquero, 1999;Jürgens and Krzywdzinski, 2009).Despite the high logistic costs derived from its location, the plant quickly became the most productive in the lighting division,gaining centrality within the networkand acquiring partially new responsibilitiesin sales and procurement.In this process the local vocational training school and the University of Jaen, which had an engineering faculty were playing a key role by providing high skilled workers and engineers.

In 1985,the newly appointed factory director, who until then had played a major role in the sustained growth of productivity as plant manager,undertook the task of modernizing the siteand dealing with the increasing problem of the lack of space by implementing lean manufacturing (Womack and Jones, 1996). Until then all phases of the manufacturing process were performed in-house including those most labour intensive such as cutting and cleaning. The Martos plant in fact represented a *raraavis* since it practically doubled in term of employees the rest of facilities within the lighting division. One of the first measurestaken was to focus on the critical process and the organization of production while outsourcing the rest, notably injection moulding. Several employees sought an opportunity and left the company to create their own business as Valeo suppliers. In some cases Valeohelped them to establish by lending machinery and equipment. These first-tier suppliers, in turn, externalized some tasks as well to lower tiers forming this way a supply pyramid. As a consequence of this process,in the late 80's emerged a growth pole that including Valeo employed around 1.500 people (Rodríguez-Cohard,2003). In this regard it has been suggested that this kind of agglomeration leads to a 'monopsonistic cluster' with limited local spill-overs and where external economies occur they mainly benefit the foreign investors themselves (De Propris and Driffield 2006, Phelps 2008).

In addition to outsourcing,twokey events marked a new stage in the development of the Andalusian plant. On the one hand,the successful installation of the first automatic module for the manufacture of thermosetreflectorswhich placed it at an advantage over its sister companies

competitors.On the other hand, as a result of the factory director autonomous entrepreneurial activity,the company entered in the German market which was the largest car manufacturer in Europe and where Valeo had no important business for the lighting division.The entry into this market, controlled by Valeo's main competitor the German company Hellas,entailed a qualitative leap forward taking the Andalusian plant to the next level as it was awarded with the mandate to produce worldwide the Volkswagen Golf headlamps.The subsidiary was gaining momentum.In the beginning of 1990, following the above-mentioned successes ValeoMartos factory director was promoted to general manager for the Spanish lighting division and moved to Barcelona headquarters'.

4.1 Problematization: becoming indispensable (1996-1999)

Despite the continuous sustained growthin productivity of the Andalusian plant,in the mid 90's Valeo subsidiary managers were very much concerned about the future of the lighting division in Spain. Valeo'srecently unveiled plans to expand production towards the new peripheries in Central, Eastern Europe and North Africa searching for lower labour costs(Lung, 2004;Layan and Lung, 2007) threatened the position of the Spanish factories within the group. Managers knew the only way to avoid relocation was by attracting added value functions as theMartos' factory in fact remained largely truncated. However, co-development with OEM's which was key to assure its survival,was heavily concentrated in the core, mainly at the central research centre located in Bobigny (France), which constituted an obligatory point of passage (OPP) for the rest of the organization. Spanish factories were confined to the execution of the projects developed in Parisintroducing in some cases some minor modifications in order to adapt to their machinery and processes which were not as standardized as nowadays.

The concern about the future was shared by local suppliers who were witnessing a decrease in their business due to new purchasing policy implemented by Valeo. Itconsisted basically in requiring their suppliers to increasingly assume development tasks.To this end Valeo was turning to

Zaragoza, Valencia, Alicante and Madrid looking for new suppliers with higher skills and capacities able to meet with its requirements. At the heart of this process was Valeo's need to transfer downstream development costs.In this context,in 1995 Valeo suppliers, led by the biggest companies organized themselves through the local entrepreneur association of Martos (ASEM) in order to promote the creation of a public funded innovation centre to support the technological upgrading of cluster companies.By the time, there were two technology centres operating in the Spanish plastic sector: ASCAMM, located in Barcelona and AITIIP, situated in Zaragoza. Local entrepreneurswho did not involve Valeo or the municipality hired a local engineer to design under their instructions the future centre. While the project was being developed, in 1996 the process of agglomeration and cluster formation received support from Regional development agency (IFA) through the so-called "Tractor Program", aimed at adapting the auxiliary industry to locomotive company's needs(Rodríguez-Cohard and Muñoz-Guarasa, 2006). The intervention was based on a SWOT analysis drawn up together with Valeo and then with the companies of theLPS. The main weaknesses reported by Valeo werethe relative small size of local actors, low absorption capacities, limited financial resources and weak management structures.

By the end of 1997 the project with an estimated cost of 15 million euros was ready.The activities of the new technology centre were tilt to suppliers needs and would range from laboratory tests and quality certifications to applied research in technical improvements for production processes. This same year local suppliers submitted the technology centre (TC) project and its entirely public funding model to IFAwho in exchange offered to share equally the cost. Faced with this reality, local companies which have no resources to financially support the centre gave up and abandoned project.

4.2 Interessment and Enrolment (1999-2002)

In 1999 the city council of Martosbecame interested in resuming the project to create a TC. After 20 years operating in town and employing more than 2.000people directly and several hundreds more indirectly Valeo and its auxiliary sector were turning into the main engine of its economy.As opposed to

the previous project, the newly elected Mayor was convinced that the only way to succeed was to effectively involve all stakeholders, especially Valeo. To that effect, mayor firstmetand enrolled in the project the different entrepreneurs associations operating in the Andalusian plastic sector, including ASEM, as well as tradeunions and the chamber of commerce.Once the Mayor knew the project had wide support visited Valeo to present the initiative. But to his surprise, the general manager informed him that due to company policy Valeocould not support nor participate in the project.Despite the latter, Mayor invited Valeo to the meetings in which the centre activities and layout were being discussed by the recently formed local coalition. After some time,the company finallysent as a representative to these meetingsa human resource manager without any knowledge of the subject, charged with collecting information.

In 2000 two major developments drastically changed Valeo lighting Spain attitude towards the TC. Firstly, headquarters decided to segregate some activities of its central innovation centre located in Bobigny(Paris), among those plants more advanced. This move was intended not only to decentralize product development and place it closer to its OEM's customers, which were increasingly globalized,but also looking for cost sharing among the different units. Secondly, the Lisbon Strategy was approved in March 2000, which stressed the needs of promoting cluster policies and knowledge transfer between public research organisations and industry. In order to meet these goals, the Regional Ministry of Employment and Technological Development launched the Master Plan for Innovation and Technological Development (PLADIT 2001-2003) in July 2001, which included among its main objectives the development of entrepreneurial networks to promote the creation of sectorial technology centres which would facilitate the technological modernisation and update of the companies. These events were sought by subsidiary managers as a window of opportunity to attract product development to the Martos plant, since the creation of a public funded TC devoted to technic plastic and located near the factory might well be a powerful assetin its favour. In addition its candidacy could count with the support of the top executive of the worldwide lighting division, the former director of the Martos plant and the Spanish subsidiary who have been named vice-president in 1997. The questionthat

arose however washow to tiltthe TC to Valeoneeds without involving directly the company in the process. An alliance with the TC might well be a powerful and cheap barrier to avoid relocation.

4.3 Mobilization (2001-2005)

In 2001, the uncertainty surrounding the future of the Spanish lighting division which at the time generated sales of 335 million euros and employed 2,039 peoplewas increasing. The French group was going through its worst crisis in the last 15 years reporting a first-quarter loss of euro 179 million and drop of 6.6% in sales. In response to the depressed global automotive market in which forecasts were not encouraging, the French group implemented a restructuring program based on three main pillars: a) industrial rationalization with production reorganized across fewer sites, mostly in low-cost regions such as Eastern and Central Europe, North Africa and Latin America; b) to focus on core businesses and selling sale selective non-strategic activities in which do not hold leadership positions and that weigh structurally on their margins and cash amounting for around two billions euros by the end of 2008; c) reinforcing procurement by considerably reducing the number of suppliers and widely deploying more efficient on-line working practices such as "bidding-on-line" and "Web catalog" solutions. Only in 2001, Valeo sold or closed 26 of its 179 manufacturing facilities among which 12 European plants, including sites in France, Germany and Spain, axing 6,000 jobs worldwide, about 12% of its workforce. One of the affected factories was the Barcelona headlamps and pilots facility which employed 261 people. Its production was transferred to the Andalusian plant which could absorb itand where in addition wages were lower. Around 100 employees, mostly engineers, were relocated in Martos. The closure of the Barcelona facility was a warning call of what their future could look like. Facing with this situation,Valeo factory director, an expatriate, who until this moment was "in vigilante",quickly replaced his representative in the meetings with the local coalition. Instead, he commissionedthe head of the tooling department, a local engineer who had long experience contracting with the Spanish technology centres. The new Valeo's representative, who was

known by most suppliers, quickly gained the coalition trust, taking the lead of the project. In August 2002,under secondment of a year, Valeo's representative was given the task to create the trustee foundation which should develop the project of the new TC. To this end he moved to a desk in the municipalitywhere he coordinated the process and the enrolment of the potentialtrustees. During this period he visited a similar initiative, CTAP,which has been promoted by a Spanish multinational, being financed through the ERDF funds.In September 2003 the foundationchaired by Mayor and formed by 29 trusteesmostly institutionalswas operational with an initial fund of 52.000 euros. Not surprisingly,Valeo did not become trustee since it was not allowed to take any stake in companies others than Valeo's. However, as a member of ASEM Valeo joined the board of trustees proposing its representative as managing director of the TC who this way ceased to be officially Valeo's employee. It only remained to develop and find the necessary funding for the project.To this end and with Valeo partially on boardMayor quickly mobilized his political network which included the key actors at the regional and national level. In 2004, the President of the Regional Government opened the election campaign in Martosendorsing the creation of the innovation centre. Short after, the Spanish Minister of Public Administrations also visited Valeo'sfactory to boost the project showing this way the mobilisation capacity of ANDALTEC actor-network. Despite efforts to obtain its public support Valeohowever officially preferred to remain aloof of the project.

4.4 Building the ANDALTEC actor-network (2005-2009)

Although PLADIT had been launched in 2001 by the end of 2004there was no budget line allocated specifically for technology centres.This situation gave cause for concern given that 15 TC initiatives were about to become operational. All of them, relied heavily on public funding and the new Regional Ministry considered most of them not only an unbearable financial burden but also an unwanted heritage.To find a way through,the TC managing director met with Valeo general manager in order to commence the activity. At this time ValeoMartoshad decided to acquire a powerful leading software for design and

simulation, ANDALTEC'smainarea of expertise,costing around 250.000€. Bothwere convinced that if ANDALTEC owned this software it could initiate immediately the activity since it would pay itself back within a year only with the projects commissioned by Valeo.With this aim he asked first to trustees but they decided not to provide extra funding other than the initial capital, which under no circumstances could be used to finance its activities. Then, he turned to IFA to obtain the money who advised him to apply for a grant, helpinghim with thecomplex paper work required. Finally, Regional Government granted to ANDALTEC in the context of PLADIT package a non-recurring subsidy amounting 250.000 euros.In addition, Valeo as a sign of its commitment offered to negotiate the price and payment terms with the software company. If ANDALTEC by the due date could face the payment then it would become the owner of the software. If not, Valeo would buy it. It was a win-win for both, ValeoMartos and ANDALTEC.

In January 2005, ANDALTEC initiated its activity in a small rented office of approximately90 square meters with 4 employees. As expected, Valeo quickly started to transfer increasing workloads to the extent that this same year it was necessary to purchase additional software licenses. In addition under the incentive Order of July 5th 2005, the regional ministry groupedall subsidies related to innovation establishing that any company benefiting from public aids to attempt innovative actions should contract at least 15% of the total project to public research centres.As a result ValeoMartosapplied for different competitive calls commissioning ANDALTEC with numerousprojects related to design and validation, plastic injection moulding simulation and process oriented optimization. Furthermore, following its accreditationin November 2006 as Technology Centre by the regional government,ANDALTEC started participating in competitive calls for generic projects in which Valeo was interested. This way ANDALTEC was turning "de facto" into the design and development department of the Andalusian plant, its sole customer which allowed the centre to self-finance its activities. But this dependency on Valeo was also the outcome of the absence of a funding scheme for the TCs. Even the so-called basal financing,established to cover the running costs,was not delivered despite regional ministry promises.

Finally,in the beginning of 2007,three years after the creation of the trustee foundation, the project of the future centre,with an estimated initial cost of 7million euros and with a deadline for completion in 2009 wasready.The city council of Martosdonatedan area of 16.000 square meters locatedwithin the same industrial area and onlyone kilometre away from Valeo. The mobilization process was fruitful and the coalition obtained the commitment from national and regional government to finance the centre jointly through the European Regional Development Fund (ERDF) within the coming seventh framework programme 2007-2013.As part of this agreement, ANDALTEC, beneficiary of the fundingdid not have to pay back its part since the Regional Government decided to bear it entirely.In addition,in order to equip the centre with scientific and technical equipment ANDALTEC applied for a 3,8 million eurossoft loanwith a 0% interest rate to be repaid over 10 years and a two-year grace period within the technological parks framework funded by the EU and managed by central government.Coinciding with this, Valeo headquarters started to invest in R&D in the Andalusian plant, allocating 1,5 million euros for the development of technology for the assembly process of the internal parts integrated in the headlamp housing in which Regional Government contributed with 471.000 € or 32% of the total investment. Besides, ValeoMartos turned into the tutor of the Brasil and the Central and Eastern Europe lighting plants, becoming responsible for its profit and loss accounts.In 2008, while the TC was being built, the economic recession hit auto parts makers particularly hard as reflected in the dramatic decline in sales declared by companies in the sector. Valeo posted a 13% drop in sales in 2009 from 2008, its lowest level since 2005. In order to maintain “competitiveness” the Group announced a reduction of its global workforce affecting 5,000 permanent jobs and a new extensive reorganization with a simpler structure based on four business groups: comfort and driving assistance systems, powertrain systems, thermal systems and visibility systems.The restructuring processshifted the group’s centre of gravity towards the developing world (Frigant, 2011). At December 31, 2008, 45% of the Group’s sites were located in competitive-cost countries.In order to face the drop in car production, the Andalusian plant which between 2003 and 2008 had already reduced its workforce by 20% to 1.400 employees, announced in January 2009 the increasing use of redundancy schemes and of staff temporary

layoffs. In this context and in the eve of the centre inauguration Regional Government and the newly elected Mayor with the invaluable help of subsidiary managers obtained an appointment with Valeo at Paris headquarters scheduled for February 2009. This time however, the Andalusian plant could not count with the support of its former general manager and Vice-president of the lighting division who had left Valeo and joined its main competitor, Hellas.

4.5 Becoming an obligatory point of passage (2009-2015)

In January 2009 with an estimated cost of 10 million € opened its doors the first of the 3 phases of ANDALTEC with a built area of 10 thousand square meters and 24 employees.The TC was equipped with different laboratories with state-of-the-art technology includingphysical and chemical, metrological, biodegradability and compostability, optic and photometry. In addition to design CAD-CAE, prototypingand 3D rendering services the centre had experimental pilot plantsto perform small and medium-scale product simulationand processing solutions.Local suppliers were not happy with this turn in the TC activities since it was clearly tilted towards Valeo needs and it did not have the necessary equipmentto perform the tests and essays they needed the most and what in fact had been the main reason of its mobilization since the mid 90's.Local suppliers and Valeowould have to continue contracting with ASCAMM and AITIIP for these essays.

In February 2009 Andalusian Regional ministers and Martos mayor finally met with Valeo's board of directors in Paris. As a result of this meeting,in April, Regional Ministry signed in Martos a cooperation agreement with Valeo lighting Spain by means of which ANDALTEC would host a R&D lighting and signal systemsunit (ISA)for the French group own exclusive use. In addition to fully equip the unit, Regional Government would partially fund each project carried out in the ISA. In these project would also participate the Andalusian universities research groups. In this regard IFA that was renamed as IDEA in 2004 was charged with the task to animate and broker(Morgan, 1997) the relations among Valeo, ANDALTEC and the Andalusian universities.

ANDALTEC could not have asked for a better start of its activities.Valeo'sinnovation centre, which was overloaded with work, quickly commissionedANDALTEC with P1 and P2 projects[1]. Once it showed it was able to deliver high quality performance, ANDALTEC started to develop jointly with Bobigny P3 projects. It was the first time in the company that P3 projects were being developed out of the Paris central innovation centre.Even Valeo's own research center located in China that developed advanced lighting systems for Asian and Western vehicle manufacturers was no entitled to carry out this type projects. Apart from Martos and Bobigny, ANDALTEC also developed R&D projects for otherValeo facilities such as Angers in France, Sylvania Osram in the USA, Ichikoh in Japan and China as well as for the innovation centre located in China. As a result during this period ANDALTECactor-network was growing stronger expanding its knowledge base so as to meet with the new trends in advance lighting system which integrated plastic, optic and electronics. But the agreement signed between Regional Government and Valeo had far-reaching consequences for the Andalusian plant. Since the establishment of the ISA unit in ANDALTEC,headquarters started to invest increasingly in R&D in the Andalusian plant, especially in the domain of electronics.Indeed,the integration of electric components, advanced materials, batteries and new high performance electronic architectures within the lighting systems was making car part manufacturers to rely heavily upon suppliers from a cross-section of other industries(Tassey, 2014). In order to overcome this problem,following the installationin 2013 of the first light-emitting diode (LED)unit in the Andalusian plant, in 2014 Paris announced a further 15 million € investment and the creation of 160 jobs for the installation of the first electronic manufacturing module in a Valeo facility worldwide. Headquartersenvisaged that the Andalusian plant would supply from now onthe electronic systems to the whole lighting division.By its part,Regional Government would contribute with 30% of the total investment, that is 4,5 million euros. This investment placed the Andalusian plant at the forefront in this forward-looking domain.This way,the truncated branch plant of the 70's has turned now into an OPP by developing and supplyingthe electronic components for the rest of the lighting

[1]Valeo's R&D projects rangefrom P0and P1which are mostly industrial to P2 and P3 which correspond with the development of generic technologiesthat would be applied in P0 and P1.

divisionworldwide.In this process ANDALTEC has played a key role as an ideal complement for the factory not only as its R&D department but alsoas a training centre for Valeo's engineers.In 2015 out of the152 employees of the centre, 75 were paid by Valeo.The continuous transfer of employees from ANDALTEC to Valeo has resulted in the update of essential knowledge and the acquisitionof new skills, capabilities and capacities.Currently, since its establishment in 1970, the subsidiary has reached its peak in 2015 in terms of employment, not only in quantity with 2.300 employees, but also in quality as 40% of the employees are engineers.

Finally, while it is true that ANDALTEC has tried during this period to diversify and expand its customer base, notably into the food packaging sector however its marriage of convenience with Valeo has constrained these moves.In fact ANDALTEC has been captured (Phelps, 2000 and 2008; Duranton, 2011). On the one hand Valeo would stop working with ANDALTEC at the slightest suspicion of collaborating with a competitor, which reduces considerably its potential market. On the other hand, given the considerable amount of work it brings and that Valeo has priority over the rest, it overloads laboratories and monopolise facilities living no room for other customers. In 2015 80% of ANDALTEC's turnover, 5, 5 million €, was generated by Valeo.

5. Discussion and conclusions

The case of ANDALTEC illustrates how the convergence of MNEs' needs and interests with local resources can result in the upgrading of the subsidiary.As shown in the table below,Valeo lighting Spain has evolved from an initial truncated miniature replica with a competence-exploiting mandate to a competence-creating onethrough repeated investments in R&D from HQ. In this processthe availability of skilled labour and most importantly,thecreation and development of ANDALTEChave been paramountin providing local managers

with critical resources enabling them to build economically the capabilities of the subsidiary, avoiding relocation.

Valeo lighting Spain evolution 1970-2015

Period	Evolution of Valeo's subsidiary mandate	Development of regional knowledge infrastructure
1970-2005	Truncated Miniature Replica;Competence exploiting; In-situ upgrading; World Product Mandate	Vocational training school; Engineering school
2005-2009	Competence exploiting; Tutoring sister companies; First R&D investments from HQ	Vocational training school; Engineering school; ANDALTEC
2009-2015	Competence creating; Increasing R&D investments from HQ; Obligatory Point of Passage	Vocational training school; Engineering school; ANDALTEC+(ISA unit); University research groups

Source: Authors

The opening of ANDALTEC's black-box has revealed that this policy outcome is mainly the consequence of the entrepreneurial activities of subsidiary managers which are not confined to the business domain but extend to the policy realm. Through this narrative we have witnessed how subsidiary managers, as policy entrepreneurs,enrol and mobilize local actors, notably the city council, the RDA and the local entrepreneurs association to promote into the political agenda the creation of the innovation centre.In addition, the design and implementation of this initiative was carried out by staff seconded by the subsidiary, assuring this way the centre was especially tailored towards their specific needs. The control over this 'punctualized'asset, the unconditionalsupport of regional government and the alliance with the local university have allowed the subsidiary to upgrade by attracting added value activities and increasing knowledge intensive investments from headquarters.In fact, the subsidiary has become a solid macro-actor and an OPP for the MNE by controlling critical knowledge on which the rest of the lighting division is dependent (Mudambiand Navarra, 2004).At this point a pertinent question is to what extent the entrepreneurial activities of

subsidiary managersrepresented autonomous' actions on their part, or was an outcome of the responsibilities directly delegated to them by HQ? In this regard local managers, in order to avoid relocation, autonomouslytook advantage of a policy window to promote into the political agenda the creation of the innovation centre, however, they lacked the financial resources and above all the formal authority to further commit the organization with Regional government. ANDALTEC's development is the outcome of a marriage of convenience, celebrated at the highest level,between the Andalusian government and the French group. As a result, on the one hand Valeois transferring its research and development fixed costs to ANDALTEC and on the other hand the subsidiary is anchored within the local economy and has created shared value by enabling local cluster development (Porter and Kramer, 2011). Indeed, since its establishment in 1970, the subsidiary has reached its peak in 2015 in terms of employment, not only in quantity with 2.300 employees, but also in quality as 40% of the employees are engineers. On the other hand, local suppliers are being included in the MNE global value chain while at the same time diversify into various plastic related sectors, reducing in a certain way their dependence from the MNE.While it is true that the alleged 'success' of ADALTEC has helped secure Valeo at least for now,the question which arises is whether the capture of ANDALTEC by Valeo will actually undermine the longer run health of the cluster which needs an interchange of knowledge and innovation?

From a policy perspective the case reveals how Regional Government has followed a picking winner's strategy playing the role of a guarantor of employment security and high wages, and influencing cluster development through high levels of industrial subsidy (Tödtling and Trippl, 2005). Customization around MNEs is more evident in the case of convergence regions such as Andalusia because of their high dependence on FDI in employment terms. Notwithstanding down-sizing and outsourcing, MNEs continue to be major employers and large numbers of jobs translate into political influence. The main policy lesson to be drawn from this case is that asymmetry of powers between MNEs and increasingly dependent and vulnerable localities are opening up policy spaces in which there is potential for the capture by MNEs of expenditures intended for collective consumption (Phelps, 2008).In

this context and given that MNEs outsource more and more RD and design activities, regional policies designed to upgrade the innovative capacity of SME suppliers may result in a lessening of power asymmetries (Rutheford and Holmes, 2008).

In terms of policy analysis thiscasehighlights thatinnovation policies in general, and cluster policies in particular are far more complex than portrayed in conventional accounts based on the heroic policy maker. They are designed and implemented in extremely uncertain and complex multi-actor and multi-level environments This questions seriously the traditionaltop-down focus in policy formation,calling for a more realistic approach to policy making which acknowledges as pointed out by Flanagan and Uyarra(2016), the agency of actors in relation to policyand outcomesand their influence on institutionalisation processes.

Finally, it is worth stressing that while our use of ANT offers insightsinto what strategies, actions and tricks individual or collective actors undertake,howeverwe have to acknowledge its potential limitations. First, because ANT focuses on what actors do, it gives less attention to the sedimented patterns in which they are embedded and the structures which bound actor networks.Second ANT accounts privilege networks over accumulation and financial size, underestimating the degree to which large MNEs can exercise influence over Regional governments and especiallypower over SMEs in industrial clusters. Without the former, we really doubt the Valeo managers could act as the policy entrepreneurs to produce the effects that they did.

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Resultados y conclusiones

El análisis cronológico de los principales planes y programas económicos desarrollados por la Junta de Andalucía muestra cómo la inicial orientación académica de las políticas de innovación basada en el modelo lineal ha ido evolucionando en consonancia con las nuevas ideas y paradigmas en boga, hasta una concepción sistémica e interactiva de corte empresarial. Paralelamente, a través de este recorrido hemos asistido a la evolución de la agencia de desarrollo regional de Andalucía desde su primera configuración, el IPIA, que fundamentaba sus acciones en desarrollo de las capacidades endógenas de los territorios, pasando por el IFA, que principalmente siguió el modelo de apoyo a la industria basado en la reconversión, imperante en la política industrial española de los 80 y 90, y finalmente IDEA, como facilitador y animador y promotor de iniciativas emprendedoras innovadoras. En esta transición, si bien es cierto que la idea inicial del desarrollo endógeno, nunca desaparecería del todo, se transforma hacia el concepto más amplio de desarrollo local, que permite la presencia también de un modelo de desarrollo exógeno, que estimule la atracción y mantenimiento de empresas extranjeras en la región.

Dado que en los más de tres decenios de vida política de la Comunidad Autónoma el Partido Socialista obrero Español (PSOE), ha dirigido siempre el Gobierno Regional, el cambio en la orientación de la política andaluza de innovación, no vino motivada como en el caso de Valencia (López-Estornell et al., 2013; Ybarra, 2006) o Madrid (Sanz Menéndez et al., 2001), por la llegada al gobierno regional del Partido Popular, sino que el punto de inflexión del cambio de la política de innovación en Andalucía lo constituye el lanzamiento de la Estrategia de Lisboa en 2000, y los cambios institucionales que la Junta de Andalucía puso en marcha para adaptarse a este nuevo marco.

La orientación y predominio de la esfera académica que ha tenido la política andaluza de innovación hasta el lanzamiento de la agenda de Lisboa en el año 2000 se ha reflejado en diseños institucionales caracterizados por una considerable separación, descoordinación y asimetría en la relevancia de las políticas de orientación académica y empresarial (Romero et al,2004). Así, por un lado, la Consejería de Educación y Ciencia ha liderado la esfera dela política científica mientras que el desarrollo de la política tecnológica ha correspondido a la consejería que en cada período legislativo ha asumido las competencias en materia de política industrial (Merchán, 2010). Del mismo modo y mientras que la esfera de política científica ha contado, desde sus inicios, de un marco político y normativo estable y específico, primero a través del Programa de Política Científica y desde 1990 a través del Plan Andaluz de Investigación (PAI), la política tecnológica no tuvo hasta la aparición del Plan Director de Innovación y Desarrollo Tecnológico de Andalucía (PLAIDIT 2001-2003), un instrumento propio para su realización, sino que, como señala Real (2001), se

ha caracterizado por la dispersión de instrumentos y órganos y la discontinuidad en su aplicación, lo que le ha llevado a ser calificado como un sistema altamente fragmentado (Alberdi et al., 2014).

El PLAIDIT constituía la respuesta formal de la Junta de Andalucía a la estrategia de Lisboa, ofreciendo un marco general para la coordinación de los diferentes actores e instrumentos involucrados en el Sistema Regional de Innovación (Cooke, 1992). Este plan supone la formalización de las políticas de cluster en Andalucía y su inclusión en el tool-box (Witt, 2003)para reforzar la red andaluza de sistemas productivos locales, como parte fundamental de una estrategia orientada a un desarrollo industrial equilibrado y de base endógena (Caravaca et al., 2003). El PLAIDIT expresaba la necesidad de impulsar políticas activas que permitan promover una oferta coherente de servicios tecnológicos avanzados que refuercen el tejido productivo andaluz, que adolecía de un desfase entre la oferta y demanda de servicios tecnológicos, haciendo patente la necesidad de incentivar en las empresas una cultura innovadora. En esta línea, propone la creación de infraestructuras de soporte al tejido productivo, especialmente Centros Tecnológicos (CT). De esta manera, la creación y potenciación de CT y la generación de economías de red entre ellos, constituirá uno de los puntos centrales de la nueva estrategia de desarrollo tecnológico de la Junta de Andalucía, y está en consonancia con la idea central de los sistemas regionales de innovación (Asheim et al., 2011).Baste decir que en el periodo comprendido entre 2000 y 2010 se crearán 20 de estas infraestructuras de soporte al tejido productivo. A este punto merece la pena señalar que el PLAIDIT dejaba claro que los CT se financiarían principalmente a través de los ingresos generados por la prestación de servicios a las empresas, siendo complementados con las ayudas específicamente otorgadas por el Gobierno Regional. Escorados ya de entrada, por lo tanto, a un modelo de corte empresarial, como la segunda generación de Institutos Tecnológicos de Valencia, lo que deja de lado ciertos objetivos de desarrollo de la innovación, estratégicos a largo plazo, pero que no son valorados por el mercado de inmediato (Ybarra, 2006).
En 2005, el PLAIDIT se vió reforzado por el Plan de Innovación y Modernización de Andalucía (PIMA 2005-2010), cuyo objetivo principal era vincular el crecimiento del sistema de conocimiento andaluz, especialmente las universidades, a las necesidades de desarrollo regional mediante la promoción de la transferencia de conocimiento entre los organismos públicos de investigación y la industria. A partir del PIMA, la Junta de Andalucía hizo coincidir el proceso de planificación regional con la programación de los fondos estructurales con el objetivo de garantizar para el período 2007-2013 un único planteamiento estratégico de desarrollo regional acorde con las directivas europeas.

A principios de 2010 la crisis económica empezaba a sentirse con fuerza en Andalucía. Como respuesta a los ajustes fiscales, se suprimía del organigrama de la agencia IDEA la dirección de clusters y se intensificaba la reorganización de competencias de las distintas consejerías. En 2013, con veinte centros tecnológicos operativos, el Gobierno Regional suprimía la financiación “basal” destinada a cubrir los gastos corrientes, aconsejando a aquellos incapaces de autofinanciar sus actividades, "encontrar un socio rico con quien fusionarse”.

Este recorrido por los principales planes e intervenciones también pone de relieve la falta de un enfoque multidisciplinar en la formación de políticas de innovación en Andalucía, donde las competencias en ciencia, tecnología, empleo, industria, empresa y promoción internacional han estado dispersas en diferentes consejerías hasta 2012. Esto ha dado como resultado que la política de innovación se haya definido y aplicado de forma bastante descoordinada, dando lugar a la dispersión y falta de continuidad de los distintos programas e instrumentos y a la creación de una densa red de organizaciones de apoyo que compiten entre sí por obtener financiación pública, creando duplicidades.

Además, el Gobierno Regional ha seguido una estrategia de "selección de ganadores" desde 2004, dando prioridad a sectores intensivos en conocimiento a pesar de su pequeña contribución al PIB y al empleo regional. De esta manera, a diferencia de la tendencia actual de especialización inteligente (Foray, 2013), se han dejado atrás los sectores tradicionales que son fundamentales para la economía de la región. Por último, y pese a las crecientes inversiones, Andalucía constituye un excelente ejemplo de la denominada paradoja de la innovación, que es la limitada capacidad de absorción, a pesar de una mayor necesidad de invertir en innovación (Oughton et al., 2002).

Los casos de CITMA y ANDALTEC muestran el complejo universo multi-actor y multinivel en el que estas políticas emergen, se diseñan e implementan y validan nuestra hipótesis poniendo de relieve el papel clave que los emprendedores políticos juegan en este procedimiento. Estos casos ilustran cómo los procesos de formación de políticas son intrínsecamente políticos y mucho más complejos que los descritos en los relatos convencionales basados en el político heroico. Las políticas son, de hecho, impredecibles y llenas de incertidumbre, oportunidad y especificidad local. Sin embargo, reconocer esta complejidad no es suficiente, tiene que ser desenmarañada para fomentar el aprendizaje de políticas. Con este fin, hemos abierto la caja negra de estas organizaciones para comprender los procesos políticos que subyacen a su surgimiento, desarrollo y disolución.

En el caso de CITMA hemos asistido al proceso mediante el cual los emprendedores políticos de CEMER enrolan y movilizan a los actores locales, especialmente al ayuntamiento, ya la asociación de empresarios locales

UNEMAC para promover en la agenda política la creación del centro de innovación aprovechando una ventana de oportunidad. Sin embargo, los sucesivos cambios en las consejerías y en la orientación de las políticas de innovación unido al cambio en el modelo de financiación, transformaron el centro tecnológico, inicialmente concebido y aprobado como una organización pública, destinada a aumentar la capacidad de absorción de las pequeñas y medianas empresas (PYMES) mediante la prestación de servicios tecnológicos, en una consultora semi-pública dedicada a la venta de servicios empresariales standard a grandes empresas. El resultado de esta intervención fue precisamente lo opuesto a lo que se pretendía con esta iniciativa y la consecuencia o el resultado de un enfoque político de arriba hacia abajo en el que el gobierno regional no tuvo en cuenta las necesidades, los intereses y la resistencia de las diferentes partes interesadas modificando unilateralmente el proyecto y el modelo de financiación aprobado por su predecesor. Este inesperado cambio en la financiación del centro provocó la disolución de la alianza y la salida de los emprendedores políticos del CEMER de la dirección de CITMA. En este contexto y en ausencia de cualquier apoyo por parte de los stakeholders, los empleados de CITMA no pudieron construir un actor-red sólido y duradero, quedando atrapados en el círculo vicioso de la baja demanda y la escasa oferta.

El caso del CITMA pone de relieve los principales riesgos derivados del falso dilema entre financiación pública y autofinanciación de los CT en el marco de las relaciones público privadas: (1) la concentración de los servicios prestados por los CT en las grandes empresas; (2) la tendencia a ofertar servicios con menor valor añadido, pero con más demanda explícita. 3) proceso de canibalismo institucional dado que los centros tecnológicos se ven obligados a competir por la obtención de financiación pública con otras organizaciones, como universidades, centros de formación vocacional y otras instituciones. Este movimiento amenaza con duplicar el trabajo realizado por otros actores.

El caso de ANDALTEC ilustra cómo la convergencia de las necesidades e intereses de las EM con los recursos locales puede resultar en la mejora de la filial. En este proceso, la disponibilidad de mano de obra cualificada y, lo que es más importante, la creación y desarrollo de ANDALTEC han sido fundamentales para proporcionar a los ejecutivos locales recursos críticos que les han permitido desarrollar económicamente las capacidades de la filial evitando la reubicación. A través de esta narrativa hemos visto como los ejecutivos de la filial, como emprendedores políticos, enrolan y movilizan a los actores locales, especialmente al ayuntamiento, y a la asociación de empresarios locales para promover en la agenda política la creación del centro de innovación. Además, el diseño e implementación de esta iniciativa fue

llevada a cabo por personal adscrito a la subsidiaria, asegurando así que el centro estuviera especialmente adaptado a sus necesidades específicas. El control sobre este activo y la alianza con la universidad local han permitido a la filial actualizarse atrayendo actividades con valor añadido y e inversiones intensivas en conocimiento de la sede central. De hecho, la filial se ha convertido en un sólido y duradero actor-red y en un punto de paso obligatorio al controlar conocimiento crítico del que depende el resto de la EM (Mudambi y Navarra, 2004).

Es importante destacar que si bien es cierto que los ejecutivos locales, a fin de evitar la deslocalización de la filial, aprovecharon de forma autónoma una ventana de oportunidad para promover en la agenda política la creación del centro de innovación, sin embargo carecían de los recursos financieros y sobre todo de la autoridad formal para comprometer a la organización con el Gobierno Regional. El desarrollo de ANDALTEC es el resultado de un matrimonio de conveniencia, celebrado al más alto nivel, entre el gobierno andaluz y el grupo francés. Como resultado, por un lado Valeo está transfiriendo sus costes fijos de investigación y desarrollo a ANDALTEC y por otro lado la filial está firmemente anclada dentro de la economía local.

El caso también destaca cómo la formulación de políticas afecta de forma distinta a las pequeñas y grandes empresas en aglomeraciones monopsonistas. La gobernanza en este tipo de aglomeración es tan asimétrica que los poderes de decisión estratégica recaen únicamente en la EM (De Propris, 2001) y las empresas locales son un medio para un fin, más que un recurso cuyas posibles contribuciones a la innovación regional necesitan ser apoyadas (Christopherson y Clark, 2007a).

Desde el punto de vista político, el caso ANDALTEC revela cómo el Gobierno Regional ha seguido una estrategia de escoger ganadores, desempeñando el papel de garante de empleo e influenciando el desarrollo del clúster mediante altos niveles de subsidios (Tödtling y Trippl, 2005). La personalización de las políticas en torno a las EM es más evidente en el caso de las regiones de convergencia como Andalucía debido a su alta dependencia de la IED en términos de empleo. A pesar de la reducción de tamaño y la subcontratación, las EM siguen siendo importantes generadores de empleo, y un gran número de puestos de trabajo se traducen en influencia política. La principal lección que se extrae de este caso es que la asimetría de poderes entre las EM y las localidades cada vez más dependientes y vulnerables está abriendo espacios políticos en los que existe la posibilidad de que las EM capturen los gastos destinados al consumo colectivo (Phelps, 2008).

La principal lección que se extrae de estos casos, es que, a pesar de su popularidad, las políticas de clusters se enfrentan a más problemas que los frecuentemente previstos en los círculos políticos y en las versiones

tradicionales basadas en el político heroico. No sólo se diseñan y se implementan en entornos multi-actor y multinivel extremadamente inciertos y complejos, sino que debido a su naturaleza sistémica también se orquestan a través de varios dominios de políticas. Por lo tanto, su impacto real puede depender tanto de la manera en que se implementan como de si la justificación para su uso es correcta (Uyarra y Ramlogan, 2012).Lo anterior cuestiona seriamente el enfoque tradicional de arriba hacia abajo en el análisis de formación de políticas, reclamando una visión más realista de políticas que reconozca como señalan Flanagan y Uyarra (2016), la agencia de los actores en relación con la políticas, los resultados y su influencia en los procesos de institucionalización.

En este contexto, una pregunta pertinente para futuras investigaciones es si esta balcanización de organizaciones de apoyo semipúblicas y altamente subvencionadas está expulsando al sector privado, proporcionando servicios empresariales básicos a las grandes empresas en lugar de estimular el desempeño innovador de las PYMES.

Por último, cabe destacar que si bien es cierto que nuestro uso de ANT ofrece una visión de las estrategias, acciones y trucos que emprenden los actores individuales o colectivos, sin embargo debemos reconocer también sus limitaciones potenciales. En primer lugar, dado que ANT se centra en lo que hacen los actores, presta menos atención a los patrones y rutinas en los que están incrustados y las estructuras que vinculan a los actores-red. En segundo lugar, la concepción relacional de ANT privilegia el proceso de formación de redes sobre, la autoridad formal, la acumulación y el tamaño financiero, subestimando de esta manera la posición dominante de ciertos actores en las redes y por tanto los vínculos basados en relaciones de poder desiguales.

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