



THE CLUSTER APPROACH

A Strategy toward Development

A Thesis submitted for the degree of Doctor of Philosophy

by

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A mi mujer

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Chapter 1

Introducción

1.1 Generalidades

Somos testigos de la vertiginosa, y a veces tumultuosa, transición de modelos tradicionales de negocio a otros nuevos. Un simple paseo por un centro comercial de cualquier ciudad nos permite descubrir tiendas con productos inimaginables para nuestros abuelos, futuristas para nuestros padres y, todavía, sorprendentes para muchos de nosotros. Las novedades se suceden rápidamente afectando no solo gustos en el consumo sino capacidades de uso¹. Además, estas novedades no aparecen sólo en nuestro entorno sino que se expanden geográfica y socialmente. El motor del cambio es la creciente innovación tecnológica que está haciéndose cada vez más accesible y más global.

¹Hace apenas unos años, habría guardado una copia de este documento en un disquete. Si lo hiciese hoy no encontraría muchos ordenadores con el lector adecuado para leerlo

Esto es el efecto de dos poderosas fuerzas. En primer lugar, la globalización² que acrecienta tanto la demanda como la oferta de nuevos productos y servicios. En segundo lugar, las tecnologías de la información que diseminan el conocimiento y hacen germinar nuevos modos en la manera de hacer las cosas. Modos que se transmiten y que dan lugar a otros nuevos en constante evolución.

En un principio, la globalización se basaba la aparición de mercados mundiales para productos de consumo estandarizados en una magnitud no imaginada hasta el momento. Sin embargo, podríamos considerar que se ha iniciado una nueva etapa de la globalización como resultado de la innovación en la que el objetivo sería la experiencia personalizada y donde el sector servicios se convertiría en el medio a tal fin.

En este contexto, la innovación adquiere una nueva luz. Así, puede considerarse la forma en que nuevos procesos de negocio crean riqueza y bienestar social: ideas refrescantes que producen valor (The Economist, 2007[239]). De tal manera que puede afirmarse que en el crecimiento económico de las últimas décadas la innovación ha adquirido un mayor y creciente influjo. Especialmente en los últimos años, se han hecho grandes esfuerzos para conectar de manera satisfactoria el capital intelectual con el físico y fi-

²Sin entrar en el debate conceptual, creo que la globalización, consecuencia del creciente dinamismo del sistema de mercado internacional (Evans y Newnham, 1998, p. 201), ofrece quizás mayores alternativas en el acceso y la disponibilidad de los recursos. Pero, por otra parte, las posibilidades tanto físicas (a través de los medios de comunicación) como simbólicas (la persona con un creciente deseo de singularidad y, paradójicamente, con la percepción de ser parte de un conjunto que precisa y desea parecidas, sino las mismas, cosas) acrecientan la necesidad y el querer del individuo. Como consecuencia, pese a la mayor disponibilidad de los recursos, éstos siguen siendo limitados mientras que no lo son ni nuestras necesidades ni deseos. De tal forma, permanece inalterable el principio de escasez (McDowell *et alia*, 2006[145], p. 4).

nanciero (The Economist, 2007[239]). Este fenómeno afecta de manera cada vez más extensa a casi toda la actividad productiva del hombre.

En el pasado, unos bajos costes laborales habrían dado a las empresas el suficiente impulso inicial en la carrera de la competencia. Sin embargo, éstas son ventajas transitorias si se compara con el potencial de un medio global altamente innovador. En tal ecosistema se integrarían empresas, centros de investigación y educativos, servicios financieros (con capital de riesgo) y de consultoría. Todos estos actores están en próxima convivencia con el mercado. En este sentido, se subraya que innovación no es mera invención: innovación es la aplicación práctica de nuevas ideas.

Para ayudarnos en esta tarea habremos de aplicar una determinada cualidad: la racionalidad o la búsqueda de soluciones funcionales atendiendo a las necesidades. El resultado de esta búsqueda es la elección. Ésta tiene mucho que ver con la economía. De hecho, *economía es la ciencia de la elección* (Mochón, 1993[151], p. 4). En este sentido, la especialización será la elección de cada uno en la actividad productiva.

Ya desde Adam Smith (Smith, 1983[221], vol. I, pp. 48-65), se ha considerado la especialización como un factor clave para la mejora de la productividad. Parece claro que si concentro mi interés y esfuerzo en una sola actividad, enfocando toda mi energía y voluntad, mi conocimiento y capacidad en algo específico, habré de ser capaz de mejorar mi rendimiento. Que tal especialización es beneficiosa parece ser una verdad intuitiva porque raro es el idioma que no tenga dicho o refrán que la aconseje. De tal manera, especialización es uno de los elementos a tener en cuenta para entender los

conglomerados.

Con todo, en un contexto de competencia, especialización no lo es todo. Permitámonos un ejemplo algo banal. Imaginemos que quiero practicar un deporte. Si mi elección es baloncesto no importa cuanto sea mi esfuerzo porque no garantizará que me convierta en un nuevo Michael Jordan. Esto quizás no tenga mucha importancia si tal deporte es para mí una mera actividad física para los ratos de ocio, pero la tiene si quiero hacer de ella medio de vida (o la fórmula para adquirir recursos para cubrir necesidades futuras).

Ante esta tesitura bueno es calmarse y recordar que aunque nadie es bueno para todo, quizás todos somos buenos para algo. Es decir, para alcanzar más altas cotas de éxito, es conveniente intentar hacer mejor lo que ya sabemos hacemos bien o, al menos, mejor que otros. Se trata de definir ventajas que me permitan obtener mejores resultados en concurrencia con otros. Estas ventajas serán, pues, *ventajas competitivas*.

Las ventajas podrán ser *absolutas* si, claramente, somos capaces de hacer algo mejor. Así, Michael Jordan (aunque ya esté retirado y seguramente desentrenado) tendrá una ventaja absoluta respecto a mí jugando al baloncesto. Por otra parte, es sabido que Michael Jordan también juega al golf, deporte que yo juego tan mal como el baloncesto: el astro americano disfruta de ventajas absolutas en ambas disciplinas deportivas.

Ahora, imaginemos que con motivo de un evento filantrópico, existiese un programa de televisión interesado en que tanto el Sr. Jordan como yo

mostrásemos nuestras cualidades en alguno de los deportes mencionados con la condición de ser distintos. Indecisos los dos entre ambas alternativas, el programa (inducido por oscuros patrocinadores y apelando a una estricta racionalidad pecuniaria) decide motivar simbólicamente a Michael Jordan con 1 euro si éste decide exhibirse jugando al golf. De tal forma, consiguen que el Sr. Jordan, que disfruta de ventajas absolutas en las dos actividades, opte por el palo. Ese *euro* de diferencia ha generado para el Sr. Jordan una ventaja comparativa en el golf (y como consecuencia, para mí en el baloncesto)³.

Esta idea se usa comúnmente para hablar del comercio internacional. Como es sabido, me refiero al concepto de *ventaja comparativa* sugerido por David Ricardo.

En su momento, este término cuestionó el paradigma de políticas económicas proteccionistas. Apartándose de las propuestas de aislamiento frente a los posibles peligros del comercio internacional Ricardo consideró la oportunidad de alcanzar mayores cotas de riqueza, prosperidad y bienestar gracias al intercambio de bienes entre países altamente especializados en su

³Reconozco lo forzado del ejemplo. Es un intento de explicarme a mi mismo un término del que, dada su importancia, deseé tener idea clara. Mi interés es mostrar que no sólo las naciones tienen ventaja comparativa. Noción difícil de captar en algunas definiciones. Creo, según mi experiencia, que tal dificultad puede ser algo común a otros estudiantes y que se evidencia en la frecuencia (pese a la incorrección) del uso indistinto de competitivo y comparativo al hablar de ventajas. En el mismo sentido se expresa Paul Krugman en Krugman, 1998, p. 73[114]. En mi caso, creo haber incluido el elemento de coste de oportunidad que es parte imprescindible de cualquier definición (McDowell *et alia*, 2006[145], pp. 37-57 o Mochón, 1993[151], pp. 582-589). El concepto de ventaja comparativa fue magistralmente enunciado por David Ricardo y se encontrará una definición estándar, siguiendo las palabras del pensador británico, en próximas páginas (ver sección 2.2.2).

Por ello, ruego al lector paciencia si considera inapropiado este torpe abuso del *para que yo me entienda*. Es el intento de captar las diferencias semánticas sin repetir *considerando dos países A y B...*

producción. El lema era simple: todas las regiones disfrutaran de ventaja comparativa sobre una base global. El problema estriba en encontrarla. La competición global pudiera verse como un fuerte viento por muchos, sin embargo, dependería de los diferentes agentes el *construir muros o molinos* (Hawkins *et alia*, 2001[83]).

Otro problema del viento es que puede cambiar de dirección en todo momento. Así pues, es necesario ser flexible para mantener o transformar las actividades de acuerdo a las necesidades e intereses existentes a cada momento. Aquí, la innovación y la tecnología tienen un papel importante⁴, pero su significado en economía es algo diferente al dado por la gente normal.

La *tecnología* es ciencia en uso y no siempre significa innovación. La *innovación* sugiere creación, modificación, cambio y no siempre es fruto de la tecnología y tampoco es siempre productiva. La productividad es la relación entre lo producido y los medios empleados. Una innovación productiva será cualquier cambio en la manera de hacer las cosas que mejora la productividad de los factores dados.

En cualquier caso, frecuentemente al hablar de industrias de alta tecnología pretendemos hacerlo sobre aquellas industrias que aplicando los últimos avances de la ciencia están a la vanguardia en la aplicación de las innovaciones más actualizadas. De esta manera, identificamos innovación y tecnología como si fueran la misma cosa. Esta relación no es cierta.

⁴La innovación y los cambios tecnológicos son las principales causas de transformación de la estructura económica de las regiones y naciones. Malecki, E. J. and Varaiya, P., "Innovation and changes in Regional structure", en Nijkamp y Mills (Eds.), 1987[155], vol. I, p. 629.

Si intentamos utilizar un novísimo programa informático en un ordenador portátil comprado hace seis años, nos daremos cuenta de que en la mayoría de los casos éste será incapaz de funcionar adecuadamente aun siendo un objeto de alta complejidad tecnológica. La razón no es que el portátil sea viejo sino que el nuevo software lo convierte en obsoleto. Por contra, un lapicero es un objeto más simple desde el punto de vista de la tecnología acumulada para su desarrollo y, sin embargo, no es obsoleto si consideramos su funcionalidad a la hora de escribir en cualquier dirección. Esta cualidad lo convertiría en una innovación productiva en la resolución del problema de escritura en el espacio sideral⁵.

La conexión de alta tecnología e innovación distrae a la hora de captar la comprensión de esta última. En teoría, que la innovación se base en la adquisición y aplicación de un nuevo sistema informático o en ordenar los subrayadores por colores en nuestra mesa de despacho no supone gran diferencia. De nuevo, la innovación productiva sería aquel cambio en la manera de hacer las cosas que mejora la productividad de los factores dados. No hay, pues, límites para la creatividad.

Hay algo fantástico sobre la creatividad y la innovación: se puede aprender a ser creativo e innovador dejándonos inspirar por gente creativa e innovadora. Es por ello que las universidades organizan seminarios o discusiones, que tenemos bibliotecas o que nos gustan los programas de cocina en la televisión. A través de estos medios, sabemos que es posible adquirir

⁵Este ejemplo está basado en una de esas bromas que circulan por internet. Parece ser que con gravedad cero, un bolígrafo normal no escribe. Para resolver el problema la NASA habría invertido millones de dólares en el desarrollo de un nuevo útil. Ante el mismo reto, los soviéticos optarían por dotar a sus cosmonautas de lápices. Sin entrar en los detalles sobre su verosimilitud, la anécdota resulta ilustrativa.

alguna que otra buena idea. Algunas, las copiaré directamente y otras las adaptaré de acuerdo a las circunstancias. De tal forma que la idea adaptada dejará de ser mera copia: la larga carrera del saber de una persona y de la humanidad se basa en los pasos anteriormente dados por otros⁶.

Desafortunadamente, tendemos a olvidar los beneficios derivados de la cooperación. La actividad económica es vista por muchos como una especie de enconada confrontación de intereses (cualquier cinéfilo recuerda filmes como *Wall Street* con Michael Douglas y Charlie Sheen en el papel de los principales personajes⁷). En el olvido queda la benefactora caricia de la *mano invisible* del padre Adam Smith. Sun Tzu y Maquiavelo se convierten en lecturas de alcoba de cualquier ejecutivo que se precie.

La situación se exacerbó tras la Guerra Fría. La resultante globalización se expandió por la extensión de los mercados libres y la revolución de las computadoras: compañías procedentes de cualquier parte del mundo eran capaces de ofrecer sus productos en la tienda de la esquina. Ahora, las empresas estarían forzadas a realizar mayores esfuerzos para adaptarse al cambio, manteniendo su competitividad (nuevo término que engrosaría el acervo lingüístico de políticos o analistas) o encarando el colapso.

El enfoque de conglomerados⁸ presenta una alternativa basada en la

⁶Esta idea pertenece a uno de los filósofos españoles más influyentes de todos los tiempos: José Ortega y Gasset. Sobre creatividad, existe un precioso libro escrito por José Antonio Marina, *Teoría de la inteligencia creadora*, Anagrama, Barcelona, 2004 (1993)[139].

⁷Dirigida por Oliver Stone y distribuida por 20th Century Fox, 1987. En mi opinión, la frase "It's all about bucks, kid. The rest is conversation" que dice el personaje de Michael Douglas, Gordon Gekko, es un resumen del espíritu del momento.

⁸Habiendo escrito el original de este capítulo en inglés me ví en la gran dificultad de encontrar una alternativa apropiada en castellano. En España el término oficial (del Ministerio de Economía) sería el de *agrupaciones empresariales innovadoras*. Siendo varias

reciprocidad que se asienta en un método de planificación y reconocimiento de un sistema. Así entendido, el enfoque de conglomerados tiene una naturaleza dual: como modelo de desarrollo regional y como modelo de política de desarrollo. Así, en primer lugar, el enfoque de conglomerados puede usarse como una herramienta de análisis y seguimiento para etapas dadas de desarrollo económico. Seguidamente, el enfoque puede considerarse un método para el diseño e implementación de políticas de desarrollo económico. En este sentido, el modelo de conglomerados sugiere un conjunto comprehensivo de elementos estratégicos sobre una combinación de estrategias de asignación y asociación subsidiaria.

Es una imagen impresionante. Especialización, ventaja, competitividad, innovación, conglomerados son todas grandes palabras. Todas se refieren de alguna manera a ideas concluyentes aprender, aportar, intercambiar, comunicar, mejorar ...

El uso completo de nuestra capacidad como individuos depende del talento a la hora de colaborar con los demás⁹.

las posibilidades de traducción, he optado por *conglomerado* y *enfoque de conglomerados*. Esto es porque, aunque no literales, creo que se acercan más a la esencia de los conceptos en este contexto.

⁹No puedo resistirme a citar a un popular creador de opinión alemán: *was wir alleine nicht schaffen, dass schaffen wir dann zusammen*. Lo que no somos capaces de lograr solos, lo lograremos juntos.

1.2 Estado de la cuestión

El Ministerio de Industria, Turismo y comercio del Gobierno de España traduce el término cluster, de forma oficial desde 2006, como Agrupaciones Empresariales Innovadoras¹⁰. Éstas son conglomerados de actividad empresarial que desarrollan de manera consciente un fenómeno de concentración productiva en el espacio¹¹.

El “enfoque de conglomerados” es un concepto que persigue dos propósitos. Primeramente, funciona como herramienta analítica para la comprensión y descripción del desarrollo de conglomerados. En segundo lugar, es una guía para el desarrollo de políticas de creación de conglomerados.

La investigación identifica los agentes que participan en el fenómeno, la interacción, las fases de evolución y el ambiente innovador.

El estudio se completa con una referencia al conglomerado de la ciudad de Dresde (Alemania) que cuenta con cuatro áreas de especialización: microtecnología, nanotecnología, materiales y biotecnología. El grado de competencia adquirido en esta zona determina que se la conozca con el nombre de Silicon Saxony. El enfoque basado en conglomerados ha incrementado su popularidad en los últimos tiempos. Especialmente desde que los gobiernos consideran políticas de desarrollo económico basadas en fortalezas locales

¹⁰Ver orden del Ministerio de Industria, Turismo y comercio. ITC/3808/2007 publicada en BOE, 25 diciembre 2007[20]

¹¹Para obtener información sobre las Agrupaciones Empresariales Innovadoras en España ver www.ipyme.org/IPYME/es-ES/AEI. También de utilidad es www.mityc.es/AgrupacionesEmpresariales

específicas. De hecho, este factor se erige como un elemento particularísimo del concepto de conglomerados: el papel ejercido por los políticos.

En todo caso, el enfoque de conglomerados considera las concentraciones de actividad empresarial con especial viabilidad comercial en los mercados internacionales. También, reconoce la asignación de actividades especializadas derivada del fenómeno de integración regional. Igualmente, se hace énfasis en el uso intensivo del conocimiento y en el desarrollo de sinergias positivas entre los diferentes miembros de la red del conglomerado.

El planteamiento hace hincapié en que la motivación para la aglomeración se basa en el hecho de que cada participante individual puede obtener mayor competitividad (derivada de las oportunidades de incremento de productividad por el acceso a información que puede convertirse en innovación) cuando hay reciprocidad. Asimismo, el beneficio para el conjunto del conglomerado puede ser mayor que el beneficio agregado de organismos no conexos.

Con todo, la idea de conglomerado que se sugiere en el presente documento sobrepasa la de mera concentración geográfica de actividad productiva. El de conglomerados innovadores ha llegado a ser un concepto muy de moda y así se describiría *cualquier* concentración de actividad¹².

Es además uno de los enfoques de desarrollo económico más populares

¹²O lo que es más discutible, se etiquetaría de esta forma cualquier iniciativa política para el fomento de empresas de determinados sectores independientemente de que la intención tuviese mayor o menor base económica. No basta con llamar a un entorno *ciudad de la ciencia* o *ciudad de la innovación* para hacer el proyecto posible: un eslogan no puede llenar todos los vacíos de la realidad.

frente al reto de reconocer las tensiones entre la globalización y la localización en años recientes. En las próximas páginas, tomaremos el término para explicar como una identificación comprensiva de las interdependencias entre geografía y economía puede influir en el desarrollo económico regional.

Así pues, el concepto actual de aglomerado se asienta sobre el trabajo de Porter, aunque con los aportes de una larga tradición académica desde Marshall hasta la idea de *innovative milieu* investigada por el equipo GREMI (Raines, 2001[195], p. 3). De esta forma, el aglomerado debe ser interpretado como una red integrada por diferentes agentes que van desde las empresas hasta un amplio espectro de organizaciones de heterogénea función (institutos de investigación, centros formativos y académicos, instituciones de financiación o agencias públicas). Todos estos agentes se caracterizan por el establecimiento de formulas de apoyo mutuo y cooperación mientras mantienen altos niveles de competencia.

Con estos elementos, pueden considerarse las aportaciones de Alfred Marshall como los auténticos antecedentes teóricos de la idea de aglomerados de innovación. Marshall describió un fenómeno frecuente: la concentración de industrias de un sector en áreas concretas. Por ejemplo, la mayoría de la decoración navideña de Alemania se produce en una pequeña región al sur de Sajonia. Dentro de la misma, en cada pueblo hay especialización en un determinado objeto de madera: cascanueces, incensarios o candeleros. Igual pasa con los pepinillos que se producen en una región en Brandemburgo a medio camino entre Berlín y Dresde¹³. Lo mismo ocurre en otros sectores

¹³Si repasamos la geografía española encontramos el mismo fenómeno: mantecados, mazapanes, obleas, sobaos, turrónes o sobrasada están ligados a determinados paisajes que aportan con su nombre una garantía de calidad basada en el saber hacer.

como el de prensa y medios audiovisuales entre Colonia y Düsseldorf (conocidas como la “Meca de los medios de comunicación” de Alemania) ¹⁴. Aún existiendo razones múltiples todas estas regiones tienen en común la concentración de determinadas actividades, atrayendo la atención de la clientela y donde un buscador de empleo del sector preferirá mirar primero.

Fue Alfred Marshall quien describió la forma en que gente que compate una determinada profesión tiende a concentrarse en áreas relativamente reducidas (Marshall, 1938[140]). Él mencionó las ventajas de estas industrias localizadas y resumió las razones en internas y externas.

Primeramente, Marshall consideró como razones externas las condiciones físicas tales como la proximidad a los recursos (i.e., acero, pescado, carbon o Madera) o a los canales de distribución (i.e., ríos, puertos, carreteras, estaciones. . .), el apoyo de instituciones políticas¹⁵ o la existencia un empresariado psicológicamente motivado y entendido.

Como condiciones internas Marshall mencionó los recursos individuales, la organización y la eficiencia en la gestión. Desde el punto de vista del aglomerado, estos recursos pueden beneficiarse especialmente de la existencia de un ambiente creativo y del intercambio de experiencia.

En los años ochenta del pasado siglo, un grupo de economistas regionales desarrollaron el concepto de *innovative milieu* o medio innovador. Todos ellos eran miembros del *Groupe de Recherche Européen sur les milieux*

¹⁴De nuevo en España, cualquiera que tome la carretera de La Coruña a la salida de Madrid podrá reconocer ciertas pautas en las empresas que nos encontramos.

¹⁵Ejemplificadores son los casos de patrocinio en tiempos de la Ilustración: Carlos III en España, Federico *el Grande* en Prusia o Augusto *el Fuerte* en Sajonia.

Innovateurs (GREMI). El medio innovador podría definirse como un agregado altamente concentrado en el espacio de empresas innovadoras en conjunción con instituciones de investigación y transferencia de conocimientos. El medio innovador era capaz de integrar las condiciones socioeconómicas de especialización geográfica con la creación de una cultura de aprendizaje común y cooperativo a nivel local.

Sin embargo, la formulación de distrito innovador del GREMI se ha visto alterada por manifestaciones de saber convencional (Galbraith, 1998[74], pp. 6-17) en torno al concepto de *competitividad*. Algunos sectores de opinión se subían a una nueva ola de proteccionismo sobre la tabla formada por dos sobrentendidos (claramente señalados como falaces por Paul Krugman en su libro *Pop internationalism*¹⁶).

Estos supuestos eran: primero, que los países competían entre si en guerras comerciales; segundo, que para sobrevivir los gobiernos de estos países tenían que encontrar formulas para apoyar aquellos sectores industriales más competitivos¹⁷.

Empecemos por este último. La segunda de las creencias supone una distorsión, la percepción puede verse empañada por simples cuestiones de imagen. Obviamente, producir tomates es menos *glamuroso* que producir microprocesadores. Pero no por ello necesariamente menos conveniente para

¹⁶Este es un libro muy legible y divertido considerando que trata sobre economía. Paul Krugman, *Pop Internationalism*, MIT Press, London, 1998[114].

¹⁷Se daba por hecho que existían sectores más competitivos que otros, entendiéndose el término entre productivo y beneficioso. El aspirante a consultor podría sugerir el “deber de ser conscientes de la cantidad de tomates que hay que dar a cambio de un ordenador” invitando, por supuesto, a apoyar el sector informático frente al tomatero.

un país. Todo tiene que ver con el principio *ricardiano* de ventaja comparativa mencionado en páginas anteriores. Esta idea desbarata el segundo sobrentendido.

En cuanto al segundo supuesto, apenas comenzados los años noventa del siglo XX, y en plena controversia, se publica un libro seminal para el desarrollo de la idea de conglomerados tecnológicos: *The competitive Advantage of Nations*, de Michael Porter¹⁸. Este profesor de Harvard escribiría un texto que adquiriría gran importancia tanto en medios políticos como académicos. Una de las tesis defendidas por el autor en esta obra reconocía que en un mundo de competición global en los mercados sólo aquellos que disfrutaran de ventajas sobrevivirían. Sin embargo, los que competirían no serían los países, ni siquiera las regiones, serían las empresas. Esta afirmación rompe las bases de la primera creencia.

Porter incluso fue más allá argumentando sobre el hecho de que las empresas competitivas tiendan a aglomerarse en regiones específicas¹⁹. Además, se afirmaba que el bienestar a largo plazo de una región dependía de la habi-

¹⁸En este libro también puede encontrarse el famoso *diamante de la ventaja nacional* (Porter, 1990[186], p. 141). Sin entrar en la aparente contradicción por el uso de la palabra “nacional” junto con “ventaja”, el esquema es muy interesante pues plantea de forma simplificada los cuatro elementos que una región debe considerar para fomentar el asentamiento de empresas:

1. condiciones basadas en factores;
2. condiciones basadas en demanda;
3. estrategia y rivalidad entre empresas; y
4. la existencia de industrias relacionadas o de apoyo

Extenderemos la idea en páginas sucesivas. Puede decirse que este esquema supone el núcleo de la aportación de este autor en la génesis del concepto de conglomerados.

¹⁹De acuerdo a Brakman, Garretsen y Marrewijk (Brakman, Garretsen and Marrewijk, 2001[25], p. 2), hay tres nivel de agregación que pueden describir estas concentraciones: global, continental o nacional.

lidad de sus empresas para mantener altos y crecientes niveles de productividad en aquellos sectores donde competían. Tal característica descansaría en la capacidad con la que las empresas lograban mejoras en la calidad y mayor eficiencia. La competitividad, por lo tanto, no estaría estrictamente relacionada a industrias específicas sino a aquellas empresas de cualquier sector que mostraran una mejor capacidad para competir.

Esta disposición para prosperar en sus mercados resultaría del mejor y más eficiente uso de los factores productivos, de las características de su producto en relación al de la competencia y, con ello, de la adquisición de una mayor cuota de demanda en su segmento por la mayor relación entre precio, calidad y diferenciación del producto. A su vez, todo sería consecuencia de la eficiencia con que los recursos disponibles son utilizados y, así, de la productividad o el valor del output producido por unidad de trabajo y capital requerido. De tal forma que lo que incrementaría la productividad sería la innovación. En otras palabras, ya que el principal objetivo de una autoridad pública debiera ser procurar altos y crecientes estándares de vida para los ciudadanos, sería recomendable que facilitaran la creación de condiciones para un medio ambiente innovador o aglomerado.

Así, se subraya la naturaleza común de todo aglomerado en los términos en que el comportamiento y actuación de empresas altamente innovadoras, se ven apoyados por las decisiones de los agentes políticos para promover el asentamiento de este tipo específico de compañías en sus áreas dadas de responsabilidad.

1.3 Objetivos de la investigación

Si uno tiene la oportunidad de vivir en Dresde, junto al de innovación parece recurrente el uso de conceptos tales como *especialización*, *ventaja*, *cluster* (conglomerado) y *cluster approach* (enfoque de conglomerados). Sin embargo, en la mayoría de los casos hay una diferencia significativa en la comprensión de los mismos dependiendo evidentemente de quien los use.

Por otra parte, pese a la popularidad ya mencionada, el concepto de conglomerados está siendo criticado en los últimos tiempos²⁰. El argumento principal es que el concepto de conglomerado ha perdido contenido y que *los gobiernos se limitan a elegir una región que consideran prometedora, idealmente que cuente con una universidad, e invertir enormes sumas de dinero para conseguir motivar al empresariado guiados por benevolentes burócratas* (The Economist, 2007[239]).

La crítica se basa en algunos de los siguientes aspectos:

- el excesivo intervencionismo de los políticos
- la falta de ejemplos exitosos de conglomerados altamente concentrados
- la incapacidad de crear conglomerados sin base productiva previa
- la falta de consideración en el papel fundamental del tiempo
- la ignorancia de las ventajas comparativas

²⁰Ver “The fading lustre of clusters” en “Something new under the sun. A special report on innovation”, The Economist, The Economist Newspaper Ltd., London, 13 October 2007[239].

Hay que decir que en la mayoría de los casos esta crítica tiene base suficiente. Con excesivo optimismo se nomina una zona con palabras altisonantes sin que eso signifique la realidad.

Por ello, el objetivo de este trabajo es clarificar las definiciones de tan repetidos terminos y sugerir un modelo para entender la manera en que un tipo específico de empresas llegan y se asientan en áreas específicas. Este modelo es se llama el “enfoque de conglomerados”.

1.3.1 Generales

El propósito de este trabajo es presentar una estructura sencilla para la comprensión del fenómeno de conglomerados industriales.

Puede decirse que hay gran presencia del término, en especial unido al apoyo público a la instalación de complejos industriales basados en alta tecnología. La intención del documento es aclarar que tal mecanismo no está necesariamente unido a determinadas actividades productivas. Es más, también se explicará porque no es conveniente que esto sea así.

El enfoque de conglomerados es la fórmula para obtener desarrollo económico a través de la concentración de actividad en el espacio. Este método acumula diversas corrientes teóricas que serán presentadas y explicadas en páginas sucesivas.

El apoyo consciente a través de políticas debe considerar el más amplio

cúmulo de aspectos que determinan el éxito de un proyecto de este tipo. Entre ellos se encuentran la detección de la actividad más conveniente, la disponibilidad y uso de los medios adecuados, el mantenimiento de un apoyo coherente con los objetivos perseguidos, el ser consciente del efecto de la innovación y la transmisión del conocimiento y, finalmente, de la importancia decisiva del tiempo.

Por otra parte, es importante mostrar un ejemplo concreto de conglomerado funcional. En él, se buscarán los elementos teóricos sugeridos describiendo su evolución en la realidad. Este ejemplo subraya la importancia del enfoque de conglomerados como política para el desarrollo de redes de innovación, difusión del conocimiento y reciprocidad.

Esta fórmula se erige como alternativa efectiva de aplicación del método de desarrollo de conglomerados frente a la apuesta por sectores productivos concretos.

1.3.2 Específicos

La investigación contempla cubrir los siguientes objetivos:

1. aportar una definición operativa del concepto de *cluster* o conglomerado;
2. definir la política de desarrollo económico basada en conglomerados (enfoque de conglomerados o *cluster approach*);

3. describir los sujetos que participan en el desarrollo del conglomerado;
4. presentar y describir la figura del iniciador político o *political trigger*;
5. enumerar y describir las etapas de formación de políticas de conglomerado; y
6. describir el caso de Dresde (Alemania) como ejemplo de conglomerado basado en el mantenimiento de redes de innovación.

1.4 Estructura

Este documento está estructurado en nueve capítulos contando la presente introducción. Además se incluyen dos anexos.

El capítulo “Understanding Clusters” presentará los principales conceptos usados en el estudio. Se definirán los antecedentes teóricos del término conglomerado: las economías de especialización, el principio de ventaja comparativa, la Nueva Geografía Económica (NEG), la ventaja competitiva y el *milieu* innovador. El objetivo es presentar el concepto de conglomerado como término integrador de diversas corrientes teóricas. Se definirá el término conglomerado así como el enfoque de conglomerados. Para este último también se hará referencia a los fundamentos en la teoría precedente y los mecanismos para la obtención de información sobre las ventajas comparativas. El capítulo se cerrará definiendo los objetivos del enfoque de conglomerados, sugiriendo una línea de referencia para guiar políticas de formación de conglomerados y mencionando sus beneficios.

El capítulo “The Actors of the Cluster Approach” definirá los cuatro agentes que intervienen en la creación, desarrollo y mantenimiento de la red de conglomerado. También se describirán las motivaciones de participación de los actores así como su papel específico.

El capítulo “The Political Trigger” ampliará la información sobre el iniciador político al ser éste el elemento a destacar en la creación de una red de conglomerados. Se definirán las características de este actor en cuanto a entidad política. Se hará referencia a las bases doctrinales de su comportamiento en el sistema. También se tratará el reto principal en la acción de este actor o el riesgo de cruzar la línea entre el apoyo institucional y el intervencionismo. Por ello, será necesario completar el capítulo con una referencia a los límites al iniciador que contempla el enoque de conglomerados.

El capítulo “Cluster Approach as Development Model” definirá las etapas de desarrollo de un modelo de conglomerados. Además se considerarán los aspectos necesarios para el desarrollo de una estrategia efectiva de asentamiento que desembocará en la institucionalización de la red.

El capítulo “Starting the Cluster: Dresden” desarrollará los antecedentes históricos previos a la creación de la red de conglomerado de esta ciudad. En especial, se mencionará el efecto de los conflictos políticos en la situación social y económica del entorno considerado.

El capítulo “The main sectors clustering in Dresden” presentará el modelo de conglomerado en la realidad. Para ello, se describirán los cuatro sectores productivos que se concentran en la ciudad por el efecto de una única

red integrada de conglomerado. Este capítulo apoya la intención del autor de presentar los conglomerados no como concentraciones de actividad sino como redes de intercambio de información que producen innovación. Este capítulo identificará también dos de los actores teóricos del conglomerado: las empresas y los centros académicos.

El capítulo “Cluster Approach in Saxony?” identificará los restantes actores teóricos que intervienen en el desarrollo del conglomerado en la ciudad de Dresde: el iniciador político y el financiero. Con este capítulo se completa el estudio del enfoque de conglomerados en Dresde.

El texto principal finalizará con una conclusión.

La investigación se va a completar con el contenido de dos anexos que presentan las dos alternativas consideradas por el autor para el desarrollo de la presente investigación sobre los conglomerados.

El Anexo A “Modelling the Cluster Approach: complex systems” presenta de forma muy esquemática una posibilidad para modelar el método de red de conglomerados enunciado en estas páginas. En este sentido, es el paso inicial de lo que el autor considera una primera vía del desarrollo futuro de esta investigación: obtener herramientas teóricas lo suficientemente fuertes para anticipar la evolución de una red de conglomerado en cualquiera de sus etapas una vez identificados los actores. Esta propuesta opta por el uso de la teoría de sistemas complejos que permiten la recreación de redes de intercambio altamente sofisticadas mediante la identificación de unas pocas normas de acción.

El Anexo B “Las Agrupaciones Empresariales Innovadoras” hace una somera aproximación al fenómeno de conglomerados en España. Se presenta la situación en el país comparándola con la alemana de Dresde y se enuncian las líneas básicas que, en opinión del autor, deben regir el comportamiento de los organismos públicos

Chapter 2

Understanding clusters

Cluster has become an increasingly popular topic for scholars and economic development policy makers. However, clusters develop over time and understanding their evolution is still a controversial issue. In order to clarify such image it is necessary to establish a basic conceptual framework.

In this chapter, we will define the concept of *cluster* and *cluster approach*. The aim is to contextualize the use of the concepts regarding cluster approach and briefly review the reference literature that establishes its theoretical background.

This chapter also describes the dual nature of cluster approach: as a model of regional development and as a model of policymaking. The point is especially relevant because it suggests a guideline for policy makers based on selective recruitment of partners and policies aimed at enhancing cooper-

ation¹ among the participants.

2.1 Common concepts

There is abundance in the use of several concepts such as competition, competitiveness, innovation, cluster and cluster approach. Most of the time, there is a significant difference in the understanding of these concepts depending on the user.

Normally, the common use of those terms is related to the behaviour and performance of high-tech firms and the decisions of political agents to promote the settlement of such companies in their given areas of responsibility. Apparently, scholars have a broader perception of a competitive sector in relation to the clustering phenomenon.

A useful definition of “competition” is *an event or game in which people or teams try to do better than each other in order to win*². Hence, the term has a huge impact on any economic process: prices, wages, methods of production or distribution of resources. It is also important to underline that being competitive is a mean to achieve a goal and not the goal itself³. The

¹The word “cooperation” is used here as in most of the rest of the paper without any unlawful or harmful connotation for society. The purpose of agents is mutual support with no illicit consciousness. It has to do with synergy or symbiosis. So when it is said “cooperation between companies” no activity is considered that could cause detriment to free market principles. This kind of collaboration does not have to do with the idea of clusters.

²Della Summers, *Longman Language Activator. The World’s First Production Dictionary*, Longman Group UK Ltd., Harlow, Essex, 1999 (1993)[230].

³The term is related to being effective. There is no possibility for *effectiveness* when there is no real *effect*.

game of competition has no sense without the prize of profit. And when the market competition is on profits, any participant will try to increase them by introducing new goods, new technology or new forms of organization.

Therefore, “innovation” will not only be a consequence but a major force of competition: the force that helps the actor to cope with an increasingly variable environment. This space could be described in minor dimensions: number of participants, means and growth. The more significant challenges affecting the economy as a rationale are expressions of those dimensions: globalization, rapidly changing technology and declining living standards⁴.

However, considering the concept alone the picture of the economic process is incomplete⁵. Market economy is also a system of cooperation. Any person will cooperate with another in order to achieve an end. Between supplier and customer, between colleagues or friends, within the family from the father to the friend, cooperation is as vital as competition to a productive economy.

In this respect, “competitiveness”, being the characteristic that allows to be more successful than others, could somehow unify the antagonistic concepts of competition and cooperation as they are both means of success⁶.

⁴See Mary Jo Waits, “The Added Value of the Industry Cluster Approach to Economic Analysis, Strategy development and Service Delivery”, *Economic development Quarterly*, Vol.14 No.1, February 2000, p. 36[243].

⁵Just a *dog-eat-dog* situation in which people are competing so strongly that they only care about their own success and will do anything to achieve it.

⁶Many images could help to understand what I mean: a team, a choir, a body. Surely, there might be parts more vital than others, but the best performance will be found in those integrated units that work well with each other.

A *competitive actor* would be aware of *opportunities* to improve the *efficiency*. This last term defines the relationship between what is achieved and the amount of the resources used. If it is possible to achieve the same goal with less resources then the process is *inefficient*. In this sense, the opportunity cost is strictly inherent to the definition: the amount of resources being employed could potentially produce even more of the beneficial results intended than they do. In other words, efficiency means *making the most we can of the limited resources we have* (Johnson, 2005 [93]).

Those opportunities often result from circumstances (i. e., existing labour pools, knowledge, financing, physical infrastructure or regulations) rather than individual characteristics. In this context it is where we find the word “cluster”.

In his book *The Competitive Advantage of Nations*, Michael Porter suggested a new approach for understanding and creating economic success in a global economy: in advanced economies, regional clusters of related industries (rather than individual companies or single industries) are the source of jobs, income and export growth. These industry clusters are⁷:

Geographical concentrations of competitive firms in related industries that do business with each other and that share needs for common talent, technology and infrastructure (Waits, 2000 [243], p. 37).

⁷An alternative definition is also given by Porter: *Clusters are geographic concentrations of interconnected companies, specialized suppliers, service providers, and associated institutions in a particular field that are present in a nation or region. Clusters arise because they increase the productivity with which companies can compete* (Porter, 1998[187], p. 199).

As described in the following pages, in an active cluster innovative firms cooperate with each other and with support institutions to reach knowledge. A high level of interactions and information flows enhance the given geographic proximity⁸.

Frequently, the motivation to consider clusters is not the analysis of an empirical phenomenon (Krugman, Fujita and Venables, 2000[115]), but the development of a new approach for economic policy for enhancing regional economic growth: the *cluster approach* (Ketels, 2003[97], p. 14)

In the following pages, we will clarify the definitions of such repeated terms for the context of the paper.

2.2 The theoretical background of the term

A cluster would concentrate a number of participants with compatible and highly specialized activities. Cluster itself is not a theoretical framework but a description of a network form. Usually, the research on clusters is grounded in theories of knowledge spill overs or capital agglomeration or resource and social exchange. Nonetheless, it is possible to follow the theoretical path to a former starting point.

⁸See Ifor Ffowcs-Williams, "Policy for Inter-firm networking and Clustering: A Practitioner's Perspective", Working Paper Prepared for the OECD/Italian Ministry of Industry Bologna Conference for Ministers Responsible for SMEs and Industry Ministers on "Enhancing the Competitiveness of SMEs in the Global Economy: Strategies and Policies", 13-15 June 2000. Cluster Navigators Ltd, Wellington, 2000, p. 3[68].

2.2.1 Economics of specialization

Hence, economic theorists since Adam Smith⁹ or David Ricardo have focused on the importance of geographical specialization as a key aspect to enhance standards of living. Considering the existence of differences among regions (weather conditions, access to natural resources, qualification of labour or technology available), each one would tend to concentrate its production toward those goods that it is especially capable of producing. This differentiation of occupations will lead to deal with surpluses for obtaining those goods not produced domestically in exchange.

The specialization of production, then, occurs as an effect of the particular advantage of each region to produce an item. This advantage could be absolute when a region is capable of producing a specific item to a lower cost than another region (for example, when it is possible to produce more of a good with the same amount of factors). This idea could clearly be seen within natural resources: a region in comparison with another region will benefit from an absolute advantage of a good, the more reserves it has of this natural resource (like oil or bananas) and the easier its exploitation is.

However, the natural conditions have a decreasing effect in lowering the production cost compared to that of labour or capital. Considering again absolute advantage, regions will tend to differentiate its production according to labour or capital: a region with extra supply of labour will tend to produce work-intensive goods whilst a region with more capital will produce capital-

⁹Adam Smith, *Investigación de la naturaleza y causas de la riqueza de las naciones*, Vol. I, Biblioteca de Economía orbis, Barcelona, 1983. Pp. 48-66. [221]

intensive goods.

In fact, trade is much more complex: commerce involves more goods than oil or bananas and it affects more than capital-intensive and labour-intensive producers. Most of the commerce is among regions with a similar share of capital and labour rates. In this situation, a picture of a crude rivalry between regions appears without any motivation to trade when one region is able to produce every good cheaper and better than the other is.

The reaction may be protective measures on strategic sectors or policies for enhancing industrial development or qualification of employees. The first group of *autarky* measures may limit economic development in the long term, unable to predict conjunctural crises. The second group would be the encouragement of certain industries or development of education and know-how acquisition¹⁰.

2.2.2 The principle of comparative advantage

The principle of comparative advantage first defined by David Ricardo offers a more optimistic image. The *Ricardian* principle of comparative advantage is relatively simple as it is based on labour cost and the model has been expanded to include more than two regions or commodities, transportation cost or capital cost. Despite its simplicity, the principle is commonly accepted to explain why regions are motivated to trade.

¹⁰In this respect, we may mention the contribution of Gerónimo Uztáriz, the only Spanish author cited by Adam Smith in “The wealth of Nations”. See Francisco Mochón, *Economía: Teoría y Política*, McGraw-Hill, Madrid, 1993[151], pp. 628.

Considering two regions *A* and *B*, specialization and trade amongst them would be beneficial even though region *A* benefits, compared to *B*, from an absolute advantage in the production of every good. The comparative advantage is the ability of a region to produce an item at a lower cost, related to other products and compared to another region. This advantage is the result of the allocation of those economic resources which are relatively more productive in terms of costs or/and benefits.

The region focuses on the comparative advantage considering a context of inter-regional competition. This model assumes the existence of production exchange between regions in the way that a region tries to obtain more from this trade whether decreasing the production cost or increasing the price.

However, the scenario of mutual benefit clashes with a general assumption, especially in political spheres. Regions are involved in a global competition: the struggle to obtain a bigger share of a market. In order to succeed, a region should improve its productive capacity together with deteriorating the competing capacity of counter parts.

Production needs continuous reinvestment to amortize the use of factors. In contrast, productivity growth needs rising investment rates for expanding production efficiency, rising quality standard, adding features or improving technology. Therefore, a company that is not able to keep upgrading itself is less competitive. Such a situation is forced to find low-investment solutions such as business relocation¹¹. Not doing so, a firm with growing

¹¹This could explain why some low-skilled manufactures, such as textiles, move their production to low-wages labour markets.

inability to compete would cope with rivalry for a while, but inexorably will face its own ruin.

Far from celebrating the global development of trade, they take protective actions to assure their *competitive* advantage.

At this stage, two main views confront about international trade: the one of those concerned about the menace of global trade on living standards and promote actions to enhance competitiveness and the one of those considering this competitiveness agenda as the real threat to living standards¹².

2.2.3 New Economic Geography

The New Economic Geography (NEG) is an attempt made to explain why *a priori* similar regions do not experience the same level of economic development¹³. The NEG presents a synthesis of polarization and neoclassical theories (Eckey and Kosfeld, 2004[51]).

There is a concern about geographical aspects of development considering the location of economic activity and the resulting different interactions. A cluster is, in this sense, a concentration of economic activity with a thick local labour market, especially for specialized skills (Krugman, 1998a[113]). A major contribution of the NEG is the study of competitiveness and geography.

¹²Paul Krugman, *Pop Internationalism*, MIT Press, London, 1998. Pp. 49-68[114].

¹³Kristian Behrens and Jacques-François Thisse, "Regional economics: a new economic geography perspective", CORE, Université catholique de Louvain, Louvain, 2006[18].

Such contribution of NEG in the understanding of economic development underlines the effect of the removal of barriers for factors' mobilization, the reduction of transport costs on business location and the gains derived from the concentration of activities. Doing so, the NEG tries to analyze the increased tendency toward economic concentration in space as a result of globalization¹⁴ and economic integration.

However, as Paul Krugman points it, there is a widespread idea among policy makers that consider regions as corporations involved in a win-lose competition to control market (Krugman, 1998, pp. 4-22[114]). This idea does not reflect the fact that actually regions are not corporations: the resources available to a region surpass those of any firm.

Considering the relation between cost and benefits, the lack of competitiveness of a firm will result in its decreasing capacity to keep market share. A firm in such a situation will struggle reducing prices (and then benefits) and looking for maintaining cost-effective factors. However, a region can keep the production of a good that is economically not profitable because regions benefit from resources that do not depend on the market performance of such good.

Then, why a policy maker would continue defending economically weak trade policies? Because the policy maker takes decisions based on more reasons than those strictly economic. Aims may also transcend the economic limits. It is possible to anticipate the assumptions of a policy maker that need to choose between computers and avocados: how many avocados do I

¹⁴In order to establish the effect of globalization there are some *globalization index*. See www.globalization\index{globalization}index.org

need to sell in order to buy a computer? Frequently, the policy maker may conclude that rather to sell avocados, he prefers to sell computers. It is the *high-value assumption* (Krugman, 1998, pp. 27-29[114]).

This conclusion is not economic-based and thus does not consider that in terms of trading there is no difference between goods, even between computers and avocados. For Krugman the reason lies in *a basic fact of accounting, perhaps the most essential equation in international economics* (Krugman, 1998, p. 76[114]):

$$Savings - investment = Exports - Imports$$

This equation defines international trade as a closed system. Considering again the question of computers and avocados, by selling avocados one would try to compensate the cost of producing them otherwise there is no motivation to trade with them.

The same can be considered for selling computers. The production cost will be this of production factors. At the end, the number of avocados and computers in exchange will be established in a certain point where both production cost are equivalent.

After all, it seems that there is no reason to be concerned because according to the model there is no competition among regions in terms of trade. Does this mean that policy makers waste public money by being concerned about improving the conditions in which the regions compete when this competition is not taking place? Not at all, because with subsidies public makers help firms to reallocate factors and make possible that the region will benefit from the location of such firm in the area. For example, when the

settling of reputed engineering companies expands the number of graduates from the university studies of this discipline in the region, when a well-paid staff boosts local housing sector or when the image of modernity of the industry improves the external image of the region.

2.2.4 The principle of competitive advantage

Consequently, regions do not compete directly with each other, there is no such thing as regional competitiveness. The fact is that market competition is an issue for firms not for regions (Porter, 1990, p. 1[186]). A question rises in this context: why do firms of some regions succeed and firms of other regions fail in international competition?

Several theories have been given with a broad range of methodological orientations. Some consider competitiveness not only linked to internal processes within the company (Porter, 1990, p. 2[186]) in productive or managerial terms, but as a macroeconomic phenomenon, measuring such variables as exchange rates, interest rates or public deficit.

Another line of attack considers national competitiveness a consequence of labour cost. A number of scholars determine regions' performance as competitors with their accessibility to natural resources. Another explanation considers government funding as the key factor to boost competitiveness. Finally, various theories introduce successful management practices or present the elements of winning business culture.

Nonetheless, the question proves to be tricky. Every given answer is not able to explain every single case of success and, moreover, is susceptible to have exceptions. The common explanation for these failures is the complex nature of competitiveness itself. There are many variables to be considered and it is therefore very difficult to isolate a real case as a *ceteris paribus* model.

According to Porter, it is difficult to answer this question because it is not the right one to be made. The terms of the question are misleading a proper answer. For him, the key question to answer is why a region becomes the home base for successful international competitors in an industry (Porter, 1990, p. 1[186]). The standard of living of a region in the long term depends on its ability to reach a high and rising level of productivity in the industries in which its firms compete. This ability is a result of the firms' achievements improving quality or efficiency.

An economic goal for regions

With a politically oriented point of view, the economic goal of regions is to produce a high and rising standard of living for its citizens (Porter, 1990, p. 6[186]). This aim does not concern to competitiveness but to productivity or the effectiveness which resources are used to produce goods of better quality or price.

The productivity of capital determines its returns and, as a consequence, the availability of capital holders for reinvestment. Finally, consi-

dering labour as one of the factors used in production, its productivity will establish its value and its resulting price in terms of wage or time. This is very interesting, because an individual can consider a higher standard of living if there is an increase of salary, but also when the reduction of working time does not affect purchase capacity and allows more leisure¹⁵.

The convenience of reaching higher levels of productivity for employers and employees is explained in this way, but also regional standards of living increase as a consequence of public taxation (not necessary by the increasing taxes but enlarging the number of taxpayers) that, afterwards, can be reinvested supplying more and better public services for all citizens.

Competition has also a different orientation when two producers contest for a single consumer and try to attract them offering a favourable ratio price-quality in their product. As a result, the relative preference to produce intensively a good would differ from region to region. This means that adopting production schemes successfully proven in certain location could ensue unlike consequences.

There is a great range of choices with respect the various opportunities of production. Yet local characteristics not directly related to production factors (i. e., taxation system, consumption) could modify the parameters in which a region is able to compete.

This point is especially interesting, because actually is the responsible of the “clustering phenomenon”. Even within a region there would be differ-

¹⁵See Paul Krugman, 1998[114], pp. 52-68.

ences in production preferences related to the existence of specific elements that act as productivity distortions such as means of transportation. Then, the concentration of production takes a spatial dimension tending to agglomerate on a single pole. The closer to this core, the higher is the intensity of productivity.

In fact, this is the result of the existence of an optimum location point. Such concept refers to the position spot that is determined by transportation cost as a function of the given locations of the production centres, factors and consumer markets¹⁶.

The consequences of this concentration are a reduction of costs and, therefore, a better adaptation to market conditions. Then, the cluster develops into a complex net of activity according to the labour specialization and the formation of numerous interrelations. This net has an organizing agent that embraces the different participants. The role of this agent would be crucial for identifying the “cluster approach”.

2.2.5 Innovative milieu

A cluster can also be considered a network of innovative enterprises and research and transfer institutions. Such structure constitutes an *innovative milieu* and it is based on the advantages, considering certain conditions of cooperation among firms, a reservoir of highly qualified labour and financial

¹⁶This element has a longstanding theoretical background with antecedents in the works of Wilhem Laundhardt, Alfred Weber or Alfred Marshall. See James V. Pinto, “Laundhardt and location theory: rediscovery of a neglected book” in Norman and Greenhut, 1995[158] and Marshall, 1938[140].

intermediaries offering venture capital.

The relevance of such milieu concept results partly from its flexibility. It is increasingly recognized the growing role of services in regional economies in addition to manufacturing¹⁷.

According to Philip Raines, the idea comes from the “innovative milieu” researched by the GREMI group¹⁸. However, it would be possible to find earlier traditions through the work of Alfred Marshall who mentioned the great advantages of localized industries (industrial districts): *hereditary skills, growth of subsidiary trades, use of highly specialized machinery and local market for special skills*¹⁹.

Then, a cluster is a mean of minimizing the costs of transport and communications and maximizing internal economies of scale and external economies of agglomeration. Nowadays, advantages of residence and consumption would also play a decisive role.

¹⁷Klaus-Heiner Röhl, “Saxony’s Capital Dresden on the way to become Eastern Germany’s first ‘Innovative Milieu’?”. Diskussionsbeiträge aus dem Institut für Wirtschaft und Verkehr, Nr.5/2000. Dresden, November, 2000. Pp. 2-5. [201]

¹⁸The milieu concept was developed by regional economists. They were all members of the Groupe de Recherche Européen sur les milieux Innovateurs (GREMI) during the 1980s.

¹⁹The ideas were part of a beautiful book that combines an austere rhetoric with exquisite precision of rationalizations. Especially relevant for the purpose of this paper is the Book IV. “The Agents of Production. Land, Labour, Capital and Organization”. For the advantages of industrial concentration see: Alfred Marshall, *Principles of Economics: An introductory volume*. MacMillan and Co., London, 1938 (1890). Pp. 271-272. [140]

Innovation basis

According to Bruno Lecoq²⁰ there are *four “stylized facts” of the innovation process*:

1. innovation is a *collective process*;
2. innovation is a complex and interactive process;
3. innovation is a learning process; and
4. territorial organization is an essential component of the process of creation.

The first point underlines the need of coordination of different phases of the production and innovation process. The second refers to the assumption that knowledge is generally dispersed in an unpredictable way and, therefore, there is a need of communication channels. The third point refers to the way knowledge flows, integrating contributions of a number of participants that are able to adapt the information to their specific situations, providing different solutions due to own capabilities and needs.

This adapted knowledge that can be defined as “creativity” is also a source of innovation. In this respect, it is related to the point four, where an environment of constant exchange, discussion and testing enhances the

²⁰Bruno Lecoq, “On clusters of entrepreneurs: an Austrian approach to innovative milieu”, CARE, University of Rouen, Preliminary draft, pp. 3-4[131]

innovative process: innovation through the creation, diffusion and use of knowledge. Innovation is the result of networking basis²¹.

This point may be a key driver of economic development. Innovation results from increasingly complex interactions at the local, national and world levels among individuals, firms and other knowledge institutions. In this sense, *continuous technological change and innovation are among the main determinants of productivity growth and as such are necessary conditions for the welfare of nations and regions*²².

The cluster would offer institutionalized networks where informal linkage and trust build efficient communication, relying on time, affinity (based on “soft aspects” as common culture or personal experience) and, ideally, *loyalty* (Schibany and Polt, 2001b, p. 9[164]). The competitiveness of any system of innovation relies on the capacity to transfer and exploit the available knowledge in the system²³.

²¹*In general, the discovery or emergence of something depends on the combination of several parameters, all of them having to be simultaneously met* (Lambiotte, Thurner and Hanel, 2006[118], p. 1).

²²Andreas Schibany and Wolfgang Polt, “Innovation and networks: An Introduction to the Theme” in *Innovative networks: co-operation in National innovation Systems*, OECD, Paris, 2001b[164].

²³See Chaminade “Innovation Processes and Knowledge Flows in the Information and Communication Technologies (ICT) Cluster in Spain” in Organisation for Economic development (OECD), *Boosting innovation*, OECD Proceedings, Paris, 1999[161], p. 219

2.3 What is a cluster?

In general, the term refers to the tendency of some companies to *cluster* in certain locations, gathering as a close group. Such firms belong to similar or differentiated ranges of activities within the same sector (OECD, 2005[173], p. 11).

For the interest of the paper, such agglomerations would be based on regions. Finding a satisfactory definition of region is very difficult because the term is more than the extension of an area in a meso-subnational level (i. e., a region could involve territories of more than a nation) and the intuitive understanding of the term integrates a myriad of characteristics. An acute meaning seems to be very elusive, however too tempting to be avoided.

In the following pages, the meaning of “region” would be the highly individualized geographic area of some extent (Scott, 1998, p. 1[215]) based on the perceptive integration of capital accumulation, social interaction, identity (Wilde, 2006, p. 317[248]) and a broad political autonomy and flexibility, encouraging effective economic governance.

The phenomenon of cluster as an agglomeration is more the result of the creation of communication and cooperation nets between companies in an area rather than the product of corporative decisions. These nets are established on the existence of research institutes, universities, financing services and public agencies in an environment of internal cooperation and external competition (Raines, 2001, p. 3²⁴).

²⁴Philip Raines, “The Cluster Approach and the Dynamics of Regional Policy-Making”,

Michael Porter defines clusters as *geographic concentrations of interconnected companies, specialised suppliers, service providers, firms in related industries and associated institutions in particular fields that compete but also cooperate* (Porter, 1998, p. 199[187]).

The interconnection could be between buyers and suppliers or among different individuals sharing factors. However, the network includes not only firms but “associated institutions” what makes the cluster more than a concentration of activity in space. Under a managerial point of view, if a business cluster is created, firms would be able to enjoy economies of scale usually only available to bigger competitors. Some costs can be shared and this can enhance productivity, increasing firm competitiveness. Because of networking advantages, different experiences can be shared and business strategies could have more sources of information and analysis. These elements allow risk sharing, increasing the level of predictability on economic change (See Table 2.1)²⁵.

All in all, clusters develop and are important because they create great economic benefits (Ketels, 2003, pp. 6-7[97]):

1. firms can be more efficient, *drawing on more specialized assets and suppliers with shorter reaction times than they could in isolation;*

European Policies Research Centre, University of Strathclyde, Glasgow, September 2001. [195]

²⁵Statistisches Bundesamt (Hrsg.), *Datenreport 1999*, Bundeszentrale für politische Bildung, Bonn, 2000. Pp. 27-8, 98, 102-5[227]. “Saxony and the Saxons” Landesregierung des Freistaates Sachsen, 2000, p. 13-49 *Saxony00*. “Focus on Dresden: The Capital of Saxony in Figures”. Landeshauptstadt Dresden, 2000, p. 10. [119]. *Der Alumni-Guide 2002*, Technische Universität Dresden, 2002, p. 6[234].

The reunification of Germany allows, after years of prohibition, people and factors to move around the country without any legal impediment. The following years are a period of adaptation between elements of the former socialist system abruptly interrupted and the dynamic market economy of West Germany. Because of their lack of competitiveness, many businesses of the East were unable to compete under the rules of free economy. Consequently, many of them closed down and the rest survived only via severe readjustment policies.

The effect of those decisions was, in many cases, cuts in the number of employees. The Eastern economy, so far unaware of the unemployment phenomenon, suffered a rough collapse in their labour market. In 1998, East Germany (19,5%) almost doubled the unemployment rate of West Germany (10,5%). The added tensions between globalization and localization did not help to fill this breach.

Saxony, as one of the *Neue Länder*, is also included in this phenomenon. Because of this, it is interesting that in the past few years media has portrayed the region as the cradle of high-tech firms: the *Silicon Saxony*. Is it a press bluff or is there something behind? The official line of Dresden affirms that the city, heir of a long tradition of both innovative and entrepreneur spirits, takes the previous steps for economic reform policies toward competitiveness.

Since 1995, when Siemens inaugurated its microprocessors factory, several other companies have chosen Dresden as location. Infineon technologies, a subsidiary of Siemens and Advanced Micro Devices (AMD, another microprocessor factory) are the most significant new companies of the electronic sector. In addition, Infineon and Motorola have started a joint research project for new generation chips. Other companies in the city are Volkswagen, DaimlerChrysler Aerospace Airbus GmbH, ABB and ALSTOM. Hence, there are certain reasons to support the City's official promotional message.

At the same time, there are several academic research centres in Dresden: the Technische Universität Dresden, some Fraunhofer and Max Planck institutes, the "Gottfried Wilhelm Leibnitz" Scientific Association, the Rossendorf Research Centre, the Dresden Technology Centre and the Consultancy Centre for Technology Transfer and the Promotion of innovation. Some of these institutions work closely with the private sector.

Table 2.1: A case study: Silicon Saxony

2. companies and research centres can increase innovation as knowledge spill overs and the interaction with customers and other companies generate new ideas and pressure to innovate while the cluster environment decreases the cost of experimenting; and
3. the level of business formation tends to be higher in clusters, as start ups are more reliant on external suppliers and partners (all of which they find in a cluster) and clusters also reduce the cost of failure, *as entrepreneurs can fall back on local employment opportunities in the many other companies in the same field.*

2.4 What is the cluster approach?

The *Cluster Approach* is a model for explaining how regional economic development can be influenced by comprehensive identification of economic and geographic interdependencies. A clear scheme proceeds on the performance of the main development actors, setting compatible gains toward the common goal of regional growth. This attuned behaviour is the result of a conscious policy for the creation of a network of knowledge exchange.

The cluster approach focuses on those agglomerations of business activity with special trade viability in the world market. Moreover, the emphasis lies on the intensified use of knowledge and on developing positive synergies between different network members.

According to Jacobs (Jacobs, 2006[91]), the cluster approach focuses

on those concentrations of business activity, which have already proven their strength and viability in the world market. However, the emphasis lies on the intensified use of knowledge in these strong clusters and on enhancing constructive interaction between different parties in the network. The new approach based on clusters has gained in popularity especially since governments have started concentrating more on their specific strengths²⁶. Jacobs includes a very particular element of the cluster approach model: the role of politics.

The new approach based on clusters has gained in popularity especially since governments (Ketels, 2007[98], p. 3) are considered to play a crucial role in strengthening local capabilities and in coordinating local cooperation toward a common goal of economic development (OECD, 1999[161]). This aspect is interesting, because it determines a perceptive dimension on decision-making and a definition of appropriate administrative boundaries between public and private spheres. This mixture takes special relevance in the proactive dimension of the cluster approach as an economical development strategy based on competitiveness. Then, it appears as a complex net of interaction among different actors within and between levels with multiple linkages.

Clusters arise because they increase the productivity with which companies can compete. Then, the ability of a region for building a cluster will establish the capacity of its settled firms to compete with other companies, given a certain market with high levels of competition among agents.

²⁶Dany Jacobs, "Knowledge-intensive innovation: The Potential of the Cluster Approach", 2006, <http://www.jrc.es/iptsreport/vol116/english/TEC1E166.htm>[91]

By admitting the connection between companies' performance and regional welfare, the cluster characterizes an approach to understand the market foundations of economic development. This relationship combines *the operating practices and strategies of firms as well as the business inputs, infrastructure, institutions and policies that constitute the environment in which regional firms compete* (Porter, 1990[186]).

The phenomenon of regional integration has a positive effect in relocation of specialized activities. The relocation of factors depends on the comparative advantages which the specific region possesses. This acknowledgment of comparative advantages helps local authorities to design a win-win strategy. It is based on the cooperation between partners of different nature (political, academic, financial and industrial) due to a common goal of local development into a competitive global scenario.

Martin Stuchtey considers four measures for identifying a cluster: the industry output concentration, the existence of cluster externalities, the presence of central actors and, finally, a certain local culture (Stuchtey, 2000, pp. 40-42[229]).

2.4.1 The theoretical dimensions of cluster approach

Such given model integrates three different theoretical dimensions to explain the business concentration as an economical situation.

First, there is a geographical dimension focusing on the localization

process that has been explained masterly by Krugman and can be defined as New Economic Geography (NEG) paradigm. Second, there is a technological dimension considering economic performance of businesses based on high technology derived from Michael Porter's works. Third, there is a functional dimension based on cooperation gains in terms of John Nash's equilibrium. The combination of these three dimensions forms the "cluster approach".

These dimensions include the disappearance of clear governance levels from international to local scenarios and the resulting self-definition of members of each rank. The cooperation between such actors could determine increased gains in opposition to a confronted strategy.

A geographical point of view

The first dimension underlines the effect of removal factors mobilization barriers, the reduction of transport costs on business location and gains derived from such concentration. Therefore, the tendency toward such a concentration has increased because of globalization and economic integration.

Population is unevenly distributed among regions within countries. The concentration pattern is reinforced by the higher economic opportunities and wider availability of services stemming from urbanization itself (OECD, 2005a[168], p. 20). Economic development depends on the ability to access resources and services that are often available only in large economic centres (OECD, 2005a[168], p. 17).

Also, innovative activity requires human capital, infrastructure and funding that are not available everywhere. Their formation is slow and they can be used more efficiently when they are gathered in the same location (OECD, 2005a[168], p. 49). This efficiency can be understood as economies of agglomeration and there are at least three reasons for it:

1. the concentration of firms in the same place would allow a pooled labour market for skilled workers and facilitate the match between demand and supply of skills;
2. concentration allows a variety of non-traded inputs at a lower cost; and
3. the proximity between economic actors facilitates information flows and generates knowledge spill overs (OECD, 2005a[168], p. 93)

The competitive determinants

The second dimension, by focusing on the most competitive areas of economy, suggests that regional growth is a function of key sectors selected according to their economic dynamism. A region would profit from a “growth pole” enhancing economic development because of the extraordinary performance of its members in market growth or turnover results. The definition of such “pole” is a consequence of the rational identification of the region’s advantages.

These advantages could be based on different factors like accessibility to resources and services, natural resources available, infrastructures, labour

productivity, industry specialization, skills, employment rate, ageing or activity rates (OECD, 2005a[168], p. 106).

If we consider the 20 fastest-growing regions in the OECD (OECD, 2006a[171], p. 92)²⁷, the key competitive determinants for economic growth are the following:

1. Productivity;
2. Industry specialization;
3. Employment rates;
4. Participation rates;
5. Age activity rates; and
6. Population.

From all this factors, there was a relative decrease in GDP per capita between 1998 and 2003 due to a relative decline in productivity in 80% of regions (OECD, 2006a[171], p. 110). Moreover, such productivity gains are *boosted* by specialization (OECD, 2006a[171], p. 106). In most cases, *regions' good international performance seems to be driven by their own success rather than that of their country* (OECD, 2006a[171], p. 98).

In addition, a rapid rise in GDP per worker may be due to specialization or to a change in specialization toward sectors with high productivity

²⁷For data comparing regional growth in OECD countries see “The key drives of regional growth” in OECD, 2006a[171], pp. 91-113.

growth, *better infrastructure, higher skill levels or more efficient production technology* (OECD, 2006a[171], p. 93). Specialization is driven by comparative advantage and productivity growth can be regarded as a function of the region's policies.

Game Theory

The third dimension is adapted by a multiplication of institutional decision centres, vanishing of exclusive competences among them and confusion between public-private economic circles. Examples of such a phenomenon are deregulation, interregional competition within countries and cross-border partnerships.

This scenario may be seen as chaotic. However, it can be explain under the light of interest. Such impulse²⁸ rationally guides the individual endeavour in the relationship with others²⁹. As divergence or convergence behaviours interact, they define conflictive or cooperative circumstances.

Game Theory would be defined as the formal analysis of decision-making where several players must make choices that potentially affect the interests of the other players (Turocy and von Stengel, 2001, p. 2[236]).

²⁸No *hidden principle of human nature* but reason determines negotiation, change and exchange among people, according to classical knowledge. Smith, Adam, *Investigación de la naturaleza y causas de la riqueza de las naciones*, Vol. I, Biblioteca de Economía orbis, Barcelona, 1983[221]. P.57.

²⁹A player is said to be rational if he seeks to play in a manner *which maximizes* his own utility. The utility reflects the *desirability of an outcome to a player*. [...] *The expected utility incorporates the player's attitude toward risk*. Theodore L. Turocy and Bernhard von Stengel, "Game Theory", CDAM Research Report, October 8, 2001 [236], p. 3. See also Charles A. Holt, 2007[86]

Then, game Theory may be understood as the study of conflict and cooperation. Its theoretic concepts may be applied whenever several agents interact. These agents may be varied: from individuals, to groups or firms or any combination of these. All in all, game theory provides a language to formulate, structure, analyze and understand strategic scenarios³⁰.

It is possible to differentiate between *cooperative* and *non-cooperative*. The first consider games with respect to the relative influence of various players or how a coalition may affect proceeds. In this sense, a Nash equilibrium³¹ recommends a strategy to each player that the player cannot improve upon unilaterally that is, given that the other players follow the recommendation. Since the other players are also rational, it is reasonable for each player to expect his opponents to follow the recommendation as well (Turocy and von Stengel, p. 12[236]). The Nash's model fits within the cooperative framework focusing on the outcome of a bargaining process.

In the case of the cluster, players cooperate, because they hope that cooperation will induce further cooperation in future. This point is based on that *there will always be the possibility of future play* and perfectly adjusts to the kind of repeated games used to give a solution to the "prisoner's dilemma" (Varian, 2006, p. 511[241]).

³⁰Theodore L. Turocy and Bernhard von Stengel, "Game Theory", CDAM Research Report, October 8, 2001 [236], p. 4

³¹In 1950, John Nash demonstrated that finite games have always had an equilibrium point, at which all players choose actions which are best for them given their opponents' choices. *A Nash equilibrium, also called strategic equilibrium, is a list of strategies, one for each player, which has the property that no player can unilaterally change his strategy and get a better payoff.* Dean p. Foster and H. Peyton Young, "Learning Nash equilibrium", Santa Fe Institute Working Paper, Santa Fe, January 24, 2003 [70]. Theodore L. Turocy and Bernhard von Stengel, "Game Theory", CDAM Research Report, October 8, 2001 [236], p. 4.

In an extended game with perfect information, the players need to take a decision every time, there are unique³² choices. Then:

Any of these best moves could be chosen by the analyst in the backward induction process. Since the eventual outcome depends on these choices, this may affect a player who moves earlier, since the anticipated payoffs of that player may depend on the subsequent moves of other players (Turocy and von Stengel, p. 24[236]).

This is called the *first mover advantage* which means:

A player in a game becomes a first mover or “leader” when he or she can commit to a strategy that is choosing a strategy irrevocably and inform the other players about it; this is a change of the “rules of the game”. The first mover advantage states that a player who can become a leader is not worse off than in the original game where the players act simultaneously. In other words, if one of the players has the power to commit, he or she should do so (Turocy and von Stengel, p. 26[236]).

However, often there is no full access for a player to all the information. But, also in these cases, game theory would provide tools for evaluating the information available to the players when they make a move.

³²Unless there is indifference between two or more answers, because they provide similar outcomes.

In this sense, trigger strategies are a kind of strategies for repeated games (Rasmusen, 2001, pp. 131-132 [197]). In a trigger strategy, a player initially cooperates but punishes the opponent if a certain level of defection is observed. Such strategy gives an answer for the so frequent struggle between high profits today and a lasting relationship in future.

2.4.2 Searching comparative advantage

One of the basis of the cluster approach is the identification of the actual comparative advantage of the region. As described above, the comparative advantages result from the efficient specialization of activities in an scenario of global competition and free exchange.

In addition, the combination of trade costs and economies of scale generate the concentration phenomenon, resulting in the geographical clustering of production and economic activities. But, how could a region be able to discover its specific comparative advantage? How would firms of a region find their most profitable field of specialization?

The concept of Revealed Comparative Advantage (RCA³³) could be a useful tool for defining what may be the most productive specialization. The RCA is based on the evaluation of comparative advantage regarding the net exports relative to some reference group.

One common method is to determine how specialized a country/region

³³See Keld Laursen, 1998[130]. For the first use of RCA concept, see Bela Balassa, 1965. [11] pp. 99-123.

is in the production of a good through constructing Balassa indexes. These examine the proportion of a good produced or exported or the numbers employed in each industry, relative to other countries/regions. Considering two regions A and B , a formula to measure regions' revealed comparative advantage (RCA) could be the following:

$$RCA_i = \frac{(X_A^i / \sum X_A)}{(X_B^i / \sum X_B)}$$

Where:

- RCA_i = revealed comparative advantage for good i .
- X_A^i = exports of good i by $Region_A$.
- $\sum X_A$ = total exports by $Region_A$.
- X_B^i = exports of good i by $Region_B$.
- $\sum X_B$ = total exports by $Region_B$.

Then:

1. If $RCA_i > 1$, then $Region_A$ has a comparative advantage in good i .
2. If $RCA_i < 1$, then $Region_A$ has a comparative disadvantage in good i .

Using this formula it would be possible to get a *flash picture* in order to identify the most productive specialization.

However, sometimes, policy makers try to support certain sectors without enough evidences of enjoying comparative advantage in the desired good, trying to mirror the success of other areas. An ambitious plan for joining a current trend may miss the desirable goal despite the power of will or the strength of efforts.

Moreover, an inefficient allocation of factors could jeopardize a region's chances in future. In this case, it would be important to evaluate the way government actions enhance the specialization process in the region.

If a region is able to improve the value of its RCA for a good i after applying a plan, then policy makers would obtain an objective sign of achievement or, in any case, an important source of information for implementing specialization policies.

Such measure, which will be called *flowing picture*, is possible to obtain by measuring the increment of the RCA (ΔRCA_i) value for a certain good i at starting (t) and ending ($t + 1$) points of a given period T .

$$\Delta RCA_i^T = RCA_i^{t+1} - RCA_i^t$$

Given:

- RCA_i^t = revealed comparative advantage for good i in a starting point t .
- RCA_i^{t+1} = revealed comparative advantage for good i in an ending point $t + 1$.

Then:

1. If $\Delta RCA_i > 0 \rightarrow RCA_i^t < RCA_i^{t+1}$, then *Region_A* policy may have a positive effect on comparative advantage in good *i*.
2. If $\Delta RCA_i < 0 \rightarrow RCA_i^t > RCA_i^{t+1}$, then *Region_A* policy may have a negative effect on comparative advantage in good *i*.
3. If $\Delta RCA_i = 0 \rightarrow RCA_i^t = RCA_i^{t+1}$, then *Region_A* policy may have no effect on comparative advantage in good *i*.

However, this tool only shows the tendency toward specialization of a region but does not necessary reveal the origins of its comparative advantage. Then, it needs to be assumed that the comparative advantage lies on those sectors that use intensively factors that are relatively abundant or cheap in the location instead of those goods that use relatively scarce or expensive factors.

In addition, the local comparative advantages could be partially acknowledged after an economic analysis of *strengths, weaknesses, opportunities* and *threats* (SWOT). Nonetheless, considering the possibility of misleading interpretation, the cluster approach has to be flexible and able to adapt to swift changes in business environment.

These characteristics are based on the open communication between the different participants, their mutual assistance, the compatibility of their goals, the presence of correcting measures and the reduction of distortions.

By focusing on the comparative advantage, the area would develop more successfully in a scenario of global trade and competitiveness.

The existence of compatible goals enhance the loyalty among the different parts³⁴. It is a way to assure that everyone will give the best to assist the others, because somehow their own gains also depend of this aid. This spirit could also be reinforced if they share a strong moral commitment with the region in terms of pride or patriotism.

Following the cluster approach, the economic strategy of the region benefits from continuous implementation and tends to create mechanisms to set and revise plans. These mechanisms would have means to evaluate region's performance and would have the possibility to suggest and to establish corrections if necessary.

In order to minimize the distortions, it would be important that the role of the government in the cluster approach design would be restricted to a supportive function. As Porter mentions (Porter, 1990, pp. 126-128[186]), the government could influence either positively or negatively and be influenced in the same way by the other participants³⁵.

Therefore, it is vital for the success of the cluster approach that the government assumes its partial influence in the regional competitiveness³⁶.

³⁴The dynamic interaction within the cluster is organized by well-defined goals and a hierarchical organization (Valverde and Solé, 2006[240], p. 1).

³⁵The influence that may be exercised by an economic actor depends on the actor's position in the institutions of society (Bowles and Gintis, 2008 [24], p. 4).

³⁶Porter does not consider competition among regions, so when using the term "regional competitiveness", a situation is described where a region became *the home of successful international competitors in an industry* (Porter, 1990, p. 1[186]). In this sense, "regional

The successful governmental policies would be those that reinforce the actual decisive factor of advantage present in a region. Otherwise, the inadequate use of factors would have a negative impact on cluster's productivity, harming the ability to the region's firms to compete.

In this way, the cluster approach could also work as a policy guide³⁸.

2.5 The goal of the cluster approach

The development initiatives that use the cluster approach would try to combine stabilization, privatization, market opening and the reduction of the costs of doing business.

Such ambitious interest is based on a blend of specialization and synchronization policies. The cluster approach as a model of economic development focuses on the positive outcomes derived from a clustering phenomenon within a certain region. This scheme describes the beneficial result of a single productive core's action on the rest of the cluster companies.

competitiveness" is *not* a macroeconomic phenomenon, a function of cheap labour or based on natural resources, government funding or management practices (Porter, 1990, pp. 3-4[186]). These elements could act as incentives ³⁷ to attract or maintain firms in the region, but they do not make a firm competitive by themselves. Competitiveness rests on the capacity of firms to achieve improving quality or greater efficiency (Porter, 1990, p. 2[186])

³⁸In this sense, the aim is to fulfill the lack of measure tools for evaluating a cluster policy (OECD, 2007[173], p. 15. If the elements of the cluster approach are identified (i. e., the actors) there is at least a formal evidence for considering the presence of a cluster in a region. The use of RCA indexes or complex systems-network models could suggest other sources of analysis.

The beneficial result can have an extended effect also on the region as a whole through the growth of social advantages due to the clustering of those companies. Modern innovation theory suggests that the competitiveness of a cluster can be enhanced by improving its knowledge acquisition and knowledge transfer mechanisms (OECD, 1999[161], p. 219).

2.5.1 The cluster approach as model of economic development

The cluster approach as a model of development emphasises the role of a single catalyst of economic growth. The model applies on a certain scenario that enhances economic growth because of specific actions of a single actor or *trigger*. These actions are means to develop a conscious strategy to pursuit precise goals whose attainment boosts economically the regional allocation of the trigger.

The cluster approach defines an open system that admits transferences to and from the system. The surplus of goods within the system is result of raise in internal productivity. The raise of productivity means the increase in production with the same amount of productive factors. Another way is to maintain production level with smaller amounts of productive factors via changes in technology and/or organization.

The source of this growth is the shift from low productivity sectors to high productivity ones. This change can be made by the reallocation of resources. One of the resources to restructure is labour. Therefore, it is

possible to determine productivity from the relation between resources and production. In order to operate with the concept of productivity, this must be calculated after discount production cost. The production costs are those of the productive factors: labour and capital.

In this context, Christian H. M. Ketels suggests important considerations for any cluster-based economic policy:

First, all clusters are important, not only traded or high-tech sectors. The productivity across all of them determines the standard of living a country or region can sustain. Second, cluster efforts are not about targeting - they are a tool that, in principle, is open to all clusters in a region. Because of limited resources it makes sense to concentrate on a few clusters that have both a high ability to succeed and a high willingness to improve at any point in time. But this selection is driven by the specific local circumstances, not by some generic view on which clusters are more valuable. Third, cluster efforts are directed at improving the underlying conditions for higher levels of productivity and innovation, not the outcomes in terms of market share or employment directly. Pro-productivity policies allow competition to move to a higher level of productivity and unique value, not restrict competition.

[...]Cluster creation and industrial policy-type targeting is *a very dangerous guide for policy*³⁹. It leads policy makers across regions to flock to the same type of cluster categories viewed as

³⁹Not underlined in original paper

strategically important for economic development. In such a field, life sciences comes to mind, many locations without relevant competitive advantages will compete for the same number of limited spots sustainable in the industry. And these locations will tend to compete on the amount of financial incentives they give to companies, not on their inherent attractiveness for these activities. This type of locational competition not only leads to a government-centric approach to economic development very costly for public budgets. It often also relies on limiting or distorting the effects of competition- and because high levels of local rivalry are such a critical ingredient in creating competitive clusters, these policies will tend to undermine the very competitiveness they are trying to create (Ketels, 2003, p. 16 [97]).

The cluster approach defines a situation where a company settles in one place, bringing all its experience and incites the *clustering* of other companies around. The firm's decision to reallocate derived from its certainty (or realistic prospect) about the increase of productivity linked to the choice of the new location.

This decision is connected to the actual cost of factors in the former and new host areas. The cluster approach as a model of development is based on minimizing those costs. At first, *clustering* suggests allocation of production of a certain sector. This allocation focuses on obtaining economies of scale. These are the result of lowering the cost of factors by the concentration of firms of the same sector and the transference of technical expertise, experienced personnel and tested strategies from other places.

The lowering cost of factors could result of several causes: the existence of a certain infrastructure, the proximity to raw materials, suppliers or customers, more flexible tax policies, supportive legislation, financing, subsidies or cheaper labour. All these elements determine abstractly the ideal location pattern⁴⁰. Every single entrepreneur would choose the location where the profits will be maximized.

However, if production does not depend on irreplaceable and immobile factors, it would be very hard to find a sole optimal location. Considering an agglomeration of firms, equilibrium could be found as a function of individual advantages and the maximization of independent economic units. Moreover, this could be the definition of creative interdependence that the cluster approach pursuits.

The attraction of new companies means, hypothetically, to increase the demand of factors in the host area. Being labour one factor, there is a demand of workers with the arrival of every new company. The demand of workers would be adjusted to production needs and the search of profits. The company will not employ more people that it needs for its production or with a cost of employment higher than the revenues of its use.

In this situation, if more people are employed than originally, their salaries will be new incomes to the system. With no increase in the population, it may be assumed that incomes per capita grow and this element defines an aspect of economic development.

⁴⁰ August Losch's Theory of Location offers a comprehensive description of the spatial interrelationships of an interdependent economic system. See Claude Ponsard, *History of Spatial Economics*, Springer-Verlag, Berlin, 1983, pp. 65-72. [181]

At the same time, if more companies are settled than originally, their production sums to the total of the region. An increase of production with no growth of population gives more production per capita. This situation may also be considered as a representation of economic development.

A definition of economic development

Economic development could be understood as the constant expansion of economic factors and its resulting productivity in a certain period. Then, a society has experienced development in a given period when the productivity expansion is the result of changes in technology and organization.

Economic development could be measured empirically as an increase of gross domestic product. It is possible to measure the social impact of economic development as an increase in the net income of their members in terms of GDP per capita, when this growth is not the result of a diminution of total population. Doing so we assume that the effect of economic development in individuals' net income is positive, meaning addition in purchase power of persons or their capability to buy goods and services.

If "clustering" were admitted as the *Leitmotiv* of a specific development pattern, it would be necessary to establish certain standards:

1. The identification of the main functional elements of a competitive core and their role to support the cluster existence and growth would be possible .

2. An analysis of the interaction of these elements within the region (cooperation) and globally (competition) would be feasible. This aspect is especially interesting, because it could admit the possibility of local cooperation between companies that are competitors in the global market⁴¹.
3. The evaluation of the obtained framework as the result of the relation between an existing cluster and a previous cluster development policy would be viable .
4. It should be evident that, because of clustering among a chosen specialization, the region has prosperity in terms of improving the local development standards and the living standards of its citizens.

Adjustment disruptions of the cluster approach

It is important then to identify some of the adjustment problems that the cluster approach could face.

Firstly, the arrival of more companies should be contrasted with the disappearance of previous ones in the area. If the arrival of a company causes, direct or indirectly, a negative effect in the production of a preceding one and the newcomer is not able to compensate this lack, the system has no economic development.

Secondly, the employment of more individuals should be compared

⁴¹In this sense, Nakano and White mention the “competitive cooperation” or “flexible specialization” resulting from the division of labour among enterprises in regional networks (Nakano and White, 2006[154], p. 8). See section 7.2 for actual examples.

with the unemployment derived from the transformation of the production structure in the region. Related to the previous, when the unemployment caused by the structure adjustment is not absorbed again for the system, *clustering* fails as a model of development.

Thirdly, the model admits a favourable situation if the price of labour cost grows correlated to the increases in the demand of employers and its relation with the actual number of potential employees. Thus, there is a tendency toward an equilibrium price at which the quantity demanded is just equal to the quantity supplied.

Nonetheless, there are two scenarios where the paid price does not match the equilibrium price. On the one hand, productivity benefits from a lower paid price allowing production with lower costs. On the other hand, a situation of a higher paid price is sustainable, only if the employer compensates the loss of productivity per unit of labour with other means such as subsidies.

Another aspect that can affect the misperception of the equilibrium price is the increase of local population via migration; these rates cannot be higher than the actual demand of employment of the companies. Otherwise, the system does not have benefits of the growth of employment.

Which elements are distinctive for the cluster approach as a model of economic development?

Actors are entities that play an identifiable role in the cluster development policy, its design, implementation, monitoring and adaptation. At the same time, actors should have analytical capability to understand regional economy and/or functional capability to enhance the processes of economic growth.

There are two levels to define actors. The first level or horizontal level defines the actor according to its nature: political, social, economic and so on. Considering an actor as policy maker, each one should have analytical capability to understand regional economy and the processes of economic growth, executive competence to take decisions and set up actions and resources to support them. The second level or vertical level defines the actor according to its size and presence: local, regional, national or international.

Overall, it is possible to consider four actors (see figure 2.1) interacting within the cluster approach model. These are local government, entrepreneurship, academia and financier.

In this model, local governments play a key role in the strategy design, recruitment of partners, role assignation and fellowship strengthening. Local government identifies strength and weakness both in terms of local and international markets. They also play a crucial role in the redistribution of capital via taxation and subsidies.

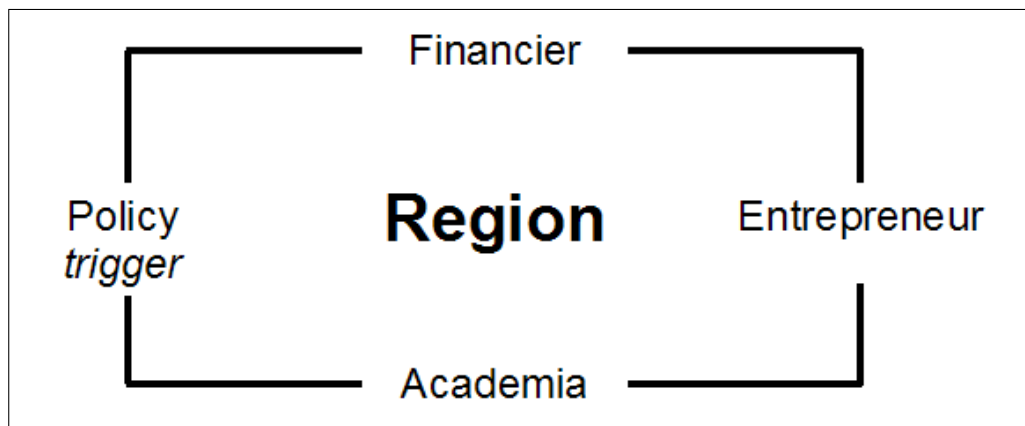


Figure 2.1: The four actors of the Cluster Approach

In addition, the specific nature of governments (medium term life cycle) allows balancing the effects of short-term crisis. For example, local governments can support key local groups (i.e., businesses) integrating short-term policies adapted to current issues and adding a relative certainty for management decisions.

The changes in technology and organization are the result of investment. Investment means *capital assets consisting of goods* (capital goods) *that are not intended for immediate consumption but are for use in the production of consumer goods or further capital goods*⁴². In a closed economy model, this investment is the surplus of goods that are not consumed directly and immediately by individuals. In an open economy model, this investment can be the result of transfer from the surplus out of the system. The agent of investment is called investor.

The effort to develop such cluster policy depends on several elements. The existence of previous partners in the area or the need to attract them,

⁴² *Concise Dictionary of Business English*, Longman, New York, 1985. [1]

the cooperative tradition in the region and previous cooperation barriers are example of such basics. These aspects will determine the effort and resource expenses of the trigger.

Furthermore, a convergence in interests among the different actors defines the way of cooperation. The long-term interest of politicians could be to assure population fixation to the region (guarantying future tax contributions) or to gain political support in the region for the party in office.

Then, the trigger would attract investment by the double interaction of marketing efforts and deployed incentives, both financial (tax incentives or capital aides) and non-financial (infrastructures or personal connection via sponsored events).

At the same time, companies come after considering the advantages derived from goal synchrony with political and social actors. This factor allows the creation of a legal framework based on the understanding that harmonise the different interests.

Finally, the academic centre has ensured its survival as well as possible prestige derived from its liaison with well-know corporations. For example, if the region supplies of a the advantage of an academic research centre, with its own laboratories and organization, this could act as a source of qualified workers that can be efficiently trained by converging academic- and market-oriented research and sharing development costs. In addition, political actors could enhance this cooperation with public incentives as scholarships organization of events or public financing. Moreover, once the localisation process

has finished, the company can enjoy the derived consequences of clustering (i. e., reduction of supply cost).

2.5.2 The effect of networking

The interactions of different actors give rationality in decision-making. Policies tend to maximize goals to fulfil the interest of dissimilar participants. As an example, role assignment “trickles” all the way down according each actor’s virtues. Additionally, regulations are adapted to fit the specific objective.

It appears a complex net of interaction among different actors within and between levels with multiple linkages. In order to understand the function and capability of every actor, it is necessary to establish a hierarchy according to every stage of development.

Every single phase is characterized by the change in the scope of the trigger, the level of cooperation and exchange of information among the parts and, not to forget, the emotional engagement with the area of location and commitment with a common goal of economic development.

Certainly, the cluster approach offers a rich methodology for the integration of heterogeneous variables in economic analysis. In fact, such comprehensive capacity depends on the multiple sourcing of the cluster methodology and the assimilation of successive development concepts (see figure 2.2)⁴³.

⁴³Chronology of regional development concepts (Stuchtey, 2000[229])

	1930 Industrial Development	1960 Creation of Growth poles	1980 Decentralised, endogenous development	1990 Learning regions	1995 Spatial strategy Convergence
Basic Belief	Industrial growth can be steered through the regional pattern of Public investments	"Counter-urbanisation" can be triggered by creating industrial complexes in peripheral settings, development will trickle down into region	<ul style="list-style-type: none"> o Initiatives must be region driven o Measures need market orientations o No orthodoxy on tool box 	<ul style="list-style-type: none"> o Regions need to build a highly networked suppliers, labour and knowledge base o Social linkages vital 	<ul style="list-style-type: none"> o Large firms need cluster and could contribute to their vitality o Public and corporate interests in the regions converge
Instruments	<ul style="list-style-type: none"> o Subsidies o Infrastructure Investments 	<ul style="list-style-type: none"> o Planned industrial complexes in focused areas o Subsidies o Focus on large corporations 	<ul style="list-style-type: none"> o Regional marketing o Attraction of investment o Infrastructures for SME and start-ups o Labour market improvements 	<ul style="list-style-type: none"> o Institutions of exchange o Knowledge infrastructure o Incubation o International networks o Business support functions 	<ul style="list-style-type: none"> o Tech-farming o Targeted localisation o Private-public partnerships o Entrepreneurs forums

Figure 2.2: Regional development concepts (Source Stuchtey, 2000)

Such concepts vary depending on the ruling paradigm and shows that solutions might be different considering the stage of development of an area. In this sense, the cluster approach is no revolution but the result of economic evolution. The tools need to be adapted to the specific circumstances, considering specific needs and interests. In order to define them, it is necessary to exclude all these elements that do not contribute to the understanding, like the random influence of fashion. All in all, it is possible to consider five stages in the evolution of growth strategies ((Stuchtey, 2000[229]):

1. Industrial development: public investments regionally located trying to stimulate the creation of industries. The tools used would be subsidies to specific sectors and investments in public infrastructures.
2. Creation of growth poles: stimulation of urbanization in peripheral areas by creating industrial complexes. The instruments would be subsidies in selected areas, focusing on specific corporations.
3. Decentralized endogenous development: market oriented initiatives regionally driven. The mechanisms are marketing actions and investments in infrastructure to stimulate private interest in specific regions.
4. Learning regions: creation of social networks connecting suppliers, labour and knowledge base. The means are institutions of exchange, knowledge infrastructure, incubation, international networks and business support functions.
5. Spatial strategy Convergence: large firms regionally concentrated with a strong convergence of public and corporate interests. The tools are tech-farming, targeted localization, private-public partnerships and entrepreneurs forums.

2.5.3 The clustering steps

In the first moment, there is an actor considered the “policy trigger”. This actor has particular interest or needs that it is not able to fulfill without cooperation of other players. Affected by this dependence, the trigger designs a policy draft where it identifies the main interest, strategy and tactical partners (See figure 2.3)

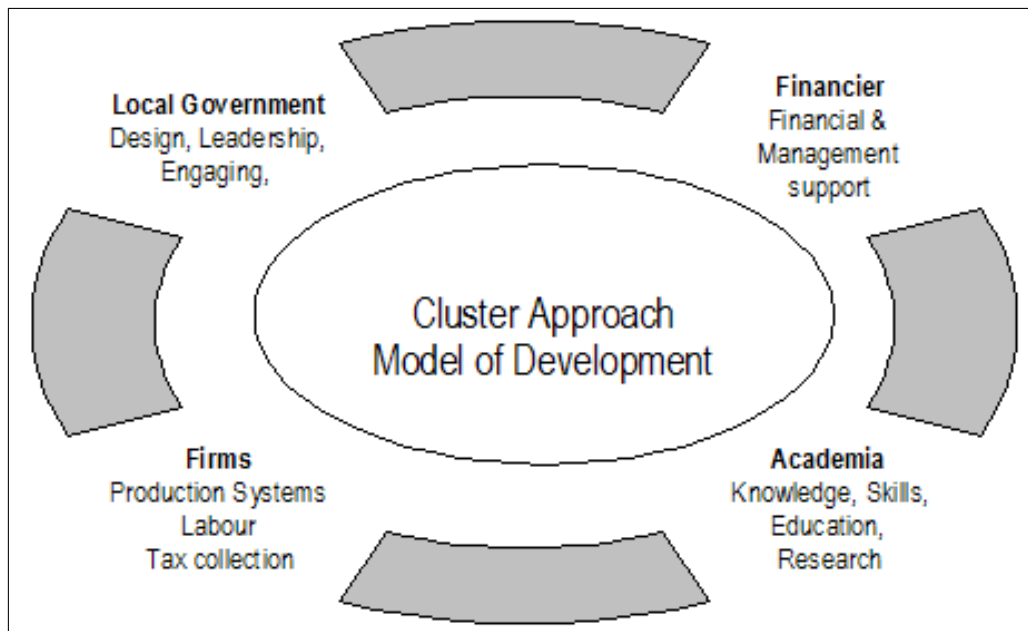


Figure 2.3: The different role of the Cluster Approach partners

As a result, every particular actor would be responsible of specific tasks though complementary:

- The local government or trigger would lead the network, searching for engagement and providing the infrastructural means for the fellow participants;

- firms may act as productive units and as the main source of tax collection for the trigger;
- Research centers (in the figure 2.3 under academia) provide knowledge and a pool of well-trained individuals; and finally,
- financiers act as a kind of system lubricant supporting firms financially and, in some cases, playing a counselling role.

The second step of the trigger would be to attract policy participants. To do so, the trigger must count on *mobilising* or *catching* resources as cooperation incentives. Having identified and attracted the policy partners, the trigger (alone or in cooperation with others) sets functions, defines responsibilities and distributes leadership (See Treyz, 1993[235])

After this, there is a second stage of development with implementation and monitoring of policies. The task distribution determines continuous communication among actors to avoid interference organize agendas, share factors, integrate actions and make good use processes. In other words, there is a net of linkages yet not necessary formal (See figure 2.4).

The aim of the second stage is to create a growth-enabling environment with self-sustainable capacities. When the policy has shown its capability, actors concerns are to maintain policy and sustain goals. Hence, there is a turn to institutionalize the net as a permanent instrument of control and governance.

The effort to develop such cluster policy depends on several elements.

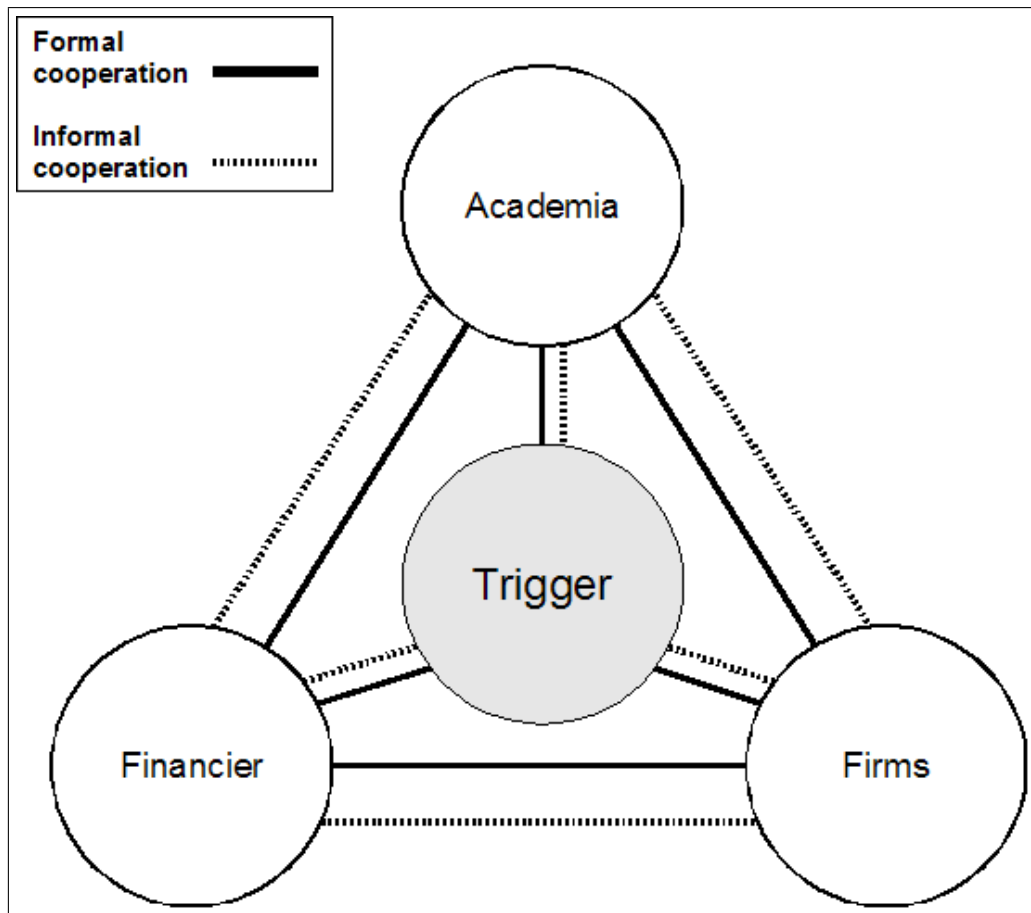


Figure 2.4: The cooperation among actors

The existence of previous partners in the area or the need to attract them, the cooperative tradition in the region and previous cooperation barriers are example of such basics. These aspects will determine the effort and resource expenses of the trigger.

In the third step, once the partnership is created in the region (see figure 2.5), every member could exchange linkage main role according to the situation. In general, it is predictable that the trigger efforts would tend to decrease if the decision was rational. When the growth enabling environment is settled, every actor gains a certain level of predictability and certainty in partners support. This mixture of private sector, academia and

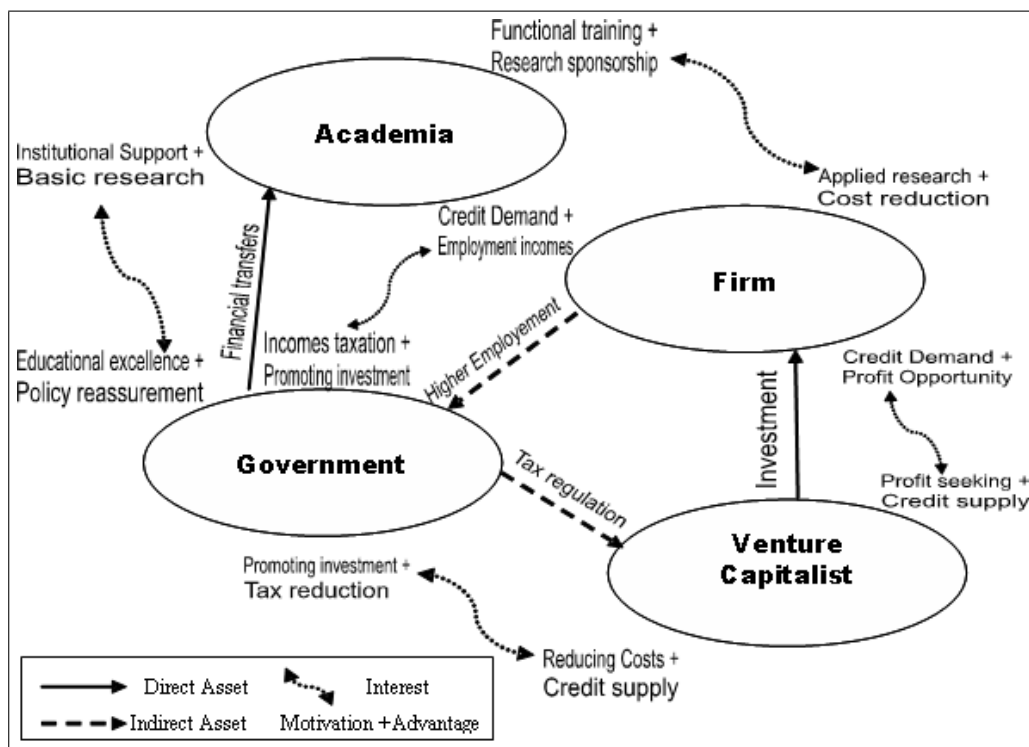


Figure 2.5: The different interactions among actors

government takes special relevance in the proactive dimension of the cluster

approach as an economical development strategy based on competitiveness. For example, the American consultant company “On the Frontier”⁴⁴ applies Michael Porter’s theory of competitive strategy to build an innovation-competitiveness culture, to increase the competitiveness of firms and clusters, facilitate a significant and durable change as *the international competitiveness emerges of geographically concentrated industry clusters*. Moreover, it recommends that *nations and states should try to build advantages on given physical inputs, knowledge capital and human resources*⁴⁵.

In order to achieve such ambitious goals it may be necessary to design and implement a comprehensive policy. It ought to enable a region to pursue different objectives maximizing the efficiency of every single mean. The cluster approach may be considered one of such wide-ranging policies.

2.5.4 The cluster approach as a new model of policy making

The popularity of the cluster concept is increasing because it is the cornerstone for cluster development strategy. In this sense, a strong policy scheme, pursuing cluster development, would define the way partnership within regions is created.

The cluster approach is a comprehensive guide to design economic development policies. The main element that defines the cluster approach

⁴⁴<http://www.onthefrontier.com>

⁴⁵One of the most quoted references about the Cluster Approach has very similar conclusions. Organisation for Economic development (OECD), *Boosting innovation*, OECD Proceedings, Paris, 1999. [161]

is the geographic concentration of firms. These firms establish a certain system of linkages, applying cooperative strategies and sharing production factors toward the creation of economic synergies. However, the cluster approach goes beyond the traditional idea of sector concentration because it is dispensable that actors are members of the same production sector if they share a common interest in a certain field.

Concentration of economic activities

The justification for concentration lies on the origin of manufacturing activity. From physical conditions to the distribution of factors, there are many various causes for the localisation of industry.

The availability of production factor could be accidental but also the consequence of an individual decision to assure the access to highly demanded products or services. Those individuals offer support for setting up a certain industry. Nonetheless, a successful story combines the commitment among participants and the accessibility to certain advantages. The definition of those advantages links with many other theoretical postures.

However, what distinguishes the cluster approach is that it offers not only an explanatory methodology for localization processes but also a proactive tool to create a competitiveness-oriented environment *ex novo*.

The cluster approach follows a theoretically coherent line. As first milestone, the Cluster Approach assumes the existence of a local compar-

ative advantage. Identifying such element and concentrating on it every economic activity, a location will enhance its economic performance in terms of economic development. Secondly, due to such specialization the location will improve factors distribution. This rationalization in the use of factors will enhance the competitiveness within the location. Nevertheless and this could be considered the second milestone, it should be taken into account that competitive is a firm in relation to others and no the location itself.

Elements of competitiveness

A firm is competitive if it successfully performs in gaining a significant share of a certain market in comparison with other challengers at the same time. The performance of a firm in such an open rivalry depends on the rational adjustment to both cost and demand. From this process, result decisions affecting prices, wages, methods of production, goods specialization, business organization or use of resources. This means that due to changes in these elements the ability of the firm to compete also vary.

A company unable to take the right decisions about them is likely to suffer from a lack of competitiveness. Persevering in the mistakes would bring fatal consequences for the continuation of the firm itself. In contrast, the complex nature of a region provides a far broader scenario in terms of access to factors and it is dubious that it concentrates their productive use in a sole industry. Therefore, because its endurance does not depend on it, a region has many ways to compensate the effect of mistake in the resident industry, giving extra time for corrections (or for new mistakes, considering

that the size would confuse for perceiving decline in time).

Even so, there are frequent references to competitiveness in media (especially when the concept is connected with political decisions) that suggest a different reading of the concept. A competitive region would be this that hosts many competitive firms. If it is assumed that the presence of many competitive firms will enhance the economic development of the region as a whole, then the pursuit of region's competitiveness will improve region's prosperity.

However, the continuous misuse of the word leads to the idea that there are specific industrial fields that are competitive such as high-tech or biotechnology. Again, the officials from a region could mobilise massive amounts of resources to cause the settlement of specific firms, getting different results as expected. In other words, a region that opts for high-tech industry is not necessary wrong but not necessary right either. Every economic development policy that the regional officials would decide would need to integrate the comparative advantage view.

Sense and appeal

Consequently, how to combine the appeal for competition and the sense for capabilities is the right question to make before giving regulations for creating an economic-development-oriented and competitive cluster in a region. The answer must consider several points.

Firstly, it is necessary an evaluation of previous experiences in the region. This is because in many cases, the success of clusters depends on local or historical circumstances. Important elements such as available raw materials, traditional expertise, the proximity to customers, the existence of specific customer demands and the conditions of institutional framework are identified within the lines of experience. This vision must be accomplished with a much more subjective one based on culture to define the mentality, the cooperation spirit and the capability to follow common goals among individuals.

Secondly, the regional executive should be aware of the limitations of their supportive function. Too high levels of involvement could produce distortions in the behaviour of firms, reorienting their activities far from the wishes of market. Doing so, there is a tendency to misusing regional factors, lacking their beneficial effects for the region as a whole. The duty would be then the promotion of business networks and their internal harmonisation in support of cluster formation. However, entrepreneurs have to maintain independent market-orientation and have to keep managerial revenue tracked decisions focused on sustained competitiveness. In the relationship among companies, harmonisation of interest and cooperation are terms that do not mean, in any case, agreements for interfering with the vigorous rivalry of markets.

Thirdly, the way to complement is offering advisory services, management tuned information, regional based technology and improving communication culture among firms.

In addition, the regional policy should consider the training for business management, the support of business contacts and initiation of cooperation among participants with confidence-building measures. Still, it is important to realise that all those actions have in the regional executive an initiator (the trigger) and, therefore, ought to be achieved with the help of private participants.

2.5.5 A cluster approach guideline

The cluster approach offers an entire guideline to complete such complex task. It affirms the importance of cooperation among an extended net of participants to increase economic development.

This guideline acts as a way to organize an assistance strategy to enhance the competitiveness of the firms of a given region and as an orientation to promote local economic sectors.

The starting element of the guideline corresponds to a diagnosis of the actual situation of the economic sectors within a region. This picture is given after analysing the region in both a macro and micro level. In the first, things like legal or economic policy framework play a crucial role. For example, the stability of price will prevent the volatility of investments and the rule of a legal system protects property. In a micro level, it would be important to identify monopolies and the ratio between private and public companies. Moreover, in the previous stage of analysis it is vital to identify the various means of financing, the access to credits or the possibility to

receive transfers and subsidies. Finally, the analysis would be accomplished if it includes the structure and size of firms, employment rate and labour costs. As a result, a cluster building strategy would be created.

The second element would be the proper organization of the recruitment process. This situation starts with the sensitization of potential partners in order to get the commitment with the cluster strategy. At this point, the trigger plays the main role as motivator and initiator of others' positive response. Governments could show at this stage a better performance in leading and moderating the dialogue among partners because, presumably, they are guarantors of people trust and their behaviour would be less vulnerable to particular interest. In fact, the grade of legitimacy that a particular government would enjoy determines its capability to obtain the empathy of counterparts.

In order to accomplish the task, it has to be considered the implementation of the cluster strategy. This idea is based on the need of a continual process of planning, monitoring and evaluation for maintaining a minimum level of flexibility that assures cluster's efficiency.

A brief compilation of policies

The process would benefit of the submission of three main policies.

First, it is vital to maintain the conditions that make possible the continuation of the cluster. In this sense, it is possible to include those

policies that promote infrastructure, competition, education or investment.

Second, it is necessary to institutionalize those services that contribute to increase the competitiveness of the cluster. Such services include consulting, financing, dialogue or information supply.

Third, it is needed to promote the cooperation between the different parts. There are several ways to reinforce such cooperation. For example, the different parts could benefit of the implantation of training programs and the establishment of cross-evaluation, outsourcing measurement and independently conducted quality audits.

2.6 The benefits of the cluster approach

The cluster approach corrects the distortions of previous models (i. e., the effect of public subventions in entrepreneurial behaviours⁴⁶) and adds some policy improvements and analytical gains.

The policy improvements are closely related to the expected economic growth and its durability based on efficiency. Then, the cluster approach consider a continuous and flexible transference of factors from low productivity sectors to high productivity ones through an institutionalized network.

⁴⁶A public investor may create policy-induced distortions on the market. As an example, public subsidies could determine a loss of productivity when an entrepreneur would act as a subsidy seeker orienting the business strategy not toward increase competitiveness but toward obtaining public compensations.

The cluster approach strengthens the importance of obtaining economies of scale⁴⁷, lowering the cost of factors by the concentration of firms of the same sector.

Moreover, the cluster maintains a constant flow of expertise and technological transference by the exchange of technical expertise, experienced personnel and tested strategies from other places. This is a strategic goal in order to maintain economic growth as a long lasting phenomenon. Finally, there is the element of converging public and corporate interests and, at the same time, limiting public role considering its differentiated motivation. As Buchanan suggested (Buchanan and Tollison, 1972[30]), the political parties in office will behave in order to improve their electoral results and concentrate their political power. At the same time, bureaucrats will act for maintaining and increasing their assigned budget⁴⁸.

Compared to the traditional sectoral approach, the cluster approach focuses on the networks between firms, knowledge infrastructure, bridging institutions, suppliers and customers, usually within the same technological area (OECD, 1999[161], p. 219).

Then, public and private interest may converge if the way they cooperate is mutually beneficial⁴⁹. This compatibility of interests maintains

⁴⁷The concept of economies of scale can be usefully supplemented by the concept of economies of scope: different activities are undertaken for the firm according to the specialties of a region. Pontes and Barr, 2005[185], p. 3

⁴⁸In my opinion, the cluster approach needs to be applied then in a democratically organized region and based on a liberal legal framework in order to balance public and private will. In these circumstances, the capacity to elect is extended to the whole society, integrating the measurement of a broad economic development.

⁴⁹James McGill Buchanan and Robert D. Tollison (Eds.), *Theory of Public Choice: Political Applications of Economics*, University of Michigan Press, Ann Arbor, 1972[30].

the network reliability, enhancing the possibilities of risk sharing, reducing system uncertainty.

The analytical gains are the identification of the main functional elements of a competitive core and their role to support the cluster existence and growth. These main functional elements are named as actors and they play a differentiated but harmonised role. The functional players are the political trigger that activates and keeps cooperation, the academia that provides a pool of well-trained individuals and up to date research, the financier that rationalises savings transfer and investment and, finally, the entrepreneur that combine those components in order to maintain competitiveness and productivity.

Additionally, the cluster approach suggests a description of actors' interaction within the region as cooperation. And, finally, the cluster approach integrate the variables that define an industrial cluster, including geography, industrial sectors, productive systems, use of technology, generation of synergies organizational hierarchy (Bowles and Gintis, 2008 [24], p. 4) and net working.

Pieter de Man and Jacobs⁵⁰ have distinguished seven dimensions that constitute clusters. These dimensions are:

1. Geographical: the spatial clustering of economic activity;
2. Horizontal: the industries or sectors that participate in a cluster;

⁵⁰Jacobs, Dany and De Man, Ard-Pieter, "Clusters, Industrial Policy and Firm Strategy: A Menu Approach", *technology Analysis & Strategic Management*, No.4, 1996[92], pp. 425-437.

3. Vertical: the adjacent phases in the production process that can be present in clusters;
4. Lateral: the different sectors with which certain capabilities can be shared and the obtained economies of scale;
5. technological: the pool of industries sharing a certain technology (i. e., the biotechnology cluster);
6. Organisational: firms that cluster around a pivotal actor; and
7. Operational: regarding the quality of the network itself.

Philip Raines⁵¹ defines several specific measures regarding such interaction based on a key feature: the presence of common competitive advantages that are external to individual firms but internal to the cluster as a whole (see figure 2.6).

As a result, the cluster approach may be a comprehensive tool, useful to define economic systems (Pryor, 2005[191]) and the formation and interaction of economic and political institutions and the relations between business, government and society⁵². The interaction enjoys different outlines: the building of a community, the maintenance of supporting linkages, the development of common ventures or the share of factors.

⁵¹Philip Raines, "The Cluster Approach and the Dynamics of Regional Policy-Making", Paper presented to the International RSA Conference: 'Regional Transitions: European Regions and the Challenges of development integration and Enlargement'. European Policies Research Centre, Glasgow, 2001[195].

⁵²These different aspects interfere with the idea of varieties of capitalism. In this sense, the cluster approach applied on European soil needs that the political trigger acts more as facilitator rather than interfering. See Peter A. and Soskice, David(Eds.), *Varieties of Capitalism*, Oxford University Press, Oxford, 2001. Pp. 1-68[81].

Community building	Linkage measures	Common resources
<ul style="list-style-type: none"> ○ Use of associations and workshops to bring potential cluster actors together, ○ Cluster-wide communication through websites and newsletters, ○ Concentration of most cluster companies in a geographically visible location (such as a science park) and identifying a common marketing 'brand'. ○ Provision of common services to assist clusters and their members to act more as a joint entity, such as joint export marketing trips. 	<ul style="list-style-type: none"> ○ Cooperation projects between cluster agents, ○ Networking measures involving both business-to-business ties and links between businesses and research providers (especially university research departments). 	<ul style="list-style-type: none"> ○ Common labour markets of specialised skills ○ Special research excellence and forms of informal knowledge specific to the region. ○ Access to key business information, ○ Specialised forms of infrastructure, such as science parks and special research facilities in niche parts of the cluster), ○ Different types of targeted training, etc.

Figure 2.6: Specific measures of cluster interaction

These three aspects may define the needed axis of a successful cluster. However, the model proposed has to be checked in reality. There is intent to predict specific phenomena through the appliance of such model and theoretical systems. Such tools isolated a limited number of factors that are considered relevant in the dynamics of the analyzed fact⁵³. This conscious isolation is based on synthetic needs that simplify the amount of possible factors.

Consequently, there is a hierarchical process according to the measurement capacity of factors. That involves certain imprecision. Because of the impossibility of identify every single circumstance that may influence the

⁵³In this sense, it is specially appealing the alternative of *econophysics* or the application of the methods of physics to economics in general (Shubik and Smith, 2006[216], p. 1). See also <http://www.unifr.ch/econophysics>

system, every sincere analysis has to include the possibility of errors.

Such unknown band may be named as noise or chance. The first would be the effect of immeasurable variables. The last would be result of the group of elements that may influence the system in an unpredictable way. Such hazardous phenomenology may be positive if reinforce the goals of the model or negative if contradicted its effects.

Therefore, the cluster approach does not pretend to offer a faultless guide for achieving development. The cluster approach would be a tool to understand the possible causes on which such development was obtained or not, if applying a methodology based on the concentration of production and innovation.

2.7 Wrapping up

The Cluster approach is a model for explaining how regional economic development can be influenced by comprehensive identification of economic and geographic interdependencies. A clear scheme would prior on the performance of the main development actors, setting compatible gains toward the common goal of regional growth.

Despite the novelty of the term, the concept enjoys a long-standing theoretical background that can be routed to the classic understanding of competition, comparative advantage and spatial economic theories.

This cluster approach has a dual nature: as a model of regional development and as a model of policymaking. First, the cluster approach can be used as an analysis and monitoring tool for any given stage of economic development. Then, the cluster approach can be considered as a method toward the design and implementation of economic development policies. In this sense, the cluster approach suggests a comprehensive set of strategic elements based on miscellanea of allocation strategies and subsidiary partnership.

Chapter 3

The actors in the cluster approach

The Cluster Approach is an economic development model based on the effect of cooperation among a certain number of economic agents. This economic agent is named in this paper as actor. In this chapter, the actors of the cluster approach will be identified and described. These core participants are the political trigger, firms, financiers and academia. These four actors would join forces and coordinate efforts.

After establishing a set of compatible aims, the policy trigger would create incentives in order to attract partners, maintain their involvement and *morally* persuade their cooperative actions. Sometimes, policies designed to use *only* self-regarding preferences to public ends may be counterproductive. These failures occur when conventional self-interest-based policies compromise the beneficial effects of intrinsic motivation and reciprocity as well as civic virtues such as a *concern for fairness* and a *desire to uphold social norms*

(Bowles, 2007[22], p. 1). A good policy is that supporting socially valued ends not only by harnessing selfish preferences, but also by evoking, cultivating and empowering public-spirited motives¹. The validity of the Cluster Approach as a model depends on its simplicity and the capacity to introduce a hierarchy of factors.

Therefore, it is necessary to suggest an organization, considering such complex net, the vast range of interaction among different actors within and between levels and the multiple linkages. Recognising the complex ity of a real world scenario, the analysis should limit the number participants to those that have the capacity to create, supply or control productive factors.

Then, the functional nature will categorise every single actor and it allows a significant simplification of the model. The resulting method defines the actor according to a horizontal scheme because of political, social or economic characteristics.

However, the reader should be aware that it would be possible to define vertical levels, distributing actors according to size and geographical presence: local, regional, national or international. Yet, because it is very difficult to define the margins of such levels in a glance, this paper will establish such hierarchy when introducing every stage of development.

Some authors suggest that regional economic development is stimulated for a fewer number of participants. For example, this is expressed in the

¹In this sense, the trigger has to promote social values in order to increase reciprocity and cooperation. *Experimental evidence indicates that incentives that appeal to self interest may reduce the salience of intrinsic motivation, reciprocity and other civic motives* (Bowles, 2007[22], p. 15).

“Triple helix” model, a configuration with a system of university-industry-government relations². In the same way the works of Etzkowitz and Leydesdorff³. Nonetheless, including the financial sector, the model enjoys more flexibility and a better adaptability to the actual characteristics of market.

In any case, previous and successful models of the “cluster approach” identify all the mentioned actors as well as their role as part of a limited geographical area. For example, Mary Jo Waits studies the relations between the different actors in the cluster (leaders, suppliers and supporters) and the key linkage with the global scenario⁴. There is a more comprehensive work like the model of Philip Raines (Raines 2001[195]). In his article, he applies tools of comparison between several cases within the European Union. He also includes several layers of decision-making and their interaction in a unique business -academia-government environment.

²Martha K. Bakkevig, “The facilitator of regional competitiveness”, Paper at The Regional Studies Association conference Reinventing Regions in the Global Economy, Pisa 12th-15th April 2003[10]

³See Etzkowitz, Henry and Leydesdorff, Loet, (Eds.), *Universities and the Global Knowledge Economy*, Printer, London, 1997[55] and Etzkowitz, Henry and Leydesdorff, Loet, ”The Triple Helix as a Model for innovation Studies”, (Conference Report), *Science & Public Policy* Vol.25(3) (1998) 195-203 [56]

⁴Mary Jo Waits, “The Added Value of the Industry Cluster Approach to Economic Analysis, Strategy development and Service Delivery”, *Economic Development Quarterly*, Vol.14 No.1, February 2000, pp. 35-50[243]

3.1 The trigger

3.1.1 What is a cluster trigger?

In the first moment, there is an actor considered the “trigger”⁵. It plays a role of initiator. As policy maker would be that entity which carries out a specific function in the cluster development policy in terms of design, implementation, monitoring, support and execution. In addition, the trigger has to enjoy of a certain analytical aptitude for understanding regional economy and a functional capability to develop the processes of economic growth. Finally, a trigger ought to have executive competence to take decisions and set up actions and resources to support them.

Such competence is based on a realistic understanding of the economic environment. A perceptive actor would admit that there are particular interests or needs that it would not be able to fulfil without cooperation of other players. Therefore, it results the interest of developing a cluster.

The attempt to develop such cluster policy depends on several elements. The existence of previous partners in the area or the need to attract them, the cooperative tradition in the region and previous cooperation barriers are example of such basics. These aspects will determine the effort and resource expenses of the trigger.

⁵The term trigger was adopted considering the role of this actor as initiator. Also because of the author’s interest in integrating an element of game theory because its importance for estimating the interactions in the model proposed (see section 2.4.1). Considering the importance of the trigger, the reader will find an extended analysis of such actor in Chapter 4 of this work.

The trigger actions focus on attracting tactical partners, required for the success of the designed strategy. The resultant cluster of trigger and partners acts as a pole of growth or productivity core. This is assumed after describing economic development as constant expansion of economic factors and its productivity.

The trigger itself can be a non-production agent, for example, a local government or a non-profit organization. Nonetheless, the cluster must include a productivity heart on which the rest of actors can actually cluster. These actors come together because of they act as suppliers of goods or/and services.

However, if the Cluster Approach model were applied in European Union soil, governments would tend to play the role of trigger. European public servants have shown an increased interest in the technological innovations provided for certain industries. As a result, it can be said that there is a remarkable support to projects based on collaborative research between firms, universities and other public and private agents (Noguera *et alia*, 2004[157]⁶)

3.1.2 The trigger motivation

This actor has to have particular interest or needs related to the region's development that it is not able to fulfil without cooperation of other players. The long-term interest could be, for example, to assure population fixation

⁶Paper presented at the Regional Science Association (RSA) Conference, entitled *Europe at the Margins: EU Regional Policy, Peripherality and Rurality*

to their region (as a source of constant employment) or to obtain an improvement in living standards of its citizens (expanding local market and purchase capacity).

If the trigger is political, it decides how to distribute a given public budget most effectively between different activities because of the two motivations explained by Buchanan's Public Choice Theory (Buchanan and Tullock, 1999[31]):

The first motivation is an electoral one: the members of a political party in office tend to act in order to keep or improve their campaign results.

The second motivation is administrative: public institutions want to increase a given budget by the tax contributions of new firms and workers.

Economic development is a major goal for every political representative, especially in those areas with a long lasting economic decline. This situation is a matter of efficiency and equity, but also of spatial geography because of the relative distance to market centers. These elements define problems as low growth rates, outdated industry and high unemployment⁷.

Some of them may incite negative externalities as social segregation, criminality or decreasing living standards (Nijkamp and Mills, 1987, pp. 11-12[155]). Such negative externalities transcend the field of economics, affecting society as a whole. Then, when a political representative opts for a

⁷Many aspects related to regional economics could be found in Peter Nijkamp and Mills, Edwin S. (Eds.), *Handbook of Regional and Urban Economics*, Elsevier Science Publishers, Amsterdam, 1987[155].

certain development policy is fighting against the causes of such undesirable phenomena.

The cluster approach suggests a policy for revitalising a region, stimulating the causes of positive externalities like enhanced housing, education or invigorating the labour market. The trigger may then develop a twofold strategy, based both on direct and indirect policy tools, pursuing economic and social objectives in order to attain its political motivations.

3.1.3 The role of the trigger as policy maker

In this model, the trigger plays a key role in the strategy design, recruitment of partners, role assignment and fellowship strengthening. Therefore, the trigger should have the capacity to influence policy (Bowles and Gintis, 2008 [24], p. 2), enact laws or regulate markets⁸. These factors are very important in order to succeed the key challenge of the trigger. This consists in attracting partners to a region where they were previously not present.

The reasons of the absence could be several. Infrastructural impediments could be the relative distances from main industrial axis or transport channels. Considering the possible obstacles, the trigger defines the goal, designs the strategy and attracts partners.

In the cluster approach model, every kind of actor (no matter its nature is) can be a trigger. The only determinant would be that it controls

⁸*Norms are basic building blocks of social and economic organization*(H. Peyton Young, "The Power of Norms" in Hammerstein, 2003[82], p. 389)

enough resources to attract or mobilise partners, as well as, possesses a certain analysis capability to design a rational strategy. These actions are means to develop a conscious strategy to pursuit precise goals whose attainment boosts economically the regional allocation of the trigger. Innovation can be *enhanced through policies focusing on stimulating knowledge flows within the system* (OECD, 1999[161], p. 219).

How the trigger acts?

The process of cluster formation includes the design of a comprehensive strategy by the political trigger. For the introduction of a cluster strategy in a given area, the trigger must develop a comprehensive policy suited to the specifics needs and wants. Doing so, the trigger would also apply new mechanisms to explore the actual capabilities of the location (even possible institutional failures). Because cluster approach is based on the synergic effect of cooperation of heterogeneous partners, the trigger has to design and complete a complex analysis in order to identify the range of interactions, evaluating their effect on the complete system⁹.

Affected by its dependence, the political trigger designs a policy draft where it identifies the main interest, strategy and tactical partners. As figure 3.1 suggests, local society requests motivate that the trigger take action and give the first steps for the creation of a cluster. These motivations (Nijkamp and Mills, 1987[155], Vol. I, pp. 1-17) are very complex and would be

⁹A trigger may influence the system in many different ways: constrains on households and enterprises, changing prices (with taxes and subsidies) or maintaing public goods. See Rémy Prud'homme, "Financing Urban public services", in Nijkamp and Mills, 1987[155], Vol. II, pp. 1179-1206.

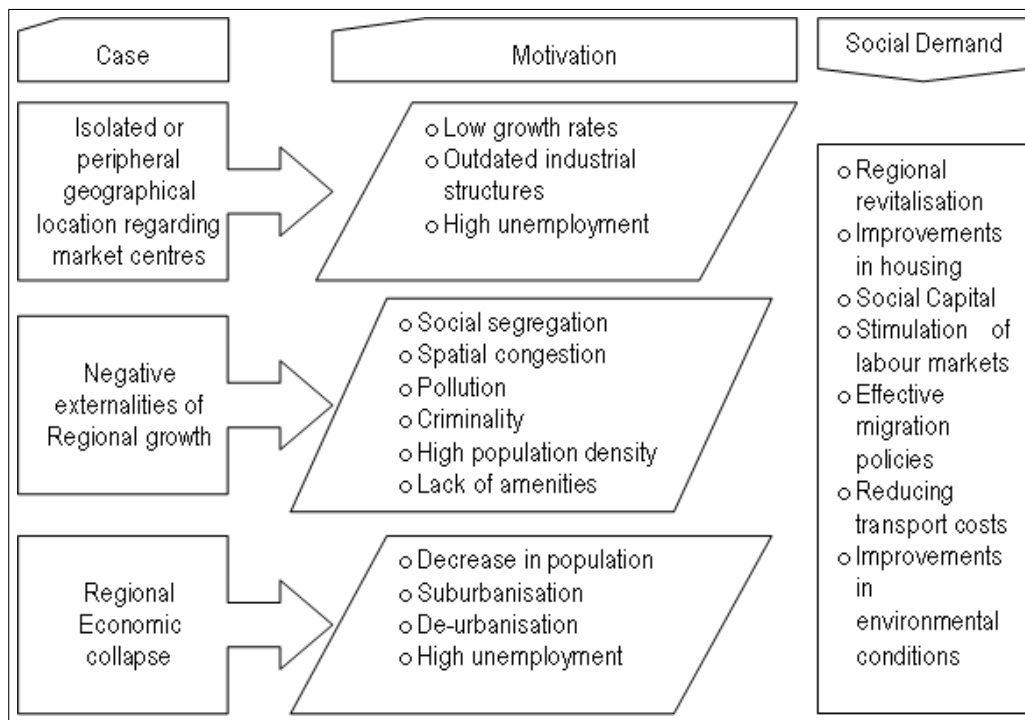


Figure 3.1: The motivations of the trigger

identify with the main interests of the cluster in order to design an effective strategy. As the figure shows, interest could go beyond economic issues affecting also socio-political ones. However, the model may integrate every issue assuming them like aspects of economic growth. Therefore, the cluster approach pursuing economic growth would sustain further social dimensions. In other words, the trigger should satisfy the social demands through its policy. This is the strategic goal of an applied cluster approach for the trigger.

After evaluating the social demands, the trigger needs to design the strategy to facilitate cluster's formation. The right strategy has also to match three requirements:

1. the trigger has to find partners with compatible goals and equal level of commitment with the region,
2. the trigger has to establish its own limits in order to dissociate itself from the system, not interfering in processes among partners,
3. even though achieving a full-operative system could take relatively long, the strategy must define a goal-oriented timeline with fixed characteristics that the cluster should possess in each life period.

The obtained strategy is a regionally adapted method for economic development. This means that, could be possible that successful plans in other regions are not possible to set out of its place of origin¹⁰.

Another element to consider is that investments in social capital may have a higher effect in regional growth than those directly spent in technological projects.

In relation to this, a study of the OECD¹¹ on learning regions gave the following conclusions:

1. the investment in secondary education in a region would have a higher effect in firms' competitiveness,

¹⁰In the same terms could be understood Vijay Vaitheeswaran and Iain Carson when criticizing EU officials *obsessed with creating geographic clusters like Silicon Valley (everywhere)*. See "The fading lustre of clusters", *The Economist*, The Economist Newspaper Ltd., London, 13 October 2007[239], p. 22.

¹¹"Achieving Sustainable Urban Development", OECD Territorial Outlook, OECD, Paris, 2001a, pp. 236-238[163].

2. regional output is not necessary higher if R&D and patents are supported instead of encouraging organizational innovations,
3. regional networks can improve the conditions for learning, lowering unemployment and social segregation and
4. an effective networking affects not only enterprises that undertake commercial venture but also non-commercial entities.

It is possible to add that open competition creates a vision of uncertainty that, however, may boost innovation and self-confidence in the participants. This spirit of leading edge allows the different agents to be flexible and resolute when dealing with change.

After designing the strategy, the trigger would focus on providing the system of the necessary factors. These factors include those tactical partners that would contribute for achieving the elements of the plan. The ensuing cluster of trigger and partners functions as a pole of growth or productivity core. This productive core would attract new subsidiary member directly related to the issue of specialization (suppliers) or providing auxiliary goods or services (housing, legal services, health care or leisure). Then, the productive core works as dynamic demand, generating needs with the increase of production or the use of new procedures for rising productivity.

In order to maintain the efficiency of the system, the trigger has to open ways of contact among the members of the cluster. The continuous communication increases the use of existing links and future interaction by adding new complementary methods of exchanging information between ac-

tors and even institutionalizing them. In this way, no actor can be isolated from others. Hence, communication is needed between actors to organize agendas and to distribute guidance.

In the resulting relationship, every actor is able to pursue its interest by accepting a particular role, defined by actual capabilities. Furthermore, their duties evolve according to the evolution of such capacities¹².

Afterwards, the trigger would accomplish and improve the acquisition of information. This information would be processed and shared with the other policy-partners. However, the trigger would need cooperation from others in this early stage because of the inability to meet the needs of evaluating the research strengths or trade competitiveness of a certain industry. This point is extremely important, because without an appropriate expert consultancy the trigger could take inadequate decisions leading to undesirable consequences.

The trigger is also responsible of the early stages of policy implementation.

Achieving the cluster

The cluster formation still needs to be accomplished. Two things happen at this stage. First, the existing participants are still coming together and cre-

¹²This is specially true for the trigger itself: *those entrusted with designing and implementing optimal incentives would themselves need the proper incentives so that [...] their "interests" would coincide with their "duties"* (Bowles, 2007[22], p. 14).

ating the different interrelations that will keep the cluster working effectively. Second, there is still a process of recruitment of new members in every field as the needs tend to be more specific and the role assignation more specialised. Then, the growing cluster attracts these partners by the double interaction of marketing efforts and deployed incentives¹³, both financial (tax incentives or capital aides) and non-financial (infrastructures or personal connection via sponsored events).

Having identified and attracted the policy partners, the trigger (alone or in cooperation with others) sets functions, defines responsibilities and distributes leadership. In order to do so, the trigger must count on “mobilising” or “catching” resources as partnership incentives (i. e., by using subsidies).

It is also vital to set up the first channels of partners’ communication, means that could be adapted and reoriented according to the requirements of the participants but which function is to keep unceasing exchanges (see figure 3.2). The trigger main effect would be to supplement the credibility of the erected associations out of their progressive place in institution.

Once the process has begun, local government counts on “leading” resources as support incentives to persuade policy participants (i. e., funding) or compelling tools to force certain actions (i. e., laws and regulations). Finally, local government is able to correct and balance the undesirable outcomes of the development process using public budget (i. e., for the con-

¹³In this sense, there is a wide range of policies considering the kind of incentive: moral, coercive or rewarding. In this document, the two last categories are clear. However, a moral incentive may have a great impact on the behaviour of individuals. External moral incentives like prestige, social recognition or public image are strong tools of social control (Noelle-Neumann, 1995[156]).

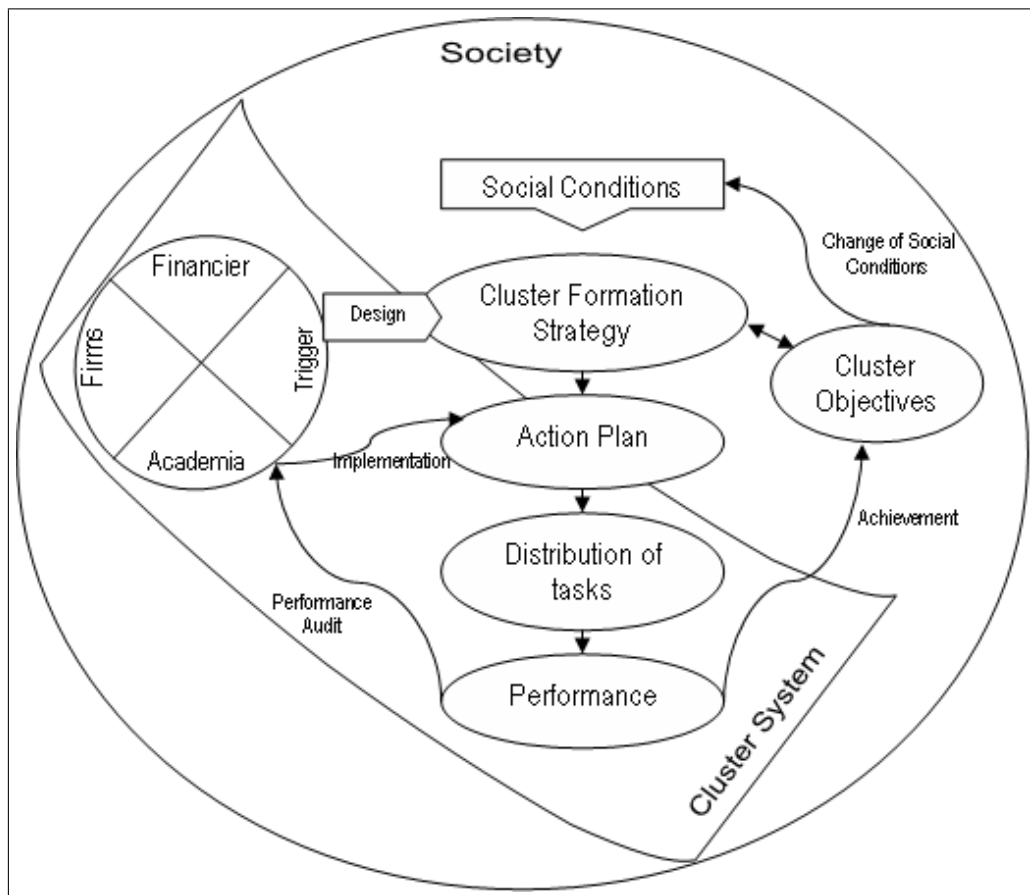


Figure 3.2: Managing the system

struction of infrastructures or giving subsidies) or arranging the legal system (i. e., laws to protect property rights and contracts or sensible tax policy). This point is important as the trigger may successfully influence the network preferences when they prescribe and enforce social norms (Rodríguez-Sickert, Guzmán and Cárdenas, 2006[200], p. 24).

The interaction of different actors gives rationality in decision-making. The applied policies tend to maximize goals in order to match the interest of dissimilar participants. In this situation, the assignment of roles trickles all the way down according each actor's virtues. Additionally, regulations are adapted to fit the specific objective.

In the stage of consolidating the cluster, the trigger should accomplish the strategy by helping partners to adapt to the new cooperative oriented environment. The trigger should also provide of means to acclimatise the behaviour of partners in this respect, making easier the access to updated tools and reinforcing again the linkage among participants.

Anyway, the trigger ought to keep conscious of the greater sharing responsibility for implementation between private and public sector. This phase is for correcting function's disorder. Therefore, it is vital to keep transparency, balance and reliability in the relation between trigger and counterparts, allowing the influence of the representative groups and undertaking monitoring duties.

Simultaneously, the task distribution and the continuous communication avoid interference, helping to organize agendas organising the way

factors are shared, pursuing integrated actions and, consequently, conducting the good use processes. In other words, there is a net of linkages yet not necessary formal. The aim of the second stage is to create a growth-enabling environment with self-sustainable capacities.

Finally, when the policy has shown its capability, actors concerns are to maintain policy and sustain goals. Hence, the role of the trigger at this stage focuses on efforts to continue institutionalising the net and updating a permanent set of instruments of controlling and administration.

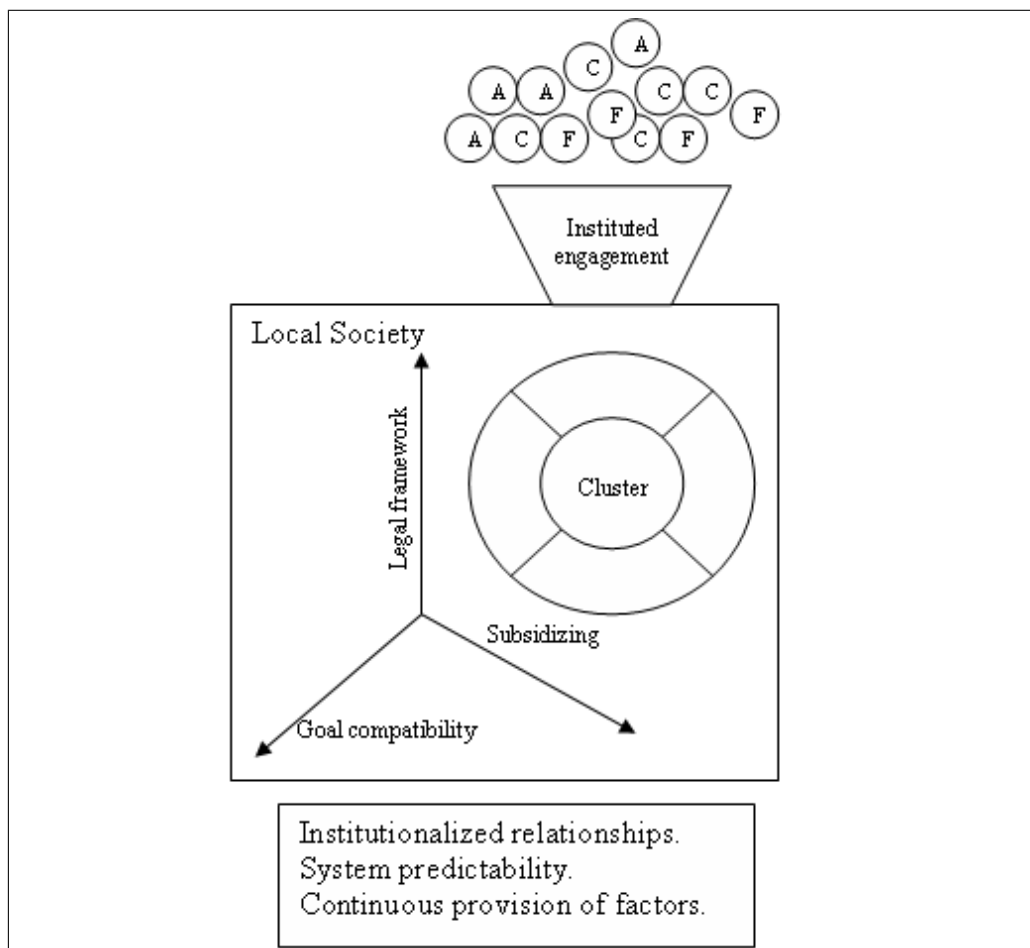


Figure 3.3: Institutionalizing the cluster

The figure 3.3 describes the late stage of the cluster approach. The cluster is already formed and working. However, in order to keep efficiency as a long lasting phenomenon, there are three obliged dimensions of behaviour for the cluster. First, it must be continuity in the goal compatibility. This means that the cluster has to satisfy the interest of every participant. The second dimension is subsidiary. Every member of the cluster has to be able to find a partner in the other members. For example, in case of firms, they would find the means that support productivity in the other actors as source of R&D, investment or legal support. This legal support appears also as the last dimension of the cluster.

The cluster enjoys a certain legal standard that protects participants and balances their influence within the net.

In conclusion, it is possible to anticipate that, in this model, the trigger plays a key role in the strategy design, recruitment of partners, role assignation and fellowship strengthening. It also has a key function in the redistribution of capital via taxation and subsidies. In addition, the specific nature of governments (medium term life cycle) allows balancing the effects of short-term crisis. For example, local governments can support main local groups (i. e., businesses) integrating short-term policies adapted to current issues and adding a relative certainty for management decisions.

3.2 The finance sector

3.2.1 What is financier?

A relevant development of the interaction between inter-governmental cooperation and private-public accompaniment would bring an interesting factor: financial sector.

As finance is describe the pool of capitalists that give monetary support for enterprises. There are *financial institutions* like banks, insurance companies or mutual funds. And we can consider also *financial markets* like bonds, stocks or foreign transfers. All this has an effect on the creation of a complex *financial system*. The manage the private supply of investment, providing pecuniary means for the creation, expansion or adaptation of businesses that, interested in increasing budget, offer profit opportunities.

Such system will have as primary economic function to hold deposits and to honor payments drawn upon them. As secondary functions, they lend money and hold government bonds. Finally, they hold savings or time deposits. As mentioned, banks are by no means the only financial institutions but they provide “Bank money” and give credits.

Normally, such element appears already integrated in a regional economic network and it would be organized as a standard firm. Such company may offer a product of a very specific kind but would manage itself with similar functional parameters. Nevertheless, in areas with little tradition or

development of formal financing or banking, venture capitalists act as informal financial suppliers. In addition, the cluster approach tries to boost the economic situation of a specific area because of the interaction of different agents.

These gain from the regional comparative advantage but in a way that may create new and untested procedures. Such trials generate a situation that offers speculative rewards but with an uncertainty cost too high to be assumed for a standard financial company. A venture capitalist would be integrated into the network because of the potential profits offered by relatively uncertain endeavours. Because of this, the description of the financier in the cluster approach will refer specifically to this kind. The sources of such private funding are various (see figure 3.4).

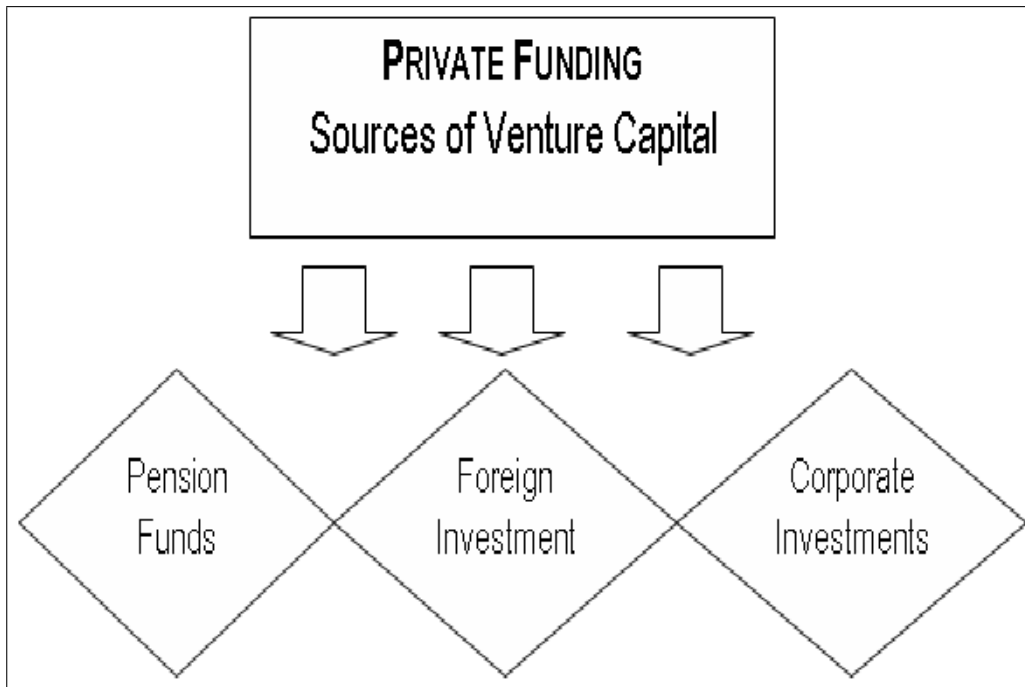


Figure 3.4: Informal financial suppliers

The most important one is pension funds. The reason of its relevance is that the finance intermediary has an investor's portfolio of many relatively patient, anonymous and unorganized clientele. Because of their size and lack of organization, these investors are not able to oppose their agent's actions and in many cases do not have enough background to discuss (or even understand) the basis of its decisions. There is, as well, a vital motivation for these investors: considering a troubled retirement time (due to the uncertain government pledge and low-rate saving accounts), it is easy to be convinced by a persuasive bank salesperson.

The second source of private funding is the foreign investment. This source is increasing. Foreign investors that want to gain the profits of a new market or to settle lately on it, lend to local firms. This solution has lower costs. Foreign investors save set up expenses and, at the same time, they prevent mismanagement cost resulting of the ignorance of local business culture. Moreover, borrowers could work as a source of contacts for the lender.

Finally, there are corporate investments. These are mediators between big corporations and emerging companies. However, as it was previously mentioned, big corporations emerge as venture capitalists, investing in their subsidiaries bypassing the service given by corporate investments. Because of the phenomenon, this kind of venture capitalists will decrease their importance and, finally, disappear.

3.2.2 What is venture capital?

Venture capital is a relatively new phenomenon in Europe. The long tradition on entrepreneur “Angels” in the United States did not have repercussion in our continent until the late eighties. The reasons could be both structural and psychological. Within the first, it can be found the existence of a strong public sector controlling the key activity sectors, also ingesting an important part of private business surplus via taxation.

Furthermore, there could be found undersized informal entrepreneur linkage and liaison and, additionally, the existence of public pension plans (whose relevance is mentioned below). Among the second group, we can identify an interest for security and tangibility that sacrificed the ambitious returns offered by perilous projects, but guaranteed certain benefits to the main economies of the continent¹⁴.

Whatever the cause, it is not until the 1990s that venture capital in Europe rises until a level that is considered “maniac” for some scholars¹⁵. This explosion was related to subsidies from European governments. In the minds of politicians appeared the promise of generating productivity that could be transformed in welfare gains for their voters. The model for such plans was the successful high-tech clusters in the United States. The European counterparts understood that venture capital provides of an efficient

¹⁴In this respect, Ian Percy, an international management consultant settled in Munich, remarked the importance of insurance companies in Germany in comparison with the minor role of Venture Capitalists. “Teameffektivität und Interkulturelle Kompetenzentwicklung”, Dresden, 03.06.2003.

¹⁵Andrea Schertler and Michael Stolpe, “Venture Mania in Europe: Its Causes and Consequences”, Kieler Diskussionbeiträge, Intitut für Weltwirtschaft, Kiel, February, 2000[212]

financing solution for the promising e-business companies. In the most feverous moments of the “e-economy” enthusiasm, politicians considered the up and coming branch as an everlasting source of work and wealth.

Another element is the so-called crisis of the welfare system. The unbearable deficit of an oversized public sector and the lessening working population (for the reduction of a progressively aging active population that at the same time delays the formation period) raise the alarm on public pension plans. Among the different suggestions, the European governments invite their citizens to contract private pension’s funds to financing companies. As a result, a massive amount of small customers’ savings was put in the hands of investors that at once fuelled the stock markets during the 1990s already excited about the emerging *dotcoms*.

Venture capital is related to diverse topics as pension fund investment, corporate finance, small business management, business incubators and so on. Hence, it is necessary to define what “venture capital” is. Traditionally, venture capital has been early stage financing for emerging private businesses. These could be young companies with little or no operating history, public companies in the process of going private and being momentarily illiquid, businesses in expansion or companies with difficulties to be valued by formal lenders (Schilit, 1991[213], pp. 34-37).

It is also possible to define venture capital according to the stage of help of financing. There are, for example, loans for market research or seed financing, credits for product design and development or start up financing and lending for product commercialisation or first stage financing. Moreover,

there is expansion financing for businesses that, planning the development of their core business, do not have their own financial resources to grow. Finally, there is financial help for restructuring companies that need support to succeed in their process.

Venture capital specialization

This means that there is a process toward specialization in venture capital investments. For that reason, it is possible to distinguish three patterns of specialization: by region, by industry and by stage of development.

The first group has two areas: reinforcement of location strategies and regional economic development. This means that investors, aware of the benefits of production cluster, tend to help emerging companies sharing business local specialization or those firms close to the venture capitalists themselves. At the end, the economic regional core includes its own source of venture capital as a continuous supply of investment. On the other hand, local actors, lacking of local economic development, act as catalysts to enhance economic growth.

The second kind of specialization has been by industry. This means that there are specific sectors more attractive for venture capitalists' money. Particularly, high-tech companies attract more easily such funds. In the case of computer-related firms, it is possible to see the emergence of software businesses, but at the same time the decline of computer hardware projects. Parallel, health care and biotechnology are important growing industries,

especially if there is a linkage between genetic research and pharmaceutical use. Then, telecommunications funding boomed after mobile phones appear, with a short period of deceleration coinciding with market saturation at the end of the 1990s and again a new period of expansion following the rumours of unlimited applications for the new generation of cell phones and computers microprocessors.

The third kind of specialization results from the different stages of financing mentioned above: seed capital, start up financing or expansion financing.

Typology of venture capitalist

Consequently, there are many kinds of venture capitalist (see figure 3.5). First, it is possible to recognise those private venture capital partnerships or firms organized as limited corporations to avoid corporate income tax. Normally, there is a main partner, which manages the partnership's investment portfolio and a huge group of small and passive investors. This group includes pension funds, foreign investors, corporations, banks, insurance companies and wealthy individuals.

Secondly, there are private small business investment companies that provide management assistance as well as financing to new businesses. Mutual guaranty agreements or partnerships of small businesses united to obtain loans are part of this group.

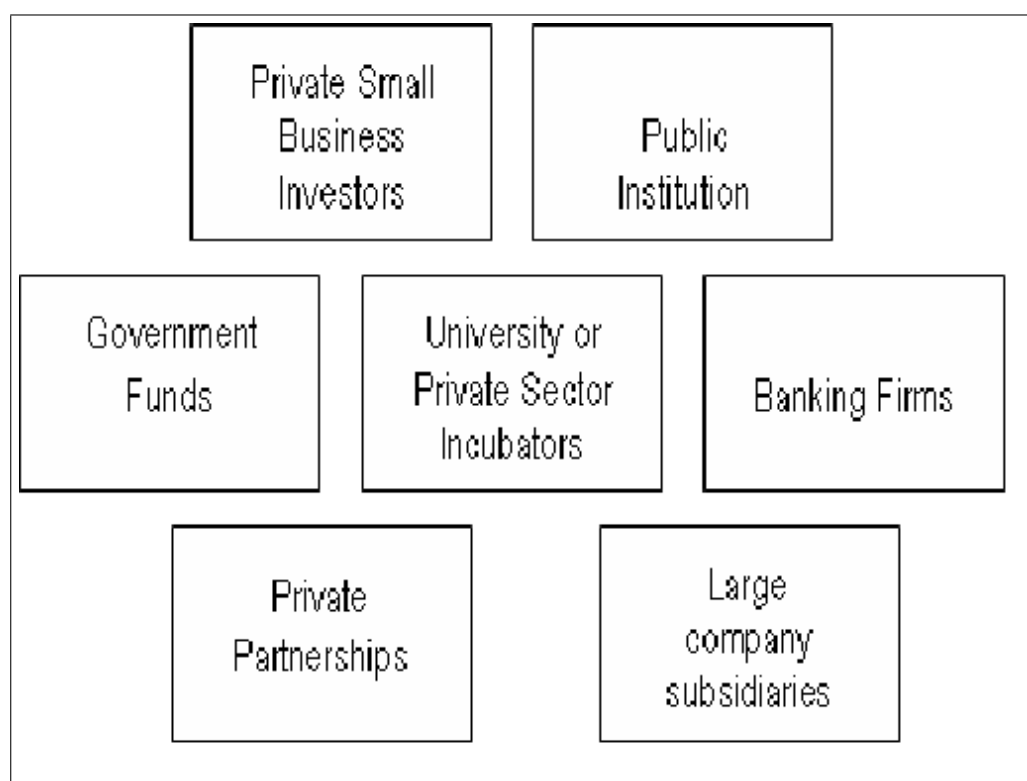


Figure 3.5: Typology of venture capital

Additionally, there are public venture capital institutions related to an economic sector. Normally, their intention is to maintain and expand the related activity providing subventions and counsel to their corresponding people.

Furthermore, there are venture capital subsidiaries of large corporations. This is when large corporations invest in smaller companies in addition to their own research and development (R&D) schemes. Nowadays, this is the main source of investment for small high-tech companies. The large partner considers not only the financial returns. They obtain cheaper solutions to develop technology patents (they save, among others, management expenditures), certain suppliers and direct access to the generated knowledge. On the other hand, the emerging company obtains an established customer, additional capital and credibility toward other financial sources.

In addition, there are government venture capital funds. This support can be direct when governments involve themselves financially to support specific programs. Besides, the government can provide tax incentives to private investors. In this case, governments embrace indirectly business ventures.

As well, there are university-related or private sector incubators. This recent development affects specially to technology ventures. The key of its success is that the university provides relatively low-cost (because its own sources of financial support) location, equipment, brains and contacts with government officials, bankers or selected entrepreneurs. Moreover, the university gives automatically an appearance of distinction and reputation to the developed product, very convenient for the prospect commercialisation.

Finally, there is investment from banking firms. They are companies that arrange financing deals with emerging business (Schilit, 1991[213], pp. 64-76).

3.2.3 The motivation of finance

Although it may be often considered a risked decision, the financier will decide to invest if there are enough elements that suggest the possibility of profits. These elements are very heterogeneous and based frequently in expectation created by the use of a certain technology or the validity of a legal framework. The trigger may influence such influence by enhancing the confidence of the financier with political measures affecting public expenditure, taxation, money supply or property rights. The mean could also be indirect like, for example, politics aimed at increasing employment and regional productivity that may induce a higher level of investment.

It is important to maintain a level of predictability on the system. Then, once a process is begun might be desirable not to disturb the interaction between the different participants with redefinitions of the final goal inducing unreliability¹⁶.

¹⁶A strategy may be adapted to changing circumstances but remembering that in every new process that implies reform of existing situation, quite often there is certain opposition that need to be broken. This phenomenon is a kind of inertial resistance. Changing the speed or direction of an object implies the use of a certain force proportional to the required effect. In this sense, every strategy consists of tactical stages, effective steps bringing the whole to the desirable outcome. Therefore, the importance of establishing realistic goals.

An approach to venture capital motivation

The behaviour of venture capitalists has a dual motivation: get profits and minimize risks. The combination of both elements defines a complete philosophy common to many people.

In a technological cluster, it is possible to identify several elements that illustrate a perfect scenario for the rise of venture capital:

1. the actual existence of a settlement of high-tech firms motivates the investment of venture capitalist;
2. the presence of academia, which could act as a project incubator, creates demand of venture capital services;
3. the trigger, as the group of highly motivated and influential politicians convinced of their role as development catalysts, could reduce the uncertainty of venture capitalist investments; and
4. the privileged geographical situation that originates the cluster and the progressive openness to the transfer of factors, allows the venture capitalist to take swift measures.

The financier gives the financial support to the new company. Additionally, it could be involved directly in management compensating entrepreneur lack of experience.

The study of the venture capital has shown three main concerns:

the investment decision-making behaviour of venture capitalist, the performance of venture capital portfolios and the availability of venture capital¹⁷. Nonetheless, there are new fields of research related to location studies, market organization, market specialization and economic impact.

Another element that attracts venture funding is the higher rate of revenue growth of successful emerging companies. They reinvest large amounts of capital to R&D and they are specially export oriented. Because of their rapid expansion, they generate many new employment opportunities and boost the growth of related businesses (goods suppliers, services suppliers or housing).

Moreover, the improvement of venture capitalists' sense of smell to lucrative projects motivates the hunt for profitable returns in more business enterprises.

3.2.4 The role of financier

The financier function is to give answer to two different kinds of needs. First, a company needs financial support for any of its development stages. Secondly, in some cases, company requires management support. Both needs are satisfied in the cluster approach for a private agent. This does not mean that a public agent depending on the political trigger may not give support in these areas. Nevertheless, according to the suggested scheme this function ought to be undertaken by a non-politically oriented body. The cluster ap-

¹⁷Milford B. Green, *Venture Capital. International comparisons*, Routledge, London, 1991 [78].

proach considers the possibility of distinctions between the individual logic of an economic and a political being.

The financier would also collect information about the specific company, the market and product possibilities. Nevertheless, in areas with little tradition or development of formal financing or banking, Venture Capitalists acts as informal financial suppliers.

The role of venture capitalist

The different literature reviewed about the role of Venture Capitalists has a common conclusion: Venture Capitalists act as quality providers for a new firm.

The idea is that new companies have two different kinds of needs. First, they need financial support for any of the development stages. The amount of this financial support could vary depending if there is seed financing or investment for a market growth development. Secondly, the new company requires another kind of support responsible of added value: management support. As new comers, the young entrepreneur does not have enough experience to develop successfully its innovative idea in managerial terms. When Venture Capitalists financially support the new company, could be involved directly compensating entrepreneur lack of experience. The idea behind is the interest to obtain returns of the investment.

Venture Capitalists collect information about a candidate company,

the market and product possibilities. These elements help the inexperienced entrepreneur to define better the business plan, as well as, designing management structure, setting strategies and further development plans. Then, Venture Capitalists monitor new firm's behaviour. In order to keep a successful performance Venture Capitalists offer continuous advice and transferring up-to-date information and management policy. This factor could include the selection of executives to complete firm needs.

This non-financial support could be considered quality elements of Venture Capitalist's aid. The article of Kaplan and Strömberg¹⁸ and the article of Hellmann and Puri¹⁹ define this aspect of Venture Capitalists role. Thomas Hellmann and Manju Puri describe the function of Venture Capitalists, beyond the traditional roles of financial intermediaries, establishing the professional of start up companies. To attract venture capital, the candidate must take certain organizational steps regarding human resource policies, stock option plans or sales and marketing.

Once the aid is obtained, Venture Capitalists could change the structure of the executive board with independent members of proven experience. Traditionally, academic literature documents that financial intermediaries play a monitoring role, gathering information about individual firms. Hellmann and Puri consider that investors can play a much larger role. For example, investors may gather information not merely about firms, but also

¹⁸Steven N. Kaplan and Per Strömberg, "Venture Capitalists As Principals: Contracting, Screening and Monitoring", Graduate School of Business, University of Chicago, 2000[94]; Steven N. Kaplan and Per Strömberg, "Financial Contracting Theory Meets the Real World: An Empirical Analysis of Venture Capital Contracts", March 2000[95]

¹⁹Hellmann, Thomas and Puri, Manju, "Venture Capital and the Professionalization of start up Firms: Empirical Evidence", The Journal of Finance, Vol. LVII, No.1, Feb.2002[84]

for firms. This support is aimed at increasing the value of the firm.

Kaplan and Strömberg go a step ahead considering the interrelation between the traditional funding and monitoring management, finding management and providing advice. The article also shows the effectiveness of such tools. For example, by shaping and recruiting the senior management team, the Venture Capitalists reduce the risks of high monitoring costs or involvement costs.

Keuschnigg's articles²⁰ and Keuschnigg and Nielsen²¹ include these aspects for the European case.

At first, the authors suggests the need for an active research environment and its connection with innovation based new firms. As important result the suggestion that an optimal policy consists of the combination of public support to R&D, revenues subsidies that incentive new ventures and flexible relationship between Venture Capitalists and firms.

Nevertheless, some of the popular policy measures often proposed by governments do no support this model. For example, research grants to encourage new entrepreneurs and they expand the Venture Capitalists sector.

²⁰Keuschnigg, Christian, "Rationalization and specialization in start up investment", Universität St. Gallen, CESifo, December, 2001[99]; "Venture Capital backed growth", *Journal of Economic growth*, 9, Kluwer Academic Publishers, 2004, pp. 239-261[101]; "Optimal Public Policy For Venture Capital Backed innovation", Discussion paper no.2003-09, March 2003[100]

²¹Keuschnigg, Christian and Nielsen, Soren Bo, "Taxes and Venture Capital Support", *European Finance Review* 7, Kluwer Academic Publishers, 2003, pp. 515-539[105]; "start ups, Venture Capitalists and the Capital Gains Tax", Universität St. Gallen, Discussion paper no.2002-05, February 2002[104]; "Tax policy, venture capital and entrepreneurship", *Journal of Public Economics*, No.87, 2002, pp. 175-203[103]

However, the variety of new firms develop do not assure success in every case unless, there are incentives for Venture Capitalists to monitor and control the new entrepreneurs performance.

Moreover, in other article, the author considers proven the contribution of Venture Capitalists for enhancing the professionalism and growth of young innovative firms in America. This role has been recognised by European politicians and scholars. Nonetheless, the author affirms that the American venture capital model is not easily applicable to Europe. Despite huge funding and enthusiasm, these investments are not as productive as expected. Comparing different companies according to their financial investment (venture capitalist or not) there is no difference in performance. The key point is not the amount of money invested but the quality of the venture investment itself. Meaning that the crucial role of venture capitalist is based on the added value that they provide to their young firms.

This add value consist in the management expertise that the venture capitalist could offer to compensate the inexperience of the new firm. Nevertheless, this input is not defined with precision and affect the sharing of returns. This point determines the reluctance of Venture Capitalists to get involved in new firm management.

In order to promote quality in venture investment the paper examines the role of taxation as an incentive for such commitment. However, considering the difficulty to calculate the cost of management input, the policies aimed at subsidizing investment have a limited success and at the same time taxes to benefit gain work as barriers for management involve-

ment. Keuschnigg affirms that this kind of tax, whatever its size is, affect negatively to management support. The proposal is to focus on start up investment cost and then the venture capitalist must involve itself more in management advice to obtain a profitable return.

Finally, Schertler and Stolpe[212] study the policy implication of venture capitalist, i. e. : the effect of investment in software or biotechnology in related fields.

The articles considered have shown the potential of Venture Capitalists to overcome their traditional role of funding suppliers, developing relations with their venture companies that are more active. The idea behind is that in the minds of Venture Capitalists appears the interest of maximize their investments revenues. Because of this, they focus more in to generate value in the new firm than in reducing cost. In order to increase gains, Venture Capitalists would get involved in the decision making of the company, bringing support for managerial strategies, sharing information and conducting further development steps.

Nevertheless, this aspect is underdeveloped in Europe because of the excessive weight of taxation. Reforming tax policies, especially those affecting capital gains, governments will improve the performance of innovative companies by supporting the assistance of senior capitalist to their junior counterparts.

3.3 The firm

3.3.1 What is an entrepreneur?

An entrepreneur is a person who undertakes commercial ventures. This person assumes the responsibility but, also, the implicit risk of a business in order to obtain a benefit. The entrepreneur would decide what to produce selecting and using different factors available. Furthermore, the entrepreneur acts unaided meaning that if the venture succeeds the person obtains benefits otherwise would assume loses.

In the cluster approach, entrepreneurship is use indistinctively to describe the individuals o groups that take part in a mercantile project. The entrepreneurship will produce certain goods in order to obtain a benefit after commercialising them. This benefit will be the difference between total revenues and total cost.

The entrepreneur should behave in order to maximize profits. Considering the profit equation²²:

$$\Pi = R - C$$

²²An alternative formula could be found in Varian, Hal R., *Intermediate Micro Economics: a Modern Approach* Norton & Company, New York, 2006 (1987)[241], pp. 334-335. Considering that a firm produces n outputs (y_1, \dots, y_n) and uses m inputs (x_1, \dots, x_m) and including the prices of the output goods ((p_1, \dots, p_n)) and the prices of the inputs ((w_1, \dots, w_n)), then the profit, π , can be expressed as:

$$\pi = \sum_{i=1}^n p_i y_i - \sum_{i=1}^m w_i x_i$$

The first term is the *revenue* and the second term is the *cost*

Or extended:

$$\Pi = (p_x \times Q_x) - (FC + Q_x \times VC)$$

Where:

- $\Pi = Profit.$
- $R = Total\ Revenue.$
- $C = Total\ cost.$
- $p_x = price\ unit\ good\ X.$
- $Q_x = quantity\ units\ good\ X.$
- $FC = Fixed\ costs.$
- $VC = Variable\ costs.$

In order for the company to improve its profitability, management needs to increase revenues and/or decrease costs. Considering these two sides of the equation, an entrepreneur will increase such benefit if, for example, is possible to answer affirmatively to the following questions (and may be not the only ones to be asked):

- Could the firm increase prices?
- Could the firm sell more units of good?
- Are there other creative ways to grow revenue?
- Could the firm decrease fixed cost?

- Could the firm reduce the quantity of factors use without affecting negatively quantity or quality of production?

Any change in the way the good is produced resulting of an affirmative answer would be a technological innovation. The interest in answering always affirmatively to question of the same kind would motivate entrepreneurship to participate in a cluster.

An entrepreneur will appear if there are conditions for existence. This circumstances are mostly legal (protection of private property or formal ways of commercial exchange) besides psychological or sociological conditions. For example, if It is recognisable a certain social status of entrepreneurship or, basically, an open gate for private endeavour in the host society. This path is based on the reputation that this human undertaking holds in the social collective. Anyway, such activity could be as well the result of necessity in depressed economies when the limited possibilities of employment compel individuals to turn into self-employed.

Then, it may be assumed that entrepreneurship is a result of the cultural conditions of a community that encourages personal endeavour with the social recognition of self-made man or woman. The success of a entrepreneur depends on the capability in identifying profitable opportunities as an exercise to integrate information from different sources. Thus, the entrepreneur-innovator synthesizes technical information, with market information and the analysis of suitable factors.

What is a high-tech firm?

The last quarter of the 20th Century could be described as the time when high technology (high-tech) has taken a great importance in the core of modern Economy. High-tech encourages economic development and progress by expanding markets, reducing transactions costs, enhancing productivity and increasing economic welfare.

The term high-tech firm evokes miscellanea of computing, engineering, manufacturing or pharmaceutical companies that dwell on the tops of technological innovation. The common denominator of all is the importance of a highly skilled labour as capital asset, its high productivity and the increasing returns to scale.

The increasing returns to scale refer to the assumption that average cost of production tends to decrease with every new unit produced because decreasing marginal cost. This means that total costs to produce the first unit of a product are higher than the total cost of the second unit and so on. This term refers to the resulting phenomenon of mass production, with homogeneous final products and unvarying fixed costs.

Research and development, the frequent acronym R&D, link with this kind of a high-tech company as the major means to determine its high productivity and the increasing returns to scale. The investment in R&D is the use of resources for the deliberate discovery of new information and ways of doing things, together with the application of that information in inventing new products or processes. R&D has an increasing importance especially

since certain scientific advances in technology and methods become more intense as industrial products. This last aspect will refer to the formal application of a brand new machine or system result of creativity and technical expertise of highly specialised individuals. Then, academia would be the field for such players.

In this sense, it may be possible to differentiate between such invention and innovation, understanding this as the change in the use of the productive means that enhances the quality of the good produced or increases its amount.

Thus, technological innovation is a key element for economic growth because accomplish the effect of capital and labour. This portion of economic growth is known as the “Solow residual”²³.

However, technological innovation for an economist’s point of view is not only applied science but also any change in the relationship between inputs and outputs (Krugman, 1991, p. 195[112]).

Consequently, technological innovation is suitable to economic use only if it increases efficiency in the use of factors. Nevertheless, economic efficiency is measured not by the relationship between the physical quantities of ends and means, but by the relationship between the value of the ends and the value of the means.

²³Robert Solow, “Technical Change and the Aggregate Production Function”, *Review of Economics and Statistics* 39, August, 1957, pp. 312-20. *Concise Encyclopedia of Economics*. David R. Henderson (Ed.). Liberty Fund, Inc. <http://www.econlib.org>[225]

Joseph A. Schumpeter argued that the creative destruction of obsolete technologies, skills and equipment causes continuous progress and improved standards of living, for example, with constant increases in the effective stocks of finite resources like energy or raw materials²⁴. The search of this productive efficiency defines the role of a successful entrepreneur.

3.3.2 Firms motivation

competition is increasingly crossing borders. However, location still matters, with the most successful competitors in an industry often based on the same few geographic areas. companies must harness the advantages of locations but compete with a regional or global strategy. These agents appear concentrated in certain regions to benefit from the advantages of allocation. With this scenario and following a *Ricardian* model, the regions tend to export goods in which they have comparative advantage.

Companies would come to a cluster because of the existing advantages derived from goal synchrony with political actors. In addition, firms may consider also the advantage of a research centre. This is a source of qualified workers and a possibility to share research and development costs²⁵. Moreover, the cluster would be for entrepreneurs a mean of minimizing the costs

²⁴It is necessary to be mentioned that Schumpeter modifies such interpretation in Joseph A. Schumpeter, *Capitalism, Socialism and Democracy*, George Allen & Unwin Ltd., London, 1943[214], pp. 131-134 wherein he suggests that entrepreneurs' social function may lose importance because of the progress of technological change become depersonalized as a routine of trained specialists. Therefore, the process of creative destruction occurs outside of entrepreneurial action. The role of the entrepreneur would be then to exploit the profit opportunities, getting things done.

²⁵Relative trained individuals, with their own laboratories and material, paid with public money or which scholarship or financing, given by companies, have public incentives.

of transport and communications. Also, once the localisation²⁶ process has finished, the company can enjoy the derived externalities (i. e., reduction of supply cost). Finally, the entrepreneur could be interested in the financial possibilities existing in the location.

In any case, the progressive specialization has a positive effect in location or the regional placement of specialized activities. The access to more information enhances competition and undistorted markets.

It is especially relevant the use and sharing of information because of the expansion of communication network. This allows the knowledge exchange, the reduction of transmission time and the use and analysis of a more complex information sources.

3.3.3 The role of businesses

At first, companies demand workers or the service of other companies (with their own workers) or institutions when they go through a process of expansion. In this way, they are able to spread the effect of economic growth reducing unemployment or increasing salaries in the region where they are settled. This factor can be considered as a way to distribute purchase capacity. Additionally, a company acts as a tax collection unit for the local government because of the social insurance of every worker employed and, at the same time, it increases the group of income taxpayers.

²⁶An analysis for firms agglomeration in Pontes and Barr, 2005[185].

Nonetheless, it should be emphasised the role of entrepreneurs as a source of innovation and, thus, a basic actor to enhance the prosperity of an area by improving the efficiency of the resources in use. Schumpeter underlined such vital stimuli for investment and innovation and thus, to enhance prosperity.

Moreover, entrepreneurship enables the economy to adapt to changing conditions and new possibilities for material improvements by creating new production organizations. Doing so, entrepreneurship gives a flexible framework for development able to adapt its behaviour to environmental or knowledge changes. In addition, the entrepreneur innovates not only by introducing new products organization or processes (or identifying new customers and suppliers), but also by allocating factors.

Entrepreneurship in the cluster approach plays another crucial role as a source of knowledge. Firms' acquaintance of markets and the understanding of market needs are basic elements to assure the cluster success. In this sense, companies act as linkage between market and factors of production. The effectiveness of these is based on the actual needs of the market. In other words, no other entity is able to recognize demand so precisely.

3.4 Academia

3.4.1 What is the meaning of academia?

As academia, is understood the group of educational institutions that provide highly educated people, supportive knowledge and research and a source of highly qualified workers for companies. These elements assure to the business cycle a constant supply of highly skilled workers and virtually inexpensive for companies because of their training costs are afforded by academia itself or local government.

The main body of academia is university, considered as the highest educational institution but there would also be research centers and other organization that teaches or does research. Research might be both basic and applied. basic research would be the investigations usually aimed at a broad goal that represents a limit of knowledge in a certain area.

Applied research would bring the findings of basic research to a point where they can be industrially exploited in order to satisfy a specific need.

Then, it is possible to contrast the notion of research with the concept of development. Such stage, of the research and development process, would refer then to the steps necessary for bringing a new or modified product or process into production. Then, a member of academia may operate in any of these stages providing a range of opportunity for entrepreneurship, discounting to some extent the own development costs of a firm.

3.4.2 The motivation of academia

University cooperates because can ensure its survival as well as possible prestige derived from its liaison with local government or well-known corporations. In return, it adjusts research and teaching plans to the actual needs of private sector.

Research centers can improve a given situation by subsidising the work of previous companies or creating start ups that fulfil a certain production need or take advantage of a non-applied innovation. Doing so, they embrace the exact definition of the entrepreneur-innovator that expands productivity giving ground for economic development and widespread welfare.

The idea is that academia embraces the competitive goals of entrepreneurship in order to sustain its methodical excellence. The way is to avoid the temptation of generate a bureaucratic organization. Such system may create powerful and advantageous structures for dealing efficiently and effectively with routine, recurring problems in a fairly stable and predictable environment.

On the other hand, scientific knowledge goes beyond the sole accumulation of routines. A scientist would not be only a kind of erudite that accumulates information as knowledge but, also, a thinker that adjusts a given intellectual capacity focusing on understanding phenomena through the validation of experience. Such orientation tries to expand and apply the rational predictability of events in a world rich in uncertain circumstances.

The bureaucratic temptation would refer then to a situation where professional scholars are recruited and promoted based mainly on educational credentials and seniority. Such individuals would be protected by personnel practices designed to provide a high degree of job security if prescribed procedures are formally maintained (Johnson, 2005[93]).

Because of the promotion prospects would seldom depend on measurable success or efficiency, it might be possible a reorientation of the individual interest, different from what supposedly was asked to accomplish. In other words, a bureaucratic organization of academia might generate massive institutions with an ineffective relation between the resources and their results, in terms of educational and research standards.

3.4.3 The role of academia

Academia plays a dual role. At first, an academic centre provides education and training with different levels of qualification and expertise. This means that it creates the conditions for a constant supply of skilled individuals according to the needs, actual or potential, of industry. Alternatively, it also holds a pool of highly specialised individuals whose creativity and scientific expertise allow the development of brand new technical devices or systems that may be formally applied in industry.

Both elements may efficiently been combined creating an. Such active research environment is also an important precondition for the supply of high quality entrepreneurs and the contribution of new firms to innovation.

This is because research centers may improve a given situation by subsidising the work of previous companies or creating start ups that fulfil a certain production need or take advantage of a non-applied innovation.

Academic research on technology

As mentioned, the success of entrepreneur depends on the capability in identifying profitable opportunities as an exercise to integrate information from different sources. Thus, the entrepreneur-innovator synthesizes technical information, with market information and the analysis of suitable factors.

Accordingly, universities could act as incubators for new entrepreneurs because of the combination of good education and its role as a social institution. Indeed, universities can behave as a meeting place for entrepreneurs, key information suppliers and financial helpers and as providers of exceptionally inexpensive factors like labour or capital. This recent development affects specially to technology ventures.

The key of its success is that the university provides relatively low-cost (because its own sources of financial support) location, equipment, brains and contacts with government officials, bankers or selected entrepreneurs. Moreover, the university gives automatically an appearance of distinction and reputation to the developed product, very convenient for the prospect commercialisation.

What is a spin of firm?

A spin off company is a new business unit, which originates its mercantile activities from the application of equipment and knowledge developed by an academic research program. Then, a spin off is a start up company organized by individuals who had a combination of technical skills or, in other words, a high-tech firm, which enjoys a remarkable importance of highly skilled labour.

The process leading to its formation may take many forms. Acceptable models include the creation of a new company or modification of an existing company or bundling of existing companies for the purpose of creating the commercial vehicle through which certain technology is developed and licensed. This commercial activity may be in collaboration with other organizations.

This background allows a more intense use of scientific resources and methods for the deliberate discovery of new information and ways of doing things together with the application of that information in inventing new industrial products or processes.

Elements of successful spin off

The first idea is that a successful spin off must be founded on outstanding research. The proficiency level of the research centre should gain not only expertise but also leading characteristics in the specific field. In this way,

the spin off is a direct source of innovation, assuring competitiveness and reducing the dependence of process suppliers.

If a research centre may be defined as a pioneer in a certain field, it is understandable the need for the creation of a spin off because of the deficient production practice and the existence of an opportunity niche that compensate entrepreneur lack of experience or funds.

However, when the research has been already applied, there is a shorter time to enjoy a leading position (because of the assumption that companies are already familiarised with the processes that create the innovation) and it is plausible to get sponsor of pre-existing companies de-motivating the foundation of a new firm.

Another element to obtain success is the existence of a liaison with the industry or a channel to transfer the resulting technology. A successful spin off must hold entrepreneurial drive. Therefore, an inexperienced entrepreneur needs to be able to obtain know how and take benefit from experienced counterparts.

This add value consist in the management acquaintance that an extra agent could offer to compensate the inexperience of the new firm. The academic centre could support this system with university-companies co-operation programs (that could offer tuition or scholarship) or keeping an information board for new entrepreneurs.

This will help the new entrepreneur with the processes to register the

intellectual property at the very earliest stages, seeking financial support or advising for the effective commercialisation process or the design of business planning.

In order to maintain the compatibility between academic and entrepreneur interest is necessary that any relationship includes clear policies to resolve conflict of interests. Otherwise, is not likely that the university would cooperate consciously launching a new venture.

Finally, the creation of a spin off is also dependent on enough seed funds. The spin off must reduce its creation and early life costs benefiting from university equipment or attracting a sufficient amount of investment to support its early stages. These financial gains can be direct, via monetary investment or indirect, sponsoring a service.

Christian Keuschnigg(Keuschnigg, 2003[100]) suggests that new firms based on active research environment connected with technological innovation could also attract financial support if there is an optimal policy consisting of combination of public support to R&D, revenues subsidies that incentive new ventures and flexible relationship between venture capital (VC) and firms. The quality in venture investment would be related to the way that the investor involves itself more in management advice to obtain a profitable return. Consequently, a prestigious research environment that is publicly supported, brings a form of security for investors on innovation-based new firms.

The economics of research specialization

Another element to take into consideration for the creation of start up companies in an academic environment is the process toward specialization (Green, 1991 [78]).

This specialization can be regional when the existence of a prestigious research centre reinforces the location strategies of related businesses making public aware of its importance as source of regional economic development. This means that investors, aware of the benefits of production cluster, tend to help emerging companies sharing business local specialization or those firms close to the research centers themselves. At the end, the economic regional core includes its own source of venture capital as a continuous supply of investment.

The second kind of specialization has been by industry. This means that there are specific sectors more attractive for investors' money. Particularly, high-tech companies attract more easily such funds. In the case of computer-related firms, it is possible to see the emergence of software businesses, but at the same time the decline of computer hardware projects.

Simultaneously, health care and biotechnology are important growing industries, especially if there is a linkage between genetic research and pharmaceutical use. Then, telecommunications funding boomed after mobile phones appear, with a short period of deceleration coinciding with market saturation at the end of the 1990s and again a new period of expansion following the rumours of unlimited applications for the new generation of cell

phones and computers microprocessors.

All these sectors are directly linked to up-to-date scientific progress and their success depends on the ability and swiftness to transfer the discovered resources to industrial production. This interest enhances the relationship and communication between academic and entrepreneurial spheres. entrepreneur leads the allocation of resources during the course of growth and development. By considering economic efficiency, decisions on whether a new product or process will be introduced must be made.

However, the entrepreneur can benefit from the support of the academic centre, subsidising the cost of R&D with its public support. With the transfer of technology and the resulting transmission of innovations from university research to production, entrepreneurs develop business and enhance economic diversification.

If a university department developed technology likely of having a commercial application or business potential, it may be transferred via a license of the intellectual asset to an existing company. However, for a variety of reasons, including the lack of a receptor company, the commercialization route may begin with the formation of a new spin off company, which, via a license agreement or assignment of the technology from the university, becomes the receptor.

3.5 All together now

This chapter has introduced the relevant actors of the Cluster Approach as a model of development. As it can be seen in figure 3.6, the cluster approach needs of the interaction of four parts: the trigger, the financier, the firms and academia. Every single actor provides a service for the support of the cluster.

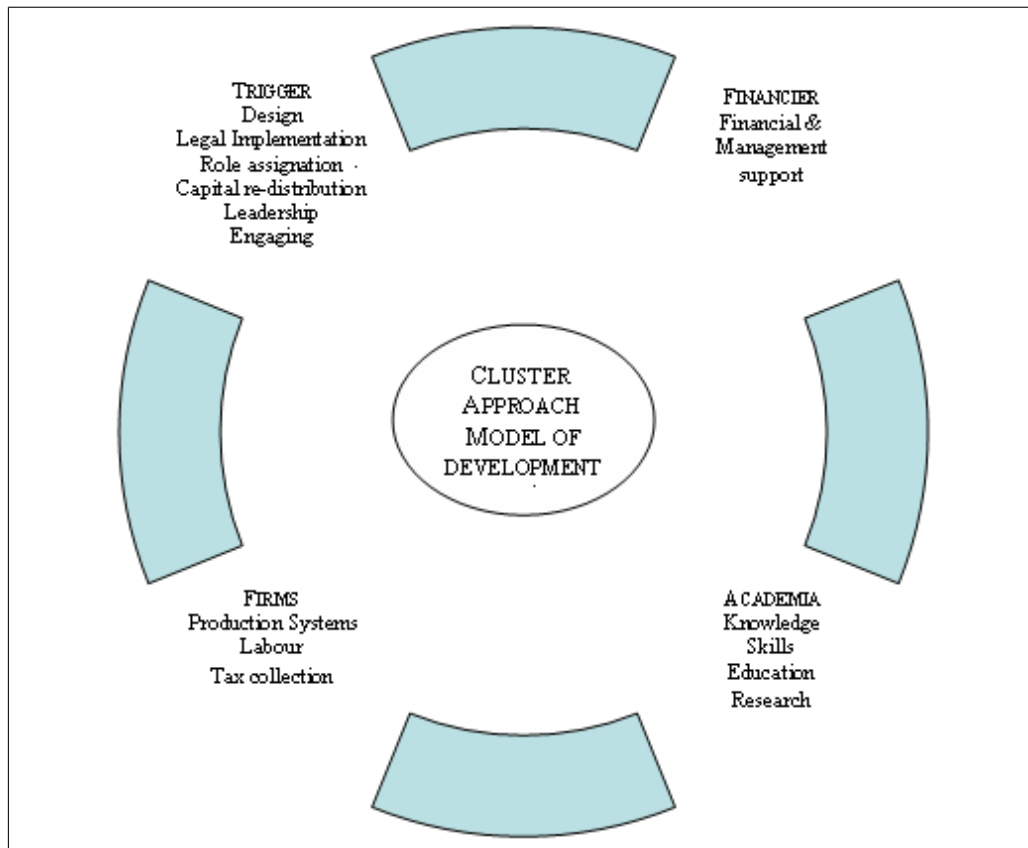


Figure 3.6: The functioning actors

In the first moment, there is an actor considered. The “policy trigger” has particular interests or needs that it is not able to fulfil without

other players' cooperation. Affected by this dependence, the *trigger* designs a policy draft where it identifies the main interest, strategy and tactical partners. The second step of the trigger would be to attract policy participants. To do so, the trigger must count on "mobilising" or "catching" resources as cooperation incentives. Having identified and attracted the policy partners, the trigger (alone or in cooperation with others) sets functions, defines responsibilities and distributes leadership.

The task distribution determines continuous communication among actors to avoid interference organize agendas, share factors, integrate actions and make good use processes. In other words, there is a net of linkages yet not necessary formal. The aim is to create a growth-enabling environment with self-sustainable capacities. Actors concerns are to maintain policy and sustain goals. This will allow economic development as a long-lasting phenomenon.

The effort to develop such cluster policy depends on several elements. The existence of previous partners in the area or the need to attract them, the cooperative tradition in the region and previous cooperation barriers are example of such basics. These aspects will determine the effort and resource expenses of the trigger. The relative distance from main industrial axis or transport channels determines focusing on non-traditional fields such as heavy industry.

The motivations are heterogeneous but compatible. Hence, companies come considering the advantages derived from goal synchrony with political actors as well as the advantage of an investigation centre, source of qualified

workers and able to share research and development costs. Moreover, as a consequence of the cluster range of linkages, academic centers can ensure their survival as well as possible prestige derived from the liaison with well-known corporations. A relevant development of this interaction between inter-governmental cooperation and private-public accompaniment would bring a last factor: finance.

The continuous communication increases the efficiency of existing links and future interaction by adding new complementary methods of exchanging information between actors and even institutionalizing them. In this way, no actor can be isolated from others. In a growth-enabling environment, every actor gains a certain level of predictability and certainty in partners support. Hence, communication is needed between actors to organize agendas and to distribute leadership.

Finally, by keeping the mutual assistance, different actors establish certainty about future that allows more ambitious but hazardous plans. The reason is that every actor relies on the bond among cluster members, secure of their aid and support in case of transitory troubles. This support can be financial, political or social (i. e., by leading public opinion). In this way, there is no a pure definition of an actor according to their functionality because of the intimate relationship created.

Chapter 4

The political trigger

In the previous chapter, the reader could get a description of the main actors of the cluster approach according to their function and motivation. This chapter will describe more specifically what could be defined as the main agent of the cluster approach considering its role as initiator and motivator of the other participants. This agent is the trigger¹. The *trigger* would be the initiator of the clustering process.

For doing so, the agent that has to performance such a role, has to be able to create the necessary synergy among local production factors (i. e. knowledge or capital) and has to be capable of influencing the distribution of those factors. Therefore, a trigger could be whether a big business corporation that concentrates and solely benefits from capital agglomeration or a prestigious academic core which conducts sensible research in a field likely of being applied for satisfying a certain social demand or, also, a compromised

¹Using the term trigger we are able to somehow get an intuition of its role. The decision to choose the term was inspired in the “Trigger strategies” of game theorists.

investor with massive source of financial capital waiting for being spent in new ventures.

As the paper has mentioned, what defines the trigger is its functionality and not its nature. This means that it is not possible to limit this task to a sole kind of entity or, better to say that theoretically there are several entities that could perform the role of initiator² (Bakkevig and Jakobsen, 2003[10]; Waits, 2000[243]).

Nonetheless, despite this display of potential trigger players, this chapter will focus on a particular one: the public representatives. This is because of the model is suggested for a specific socioeconomic scenario.

4.1 The trigger as political actor

The reason of this choice is the assumption, because of methodological purposes that a political responsible would be able to combine analysis and interest in regional basis. The first will try to define the even mechanical interactions among the elements that describe the cluster approach as a model of economic development. The second focuses on the final reason from which

²For example, in the cluster model proposed by Mary Jo Waits, a political trigger is not considered but an industrial corporation (see the description of the aerospace cluster, p. 38). On the other hand, Martha K. Bakkevig and Erik W. Jakobsen include government in their Collective knowledge model (see p. 7). Mary Jo Waits, "The Added Value of the Industry Cluster Approach to Economic Analysis, Strategy development and Service Delivery", *Economic Development Quarterly*, Vol.14 No.1, February 2000, pp. 35-50[243]; Martha K. Bakkevig and Erik W. Jakobsen, "The facilitator of regional competitiveness" Paper at The Regional Studies Association conference Reinventing Regions in the Global Economy Pisa 12th - 15th April 2003[10].

a certain policy, the cluster approach as a model of policy making, is justified. This teleological aspect can be better understood in terms of ideology.

4.1.1 Ideology as an element of policy definition

A society settled in a geographical area would enjoy a certain socioeconomic situation derived from the use and distribution of economic factors. This situation is constantly monitored by the individual and/or collectives according to the satisfaction of particular needs and interests³. Such accomplishment might be considered unfavourable by a particular human collective that judges inadequate the use and distribution of factors⁴.

As a consequence, this specific human collective initiates a dialectical process that connects how the things are and how the things should be. This process would be then political. If this collective enjoys enough willpower and mobilising resources, it might try to promote the alternative scenario transforming the unfavourable state of affairs opposing the defiant elements of the established system or other alternatives.

³I consider “need” as the element that an individual or collective has to satisfy qualitative and quantitatively in order to guarantee the essential maintenance and reproduction of the particular vital or social project. These vital and social essentials transcend the mere objective life conditions (nourishment, housing or healthiness) affecting also the subjective life conditions (leisure, comfort or enjoyment). In contrast, an “interest” would be the element with which the individual or collective pretends to surpass and excel vital or social essentials. In addition, once an interest is satisfied would be consequently perceived as a need in future.

⁴This consideration is based on the own interests and needs of the specific human collective and the perception that balances the current and potential social conditions in terms of efficiency. Ideally, this perception is rationally based on the experience (that, also, modulates the group expectations of a successful change) and the access to sufficient elements of judgment.

This confrontation has been institutionalized defining different political systems. Considering a democratic system, the human collectives (normally acting as political parties) would have the chance to modify the social conditions if, after mobilising a sufficient amount of citizens and obtaining their vote, are able to attain a noteworthy presence in the common government for its executive control.

The same if what they want is to maintain such presence because of they have to renew such support periodically. On the other hand, this government has to enjoy enough budgetary resources in order to satisfy social needs and interest in the best possible way. All this, defines the *Buchananian* motivation (Buchanan and Tollison, 1972[30]) of the political trigger that we mentioned in previous chapters.

But, because of the series of possible social situations are so numerous and difficult to predict, there is a tendency to act following a set of assumed procedures derived from the particular *Weltanschauung*. Then, the structure of measures derives from such own vision of the world, of the ideas and beliefs of groups and individuals. All together, they will define ideology.

Nonetheless, ideology offers political criteria but not single solutions. There would be certain ideologies that will match better the definitions of a socioeconomic scenario and, therefore, the elements of change integrated in a certain policy. But, being this elements limited in number, it could be possible that departing from different ideological origin governments arrive to similar strategic arrangements.

In conclusion, one may be tempted of identifying the cluster approach with a certain political point of view. However, there is not other condition but the existence of relevant cluster actors and a specific environment for their interaction what determine the cluster approach as an effective model of policy making. The first was defined in previous chapters; the second will be described in the following pages.

4.1.2 The five fundamentals of a political trigger

We understand that, in this model, policies are developed for a limited group of political actors named as government.

Moreover, being aware of the various levels of government that could be present in a region, it is necessary to close the scope⁵ and reduce such levels to the locally based one. Indeed, this paper will describe the conditions in which the function of trigger could be better sustained by local government.

Hence, it is necessary to set some fundamentals that will define a local government as an engaging trigger.

First of all, public servants should admit that the efficiency of the cluster depends on its capacity to sustain modernization. This term refers to the aptitude to develop and adopt changes in the use of production factors. Doing so, it would be possible to set up the processes that determine sus-

⁵In this sense, there is an interesting concept defined by Storper: *systems of production*. It is related to the term synergy and focuses on external economies of scope that increase the productivity of firms and the system as a whole. See Storper, Michael, *The Regional World*, Guildford Press, New York, 1997[228].

tained productivity and, therefore, maintaining the competitiveness of the cluster's firms.

We are aware that a broad understanding of modernization would include those changes resulting of the application of technological innovations or new managerial strategies responsible of effective allocation of factors. Such renewal sustains the competitiveness of the firms by the maintenance of productivity rates. In this sense, it is possible to identify such positive innovations in the managerial, production or marketing areas of a firm.

The complex nature of innovation has been underlined by several scholars from Schumpeter to Freeman. Considering this complexity and the way and intensity it appears, it would be possible to assume differences among industrial branches and, therefore, identify production fields of intensive innovation. At the same time, the indiscriminate use of the terms "technology" and "innovation" may lead to the following generalisation: a high-technology firm would be a firm which frequently innovates. Being true in some cases, it is necessary not to simplify this phenomenon in every case. In fact, it is essential to think about the causes that force some of these companies to migrate to areas of cheap labour or to increase the amount of hours of a working week without raising the wages of their employees. These are methods of increasing production not productivity⁶.

The second supposition is that assistance policies of governments are not designed for creating competitive structures, but to support innovations from firms or academia that are the actual driving forces. In other words,

⁶See Paul Krugman, *Pop Internationalism*, MIT Press, 1998[114]. Pp. 191-203 and 212-214.

the political trigger does not supply innovation but create the conditions on which the innovation would appear.

This support can be more or less active, but political representatives have to consider that the long-term effect of their actions could be different as expected before. Therefore, the necessary distinction between leadership and manipulation is: the first guides people in order to reach a common goal whereas the second uses people to achieve a restricted one. The ground is simple: there are no competitive regions but there are regions hosting competitive firms (Porter, 1990[186]).

The third basic is that the political trigger has the capacity to influence the behaviour of those living in its area. Therefore, for analytical reasons, this paper will identify political trigger and effective government. An effective government would be the one that successfully adapts the means in order to obtain what Locke defined as the public good. Anyway, the description of the end of the government is controversial and goes beyond the aim of his paper. Consequently, it is better to conclude in an operative definition of “effective government”.

Considering a set of responsibilities toward the society it governs, an effective government would be the one that design and execute policies, maximizing the effect of the controlled resources, in order to obtain the maximum contentment of the greatest number of citizens⁷. Policies are accomplished by the use of financial and legal tools both of reward and coercion⁸.

⁷We are aware that a utilitarian definition could be considered for some scholars as transcended. Nonetheless, we would like to keep Jeremy Bentham’s thought.

⁸In this sense, the governments use a combination of legitimacy and intimidation in order to reach its political goals. The efficiency of these tools must be unquestionable

The fourth statement is that the political trigger will distribute the given public budget between different activities after analysing the cost and benefits, direct and indirect, of every particular action. This method would set criteria for determining what activities should be supported and what should be the relative spending on each. As a consequence of this method, the political trigger would avoid those expenditures that could be afforded by others obtaining the same result for the common.

This point is very complex because admits also different levels of participation: public, private and mix. Public spending would also be used as a way to redistribute income (expanding purchase capacity) and to encourage or discourage certain activities.

On the other hand, it is important to keep in mind that government money comes mainly from tax collection or the profits of public firms or services. In both cases, direct or indirectly, every single monetary unit that is in the hand of a politician come from the pocket of a citizen⁹.

The fifth and last, assumption is that the political trigger would only appear under specific conditions corresponding to a certain scenario. This scenario combines political and economic circumstances. Such elements combine and, as a consequence, determine a certain set of institutions that interact complementary¹⁰. Different kinds of interaction do not affect necessary

or the government would not be able to be successful. For example, if the government support a certain legal system, this must be respected for all citizens. See the concept of “monopoly of violence” defined by Max Weber in *Economy and Society* in 1921[245]

⁹This truth is forgotten too often. I appreciate very much the help of Prof. Jack E. Wahl who explained me a very didactical picture of public spending cycle.

¹⁰For a study on economic systems derived from variations of institutional role see Frederic L. Pryor, “Market Economic Systems”, *Journal of Comparative Economics*, Volume

the economic performance but the way a suggested policy affects factors (Pryor, 2005[191]).

Such scenarios refer to the different economic system that might differ not only for their institutional dissimilarity, considering them as isolated entities, but as a group of organizations that interact with each other differently.

Consequently, this paper sketches in rough lines the different environmental conditions only because of the need of syncretism. We appeal to readers' understanding if the following description suffers from an inadequate plainness and turns out to be excessively simplistic.

4.1.3 Environmental conditions for a political trigger

Previously, it was mentioned that the trigger could be of a very different nature. Nonetheless, this paper focuses on one of a specific kind: the political trigger. Such actor would be functional only in certain environmental circumstances. This specific environment would be the inertial result of two elements: governmental intervention and market economy. According to both elements it is possible to create the matrix represented in figure 4.1.

The first scenario defines an area with relative fragility of public sector and non-competitive manufacturing sector.

33, Issue 1, March 2005[191], pp. 25-46.

Scenario I <i>Developing Economy</i> Weak Public Sector Weak Private Sector	Scenario III <i>Free Market Economy</i> Weak Public Sector Strong Private Sector
Scenario II <i>Planned Economy</i> Strong Public Sector Weak Private Sector	Scenario IV <i>Mixed Economy</i> Strong Public Sector Strong Private Sector

Figure 4.1: The matrix of economic scenarios

The second scenario would define a limited economic role for the public sector and a highly competitive and market-oriented private sector.

The third scenario corresponds to an area with a limited tradition in free market but with a well-developed public sector.

The last example, Scenario IV, would be an area that combines a dynamic private sector with the maintenance of public economic intervention.

Scenario I may have a monetary system, profit-mindedness and mercantile groups, but without presence of a market system. Therefore, neither public nor private sector assures the provision of essential goods and services. It is possible to deduce that Scenario I would require infrastructures and it is unable to hold the complex net of relations among productive units necessary for the cluster's continued existence.

They include all the different kind of factors that allow the transfer of supplies and consume goods. It is possible to consider within this group transportation, means of payment and legal framework. Therefore, being all these elements indispensable for the creation and maintenance of the cluster, any lack of them would determine the weakness of the net.

Scenario II describes a situation with a high level of economic intervention from public sector. This determines the relative debility of entrepreneurship in market economy. The public intervention affects the continuity of firm's inefficient productive processes and bears progressive lacks in competitiveness. In this situation, polices aim to establish an innovative

cluster would have critical effects because of the reallocation of factors.

In Scenario III most of the means of production are privately owned and production is guided and income distributed largely through the operation of markets. Therefore, there is limited room for public intervention considering the potency of the private sector. Under these conditions, every attempt to induce changes in the economic framework for building cluster strategies is mainly held by entrepreneurship. Firms could induce local policies in order to support their own managerial strategies. This would be possible because of the tendency of building linkages between firms or integrating them into big corporations in order to minimize or prevent market shocks.

Finally, considering that the political trigger has to be effective and promote those actions that help innovation in a high-competitive environment, there is only one scenario possible: Scenario IV.

It describes the circumstances in which the political trigger may act. On the one hand, the public sector is able to participate in the economy but without influence negatively the performance of the private sector in terms of its competitiveness. Somehow, it seems that it is compatible to maintain the orientation of firms toward competitive market and to keep institutional settings, including those that affect relationships between the private and public sectors.

Then, we could admit that if the Cluster Approach model is applied in European Union soil, governments would tend to play the role of trigger.

These definition would help us to understand the context in which European public representatives announce their interest in supporting projects based on collaborative research between firms, universities and other public and private agents. In this sense, the European Commission operates policies that already affect cluster development:

European policies either affect cluster development directly or support national and regional cluster policy efforts. Activities specifically related to clusters are currently under way in several parts of the European Commission. The CIP, the Structural Funds and the 7th Framework Programme include a wide range of activities open to clusters, innovation and competitiveness. (Ketels, 2007[98], p. 4)

The assumptions that have been defined provide a frame for the political trigger. The first indicated the aim of the trigger in the cluster approach as the maintenance of sustainable levels of innovation. The second pointed the limits of the trigger on those that characterize its supportive role. The third assumption specified the ability of the trigger, admitting an actual capacity to influence others. The fourth element previously mentioned consigned the rationality of trigger's behaviour. Finally, the description of scenarios designated the characteristics of the economic system where the trigger plays.

All in all, the political trigger appears when there are already some elements defining the potential capacity of the cluster. Then, it is necessary to answer why a political trigger should appear.

4.2 A doctrinal background

As we have mentioned before the political trigger would tend to appear in a certain scenario where market oriented forces and public intervention are balanced. The political trigger would be defined as the necessary catalyst of a clustering process.

This process takes place in an environment of global competition forcing local actors to maintain uninterrupted adaptation to market changes or to face decline. Another element is the idea of incapacity of regions to satisfy local demand with the goods produced by local firms and allows the foreign supply. This foreign supply will come in exchange of local products. But in order to maximize the gain of such trade and following a Ricardian model, the firms of the region tend to export goods in which they have comparative advantage.

As it is known, the comparative advantage is the ability of a region to produce an item at lower cost, relative to other products, in comparison with another region. This advantage is the result of the allocation of those economic resources where there are relatively more productive in terms of costs or/and benefits.

The region focuses on the comparative advantage considering a context of inter-regional competition. This model assumes the existence of production exchange between regions in the way that a region tries to obtain more from this trade whether decreasing the production cost or increasing the price. competition has also a different orientation when two producers

contest for a single consumer and try to attract him offering a favourable ratio price-quality in their product.

According with the comparative advantage thesis, regions would tend to specialise their production in order to keep a beneficial exchange. Prosperity would be then connected with this positive switch of goods. Then, a certain region would need only to identify which is its actual comparative advantage and specialise on it. But, which are the sources of comparative advantage?

The first answer would be that a region would have comparative advantage when it enjoys the abundance of a certain natural resource. This means that the region would be able to produce cheaper because its copiousness of good resources.

The second source of comparative advantage would be greater factor availability. If a region is relatively well-endowed with capital it will tend to produce capital-intensive goods.

The third source of comparative advantage would be economies of scale. Then, by specialising in the massed production of a certain good, the region would decrease the production cost of such a good.

Finally, technological development can also provide a distinctive trade advantage. Because it changes so rapidly, technology represents a challenge for a region. Certainly, the decision whether a region should import high-technology products or try to produce them too is difficult and sometimes

is taken because extra-economic reasons such as political prestige. But, due to this swift change regions could successfully overtake advantage in the production of a certain good if choice is correctly based (see figure 4.2).

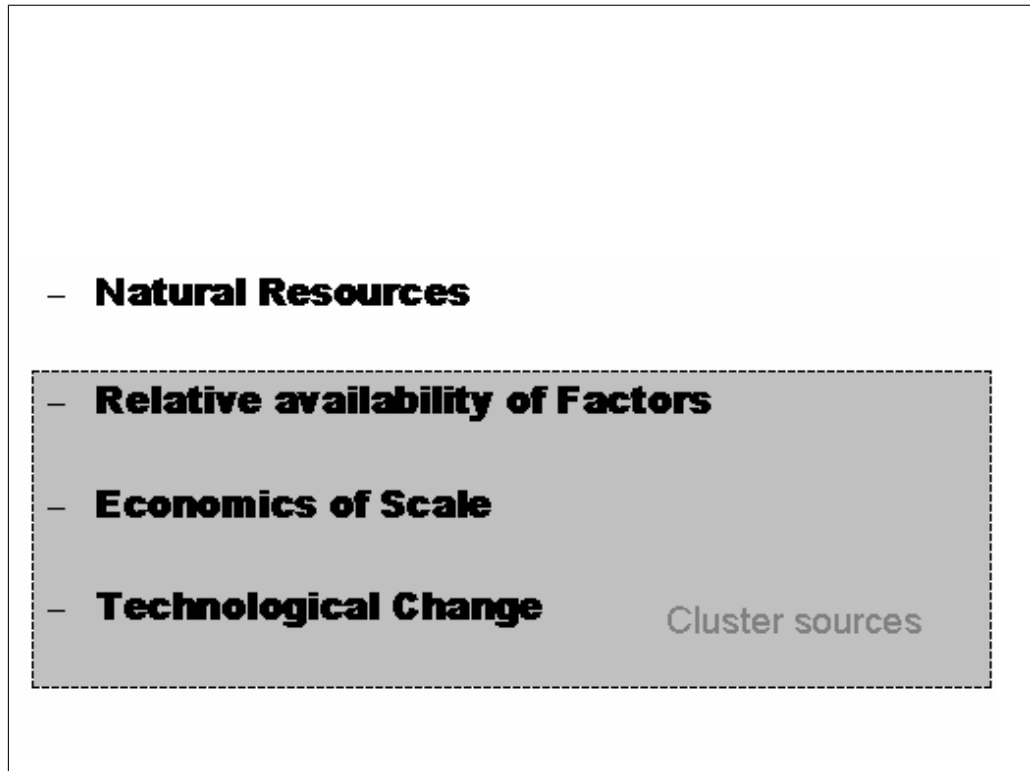


Figure 4.2: The sources of comparative advantage

A region forced to compete but unable to do it with efficiency, would try to enhance or create its comparative advantage in order to cope with challenge at first and then, if it is possible for the region to keep such improvement, to gain from such competition.

Assuming the limited capacity of human beings on the creation of natural resources, there is only one path for regions for the enhancement of comparative advantage. This path lies on three fundamentals: factor

endowments, economies of large-scale production and technology.

The idea of high-technology clusters combines such elements. But, how could such clusters be created? If so, which strategy should be followed? As it was previously mentioned, this paper considers the cluster approach as model of development. But, there is also a proactive dimension that ought to be considered: the cluster approach as a model of policy making. This dimension explains the way a trigger would act in order to procure the circumstances of economic growth. These are based on the optimal use of factors and their accomplished effect.

It can be considered that enhancing the amount and quality of the used factors, a region would enhance its economic growth. Growth has a first stage defined by the accumulation of factors. This phenomenon features the possibility of allocation : the more elements an agent could use to procure development the more chances this agent has for achieving success: growing savings would allow future investment, accumulation of raw material will maintain future production and the increase of production determines economies of scale lowering costs as more is produced.

Nonetheless, if the trigger focuses only on the quantity of factors there are two ideas that would limit economic growth as a sustained phenomenon: marginal utility and opportunity cost.

Applying the concept of marginal utility to production and considering production growth as the percentage variation of total production between two given periods, it is possible to infer that, *ceteris paribus*, the effect in

total production growth of an additional unit would be inversely related to the number of units of that factor already used. As a result, total production growth will decrease.

The opportunity cost is a concept that when a factor is used for the production of a good can not be used for making another good. This means that being limited the number of factor, it is necessary to establish the priority of producing a certain amount of a good on another and, considering the previous idea, this would not increase the efficiency in the use of factors.

Both ideas describe an inefficient growth path (Phelps, 1965, pp. 804-812¹¹). The simple accumulation of labour or capital does not assure the sustainability of constant economic development and may turn into being a handicap. Without continued adaptation of techniques and processes, the hosting areas could be very sensible to crisis or to the changes imposed by competitors.

Therefore, technological innovation is a key element for economic growth because complete the effect of capital and labour. This portion of economic growth is known as the “Solow residual”¹². And as Joseph A. Schumpeter argued that the creative destruction of obsolete technologies, skills and equipment causes continuous progress and improved standards of living.

¹¹Edmund S. Phelps, “Second Essay on the Golden Rule of Accumulation”, *American Economic Review*, 55 (4), September 1965[179], pp. 793-814.

¹²Robert Solow “Technical Change and the Aggregate Production Function. ” *Review of Economics and Statistics* 39 (August 1957): 312-20. *Concise Encyclopedia of Economics*. David R. Henderson (Ed.). Liberty Fund, Inc. <http://www.econlib.org>[225]

At the same time, considering that markets have grown to global size allowing, in theory, more agents to take part, the trigger should provide the conditions on which local actors could efficiently compete in this broader field and, at the same time, attracting foreign-based competitive actors able to support local economic growth.

One of the elements that provide local firms competitiveness is the concentration of production, industry localisation or industrial district as defined by Alfred Marshall (Krugman, 1991[112], pp. 35-67). These agents appear concentrated in certain regions to benefit from the advantages of allocation.

Following Marshall's model, it is possible to identify three main reasons for localisation:

1. an industrial centre allows *a pooled market for workers with specialised skills*;
2. it helps the creation and maintenance of a subsidiary clientele that supplies services and materials;
3. this concentration will help to attain the cost of expensive infrastructures because of the shared use of greater number of agents; and
4. this concentration facilitates the transmission of know-how and the generation of new solutions because *if one man starts a new idea, it is taken up by others and combined with suggestions of their own; and thus it becomes the source of further new ideas.* .

Therefore, the trigger should provide the conditions for making possible such beneficial concentration.

4.3 Trigger guidance Vs. political intervention

The political trigger that we define plays a supportive role in the creation of the cluster. This actor could advise the other participants but it is basic that the initiative remains in all cases with the firms, the academia and the financial agent. The trigger has indeed particular interest or needs that it is not able to fulfill either without cooperation of other players. The Cluster Approach as economic growth strategy successfully combines the plethora of interest and needs existing in a region.

The effort to develop such cluster policy depends on several elements. The existence of previous partners in the area or the need to attract them, the cooperative tradition in the region and previous cooperation barriers are example of such basics. These aspects will determine the effort and resource expenses of the trigger.

The trigger actions focus on attracting tactical partners, required for the success of the designed strategy. The resultant cluster of trigger and partners acts as a pole of growth or productivity core. I assume this after describing “Economic development” as constant expansion of economic factors and its productivity.

In this model, local government as a trigger plays a key role in the strategy design, the recruitment of partners, the role assignation and, finally, strengthening the fellowship. It also plays a crucial role in the redistribution of capital via taxation and subsidies. In addition, the specific nature of governments (medium term life cycle) allows balancing the effects of short term crisis. For example, local governments can support key local groups (i. e., businesses) integrating short-term policies adapted to current issues and adding a relative certainty for management decisions.

It is important to reaffirm that the political trigger would react to the demands, induced or impulsive, of the local society that mobilise its representatives toward the design of action plans. These demands would appear mainly in transition moments whether economic, social or political transition periods. The political trigger would, then, design the policies to satisfy the demands of local society with a reactive or anticipative mode.

Another aspect to underline is that the political trigger would appear when there are major changes to be done in the local infrastructure. Due to the cost of those investments, it is necessary that the trigger assist the system by providing the means for building such infrastructure whether by reorienting local savings toward investment or attracting foreign transfers or foreign financiers.

Also, it could be necessary the action of a political trigger when the lack of legislation affects the economic growth. Some readers could consider that risk is a natural characteristic of enterprise and therefore the use of coping with it could be beneficial to enhance entrepreneur spirit. But,

uncertainty surely undermines confidence when it affects propriety rights.

Furthermore, the political trigger is the only agent able to fulfil a lack in the political market legislation. Therefore, it has a main role in keeping fair play amongst competitors, defining obligations and protecting rights of both offer and demand and preserving trade.

These four ideas are elements that the private sector has a more limited capacity to influence. As we mentioned, the key challenge of the trigger is to attract business to the region. Therefore, it must cope with relative distances from main industrial axis or transport channels.

The trigger takes action in order to enhance the competitiveness of the area but, being aware that the cluster can not be competitive in everything. Therefore, keeping competitiveness in the sector in which the region enjoys comparative advantage is the cornerstone for the economic development of the area. This idea expresses the difficulty of adapting successful policies out of its area of birth.

Then, the political trigger should focus on the quality of factors, element that it is linked to the proper use of them. In order to keep a quality oriented use of factors, the cluster has to be aware of the effect of competition.

Every decision of the trigger must consider the local possibilities. Then, the first decision would be collecting information for a following analysis. The access to more information enhances competition and undistorted markets. The current developments in information technology make avail-

able the access to an extraordinary number of data, simplifying the way they are collected and sorted and allowing the deduction of action plans based on latest circumstances and in complex experimental models.

The analysis is aimed at assisting the economic agents in the decision making process. The economic agent has to choose among alternative scenarios for the allocation of factors. This continuous distribution is based on the need of improving efficiency. The trigger will help the local economic agent dealing with choice by providing the precise account of the available factors and accomplishing the information on supportive services.

In the cluster approach, it is possible to affirm that efforts of government as trigger are aimed at forming networks and creating partnerships with the private sector. Doing so, the entrepreneurship will benefit from lowering the hazards and expenditures associated with investment, especially for creating infrastructure.

The government also can support the early stages of new projects and, therefore, diminish the investment risks of a new venture. Nonetheless, it is important that this support allows the influence of market forces, mitigating the distortions in the relation among offer and demand. The trigger would be able to combine the support of business and market orientation through financial agents.

We consider that the main obstacle that undermines cluster efficiency is the over presence of the trigger in network decision making. But, if the trigger has confidence in the arrangements that it supports, would delegate

functions in other agents. Therefore, the successful trigger would help the system by inducing the participation of private interest.

Considering a certain business sector, it is more efficient if monitoring and auditing firm's performance is a responsibility of finance. Venture capitalists are profit oriented. Therefore, their investments would be focused on companies that would prove a relative security of future gains. Afterwards, the venture capitalist will help such firms in developing managerial plans, modernising administrative structures and keeping efficient production.

Moreover, the venture capitalist could promote the creation of business partnership and technological innovation with a spill over effect. The reason of such support is based on venture capitalist own interest in profits. After deciding the support of a business venture, the financier would try to assure its investment reducing avoidable hazards (Keuschnigg, 2004[101]).

Then, a political trigger has to promote venture capitalist participation and benefit from its skills and interest. A trigger can engage private investment by changing tax regulation related to investment, reducing the costs of financial transfer. Doing so, the political trigger only delays its return. If, because of the venture capitalist investment, new firms are created we could deduce higher employment in the region, increasing local trigger returns through taxation on individual incomes.

The way such joint forces act together subsidising roles and combining interest and needs is graphically explained in figure 4.3.

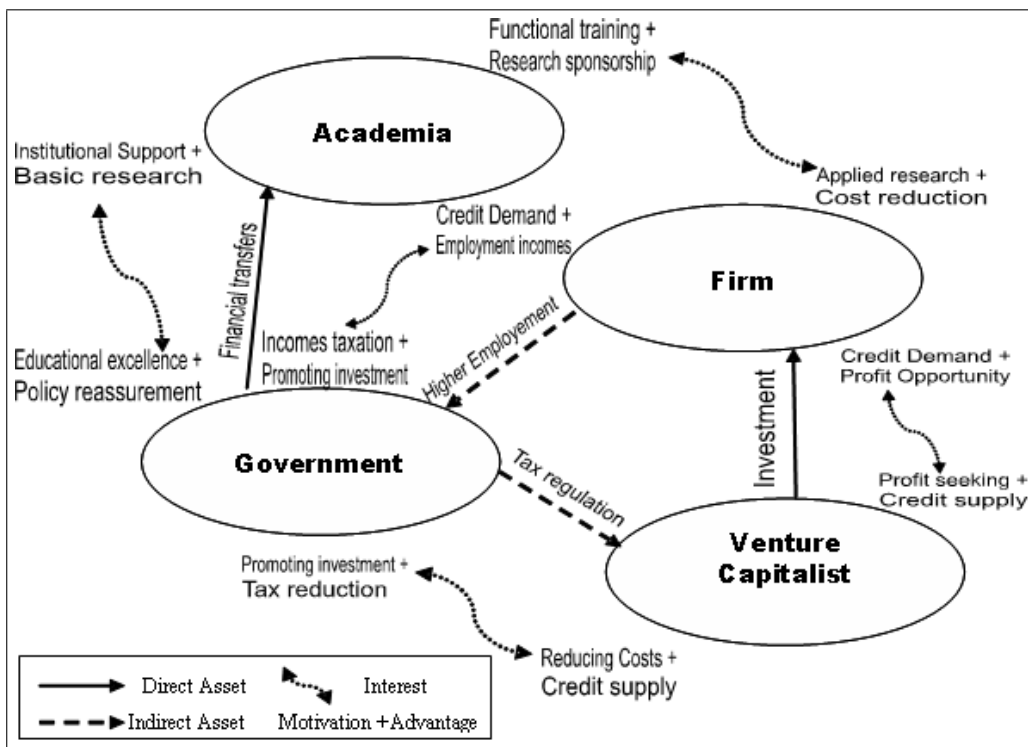


Figure 4.3: The interactions among actors

Governments are interested in promoting investment within the cluster and they are able to change laws in order to reduce taxes on capital investment. At the same time, there are some financial agents that want to maximize profits by reducing the cost of their investments and they control financial capital that may be transfer. Both agents are able to combine motivations and needs, finding a common interest in joining efforts.

A firm demands credits in order to invest and keep higher rates of productivity, assuring it competitiveness in open markets; in exchange the firm would give participation of future gains to investors. These are looking for such profits and therefore they provide credits to companies that are able to offer relative evidences and prospects of future success. They are able to reciprocally satisfy such needs and advantages.

Finally, governments promoting the creation of firms would compensate the lack of tax earnings produce by the reform of laws on financial capital duties, charging individual incomes and consumption. These would increase as a result of new employment and local growth.

4.3.1 The real thing

Politicians are frequently tempted to promote a special kind of business because reasons of conjuncture, mainly trends or views of reputation. Therefore, they might be exposed to support policies aimed at supporting non-comparative advantage ventures or, worse, firms inadequately managed.

The reason of such vulnerability is the difference among political and market goals. Avoiding the occasion to interfere in market they will also avoid the non-expected dangers of such intervention.

The political trigger must anticipate the needs of the other actors and enhance the formation of productive partnerships in order to obtain positive synergies. Therefore, a main kind of effort would be the creation of confidence measures by the use of the legal framework.

This attempt must be accomplished with appropriate assistance in order to mobilise the innovative local forces and assimilating them as a part of the local sustainability policies, i. e. : supporting excellence in education from the basic to the highest levels and integrating every stage.

Another element that the cluster-oriented assistance strategy has to achieve is the stability of the economic framework conditions. The political trigger should help in order to establish the sort of capital and money markets in which lenders could have confidence. This factor induces certainty in the decisions of the other participants, allowing the adoption of long term strategies.

Nonetheless, this is a very delicate role because, if the interest of the political trigger is to attract business, it is necessary that this would not affect negatively the companies already settled. For example, it is possible to predict an augment of land prices with the arrival of new firms elevating the fix costs. In order to avoid this, the government has two options: subsidising the cost or keeping inelastic the relation between price and demand.

The political trigger should also create the conditions for a less externally conditioned growth pattern. Doing so, the trigger would create a domestic market able to buffer economic fluctuations. In addition, the trigger would provide all the services and infrastructures necessary for the sustainability of main partners.

One may realise that the role of political trigger may differ according to the actual stage of development of the local society. But, generally speaking, the trigger interest is based on keeping a proper combination of factors, avoiding dependence. Furthermore, the trigger would promote the physical transportation of goods and the exchange of information with appropriated communication channels. The trigger would create the enhancing conditions of capital, human and physical, in order to attract investment.

Finally, the trigger has to consider the effect of its policies locally but being aware of the linkages with external areas. The cluster approach is not a method based on protectionism but, quite the opposite, focuses on the advantages derived from setting an economy open to market competition.

4.3.2 Dancing together

In this sense, the trigger could create the conditions for the encounter of the different agents. The action would be then to advise the different parts using the collected information in order to promote the creation of a business network and supporting the communication among parts (i. e., having available list of companies by branch or writing “who-is-who in. . .” guides).

The cooperation that trigger seeks should end in advantageous cooperation of the different agents in a certain field (i. e. joint promotional campaigns).

Afterwards, the trigger has to keep such linkage building confidence between the different components and guiding them on the convenience of joining forces for the creation of a cluster. In this stage, it is very important that the cluster helps to clear the actual benefit for each participant defining the assisting policies available.

This confidence has to be sustained by the creation of discussion polls in which every single actor can have access to the different counterpart in order to integrate different interests and needs. The trigger has to keep the fluency of such dialogue by providing a framework but agents should be able to formulate their demands in the areas of financial and corporate services, research and development or training without trigger's intervention.

All in all, the trigger assistance would be whether promoting relationships among academia, financiers and firms, accomplishing the channels of transferring financial resources, providing collective infrastructure (i. e., transportation channels or educational system) and creating complimentary legal and administrative framework.

4.4 A clustering potential

The origin of the clustering phenomenon could be based on very different circumstances. The given region could enjoy certain geographic conditions

that allow the localisation of industries because of the supply of specific raw materials.

There are also social elements to take into account when, because a kind of historical inertia, the region holds specific productive structures founded on the experience and skills of its labour force or the spirit of enterprise of their inhabitants¹³.

Being desirable, such elements are not indispensable because a cluster policy could compensate non-existing cluster beginnings with appropriate assistance strategies. In fact, there are several initial circumstances in which a cluster strategy could appear.

Consequently, first, there would be regions where the entrepreneurship has no initiative for coping with change and competition, reject innovation and resigned waits for downfall in their activities. In this case, the trigger should motivate the reaction of firms toward the coming changes, assisting management with training or financing modernization.

Then, we could identify areas that enjoy the structural requisites for settling a cluster and where the trigger should promote the creation of a network among the different parts, enhancing communication and the exchange

¹³In this sense, there is a lot written about the cultural foundations of private enterprise. Max Weber masterly tied the roots of capitalism with the individualistic ethic of Protestantism. Weber, Max, *The Protestant Ethic and the Spirit of Capitalism*, Routledge Classics, London, 2001[246]. Nonetheless, we may also link entrepreneurship with a less glamorous situation of neediness. In a situation of sustained penury and unemployment, people could be forced to choose entrepreneurship as a way to escape from starvation and poverty. Under- and self-employment could be a quite frequent assortment in developing societies.

of information.

Moreover, there would be places with as already developing cluster where the trigger should help accomplishing the infrastructure or implementing the necessary legal framework.

Finally, there would exist regions with running clusters in which trigger's role should be the maintenance of cluster synergies by institution-making procedures for advising or financing.

4.4.1 Clarifying things

We are trying to say that there is not a single assistance policy but that this instrument ought to be adapted to single circumstances affecting grade of region's openness to sector markets, the physical dimension of the local agents and the industry of specialization. These three elements are consequence of the local economic model and structure, affecting the stage of development that local society has.

The trigger would act then guiding the hands of academia, financial institutions and firms for joining efforts toward the common interest of creating a cluster. Such bond would keep the network together and would allow the generation of the necessary synergies in order to keep innovation as a key factor for long-lasting competitiveness and enhancing local growth.

As we have seen, the trigger would play a leading role in creating

a super- and infrastructural framework by legislations and maintenance of communication, road and rail networks. However, in the cluster approach the political trigger has to avoid playing the bouncy planning, implementation and supervisory roles.

The reason is, considering the characteristics of competitive markets and the unharmed position of public agents in such environment, such responsibilities should be beard by the private sector.

Nonetheless, the trigger still has a vital role on promoting the conditions for competitiveness, assisting the decisions of academia, financier and firms and instigating dialogue and networking.

Moreover, the political trigger has to actively attract strategic partners and include them in associative institutions for the stable organization of the settlement. The trigger has also to simplify those procedures related to the creation of new firms, the establishment of new ventures, the protection of property, the facility and transparency of tax collection and keeping quality of environment.

The trigger could also require services and products from cluster members in order to reabsorb surplus and redistribute demand. This last action is focused on accomplishing market, generating a local dimension of it. These expansions of market due to local presence also help to transfer the benefit of clustering to further groups of society. Local actors could become part of demand, helping local production to cope with negative conjunctures in global markets.

Moreover, due to such transferring, local actors may incorporate technological changes allowing them to turn into competitive suppliers of core industries or related services like housing, tourism or leisure.

As it was shown, a general view on trigger responsibilities admits some specifications because of the differentiated presence and capacity of the cluster approach actors. The flexibility of trigger performance that allows the cluster approach would promote diverse actions affecting cluster members separately and in a different grade. These determines growth as a progressive phenomenon that builds economic structures gradually, adopting measures on each circumstance and avoiding to force timing because public budget or political opinion.

4.5 The limits of the trigger

The concept of competitiveness defines the way firms successfully maintain themselves in a free market. The competitiveness is then a characteristic of a certain actor and does not define the region itself. This idea is based on the affirmation that only firms compete and not regions¹⁴. Therefore, we are not able to speak about competitive regions but about regions hosting competitive firms. *A competitive region would be here as for the rest of the paper, the capability of a region for attracting and maintaining competitive firms.*

¹⁴This statement faces the opposition of a general assumption: *regional competitiveness: Nations and regions are struggling to remain competitive and adapt in the context of globalization* (OECD, 2007[173], p. 3).

The competitiveness of the firm will depend on certain elements both internal and external. Certainly, competitiveness could arise from the fact that the firm is settled in an environment with adequate competition policies or legal framework. It also could benefit from a certain infrastructure and a maintained supply of factors (i. e., well educated and trained working force). Additionally, the firm could also have access to a domestic demand that may absorb firms' surplus. In all these situations, it is possible to identify the hand of public representatives. Therefore, it is possible for the political trigger to create the environmental conditions for competitiveness.

But, the political trigger is not able to interfere in the managerial decisions of a firm without avoiding the risk of creating distortions. These distortions would be in the behaviour of the firm's management. Trigger attempts to influence firm's behaviour may use dissuasion or persuasion tools. In both cases, the interest of management would switch from satisfying market demands to pleasing trigger's wishes whether to avoid punishment or to gain reward. In other words, firms do not aim at keeping own competitiveness in market¹⁵.

As a result, with such a control, the trigger does not fulfil the requirement of the cluster approach that is enhancing the competitiveness of the firm. Thus, clusters can only be as successful as the efficient collaboration of firms, related institutions and government structures allows keeping and limiting each role.

Moreover, if a government wants to focus on certain firms, such as

¹⁵See "The fading lustre of clusters", *The Economist*, The Economist Newspaper Ltd., London, 13 October 2007[239], pp. 20-23.

high-technology ones, could reckon on an inexistent managerial experience, risking unnecessarily public resources. Alternatively, the trigger of a cluster approach would have a different behaviour.

According to Keuschnigg and Nelsen:

Entrepreneurs lack own resources and business experience to develop their ideas. Venture capitalists can provide start up financial and commercial support. The effort put forth by either agent contributes to the firm's success, but is not verifiable. As a result, the market equilibrium is biased toward inefficiently low venture capital support. The capital gains tax becomes especially harmful, as it further impairs advice and causes a first-order welfare loss. Once the capital gains tax is in place, limitations on loss off-set may paradoxically contribute to higher quality of venture capital finance and welfare¹⁶.

This suggests that a government could accomplish private performance by supporting indirectly investment. The trigger would reduce taxation on venture capitalist. Because of the reduced costs, financier would be able to invest in certain business helping not only with financial resources but also with administrative know-how (these idea was previously explained in figure 4.3).

The achievement of competitiveness goal is based on cluster-oriented

¹⁶Christian Keuschnigg and Soren Bo Nielsen, "Taxes and Venture Capital Support", *European Finance Review* 7: 515-539, 2003. [105]

strategies that the trigger may design considering the environmental conditions that affect firm's performance. The trigger takes a more active role in cluster's development by providing a stable macroeconomic framework. This is a necessary pre-condition in order that firms could adequate their decisions to market requirements, allowing the implementation of lasting strategies.

Trigger's policies could also encourage the competitiveness of existing forceful firms, networks or clusters capable of innovation. But they could not, by themselves, generate competitive arrangements. Nonetheless, admitting that the cluster approach combines the use of existing strengths with the establishment of further competitive advantages, the trigger could have a major role in the design of cluster oriented strategies by providing information and chances to meet the different agents' expectations and interests.

The political trigger has to support consciously the sources of regional economic sector's competitiveness that are dependent on the innovative muscle, aptitude to allocate factors, inventiveness and the ability for applying such available onto entrepreneurial ventures.

The cluster approach explains how a good government may help to increase the efficiency in which production factors are used, making certain locations attractive for foreign investment and the settlement of new companies. But, an ineffective government may affect very negatively region's economic performance. The existence of a political oligarchy hostile to change economic structures will repel foreign investment. A political trigger evasive of its responsibilities, confusing and complex when setting regulations and keeping poor public infrastructures can lower productivity and induce the

escape of mobile production.

Finally, corruption would undermine entrepreneur confidence and performance, even more when is not familiar with local practices, because of the unpredictable range of events that may generate such behaviour.

4.6 The trigger sketch

For the purposes of this study, a cluster is defined as a geographic concentration of highly specialised firms, academic centers and financial agents forming altogether a network. Legally and economically the members of the network may be independent but they are linked by common interests and compatible needs.

The cluster approach will include political institutions as members of the core. This political institution with a key role in cluster design, purpose and development would be the political trigger.

The political trigger would appear under certain conditions regarding individual characteristics and regional economic structure. The trigger would act as initiator of the clustering phenomenon, recruiting new participants and integrating them in a strategy aimed at economic growth.

The trigger would assist afterwards the performance of given members but without interfering in their market orientation. Doing so, the trigger assures the efficiency in the allocation of factors and expands its own capacity

to influence further elements of cluster development. The trigger has to identify the comparative advantage of the region, concentrating efforts for developing the competitiveness of region's firms in such sector and creating the necessary situation for the generation of positive synergies.

Finally, the cluster approach as a development policy considers economic growth as a long lasting event and avoids the experimental occurrences of politicians in office and the temptation of interfering individual's will.

Chapter 5

Cluster approach as development model

The present work presents the Cluster Approach as a proactive tool for supporting economic growth policies. For this paper, economic growth has been considered as the increase of production, as a result of both the accumulation of factors and enhancing productivity. So far, we have defined the different participants that contribute for achieving such growth named as political trigger, academia, financiers and entrepreneurship.

The cluster approach model describes a situation where the different participants come together and cluster in a certain area. They would interact with each other on the basis of a system of reciprocal support, creating advantageous synergies and spreading their effect in associated services. As a result of these interactions, the cluster maintains a selection of active partners, increasing the recruitment of contributors and affecting a larger amount of individuals. All in all, the cluster approach policy will result in economic

growth improvements in the economic conditions for the hosting region.

The cluster approach as a model for policy making has to anticipate the possible scenarios for the necessary feasibility of the cluster system if there are given economic conditions for its appliance. These scenarios refer to a certain time frame. In this chapter we will define the stages of development of a cluster system.

5.1 Stages of development

The cluster approach as a model of development policy offers a description of some different situations that could appear during the evolution of the cluster experience (Andersson *et alia*, 2004[4]). These descriptions have the double function of anticipate strategies for the success of the cluster and a way to measure the way the process is developing.

The definition of such stages could be reconsidered according with particular circumstances. This paper considers that the cluster process follows a certain timeline as the inertial effect of certain economic determinants. These features are the ability of accomplishing the correct strategies by the actors, the analytical merit of the participants and talent to take actions, the openness to new and more effective processes, the way participants cope with change and the existence of historical industrial habits. Nonetheless, this paper is aware of the influence of chance for the success of an operative industrial cluster.

Therefore, with a cluster approach development policy, the domestic public administrations make an effort to establish a complex net public-private-academia with institutional, financial and knowledge linkages. This net reinforces the relation between the different parts. This possibilities task division and combines every particular interest toward a common goal of regional development.

Some considerations

In chapter 2, cluster is defined as an independent area with precise administrative limits in which exists a recognisable concentration of industrial activity, as well as, a network of managerial, educational, financial and political institutions that contributes to the making of an economic development dynamic.

The maintenance of such an agglomeration of production during a relative long period is based on the advantages that every single cluster participant benefits of. Therefore, every single effort to build such thing has to be oriented toward making the cluster a long lasting phenomenon.

5.1.1 Coping with change

Then, a building strategy has to overcome existing obstacles in the area, changing the previous economic activity providing of compulsory elements for assimilating technological advancements, adapting activities to market demands and reconverting the use of factors. Hence, new firms might emerge,

others would collapse and some would be transformed.

This means that the cluster strategy has to cope during early stages with the dramatic consequences of change¹. In order to minimize such threatening effects, the political trigger has to spread cluster's productive, working, educational and financial opportunities without affecting the own cluster efficiency.

In order to do so, the trigger may support policies that have direct influence in the system, but could indirectly benefit from advantages derived from external policies and regulations too. For example, considering employment, the trigger can provide public assistance for lowering labour costs or for education and training, allowing labour to adapt to new market requirements. But, in addition, it may possibly be supported by supra-regional policies regarding labour transfers and unemployment subsidies.

5.1.2 The multi-level concept

The cluster approach policy introduces a multi-level concept, which aims to integrate present and future achievements in economical, political and social terms. It is a clear example of the value of collaborating, because doing so the risk for each individual is less and the gains for each are greater. Theoretically, it has been previously shown with the "Nash Balance" that explains the profitable returns of working together.

¹For example, the opposition of traditional elites or interest groups.

This idea links with the effective allocation of factors. Considering a system with several agents that share factors, we may say that the allocation of such factors would be efficient if no one could improve its own situation without affecting negatively the situation of others. On the other hand, the allocation would be *inefficient* when there is an unrealised potential for benefits in the exchange of factors. This potentiality is evident when one of the agents of the system could improved its situation without harming the other agents or, worse, when there is a harm in the situation of every agent without any gain.

This paper assumes that the lack of competitiveness is related to the inefficient use of factors in relative terms. In this way, it would be possible to explain competitiveness as an optimum efficient point of allocation. This optimum would be achieved after expanding the possibilities of sharing the factors within the system. In other words, the cluster approach may enhance cooperation among the different agents of the system but, at the same time, maintaining competition as a creative pressure for finding new mechanism to improve the efficiency of allocation.

This strategy is possible due to the leadership of the trigger that, also, may keep focused because of the existence of social requirement. As figure 5.1 suggests, local society requests motivate that the trigger takes action and gives the first steps for the creation of a cluster. This motivation would be connected to Buchanan's Public Choice Theory: the members of a political party in office tend to act in order to keep or improve their campaign results and public institutions want to increase a given budget by the tax contributions of new firms and workers(Buchanan and Tollison, 1972[30]).

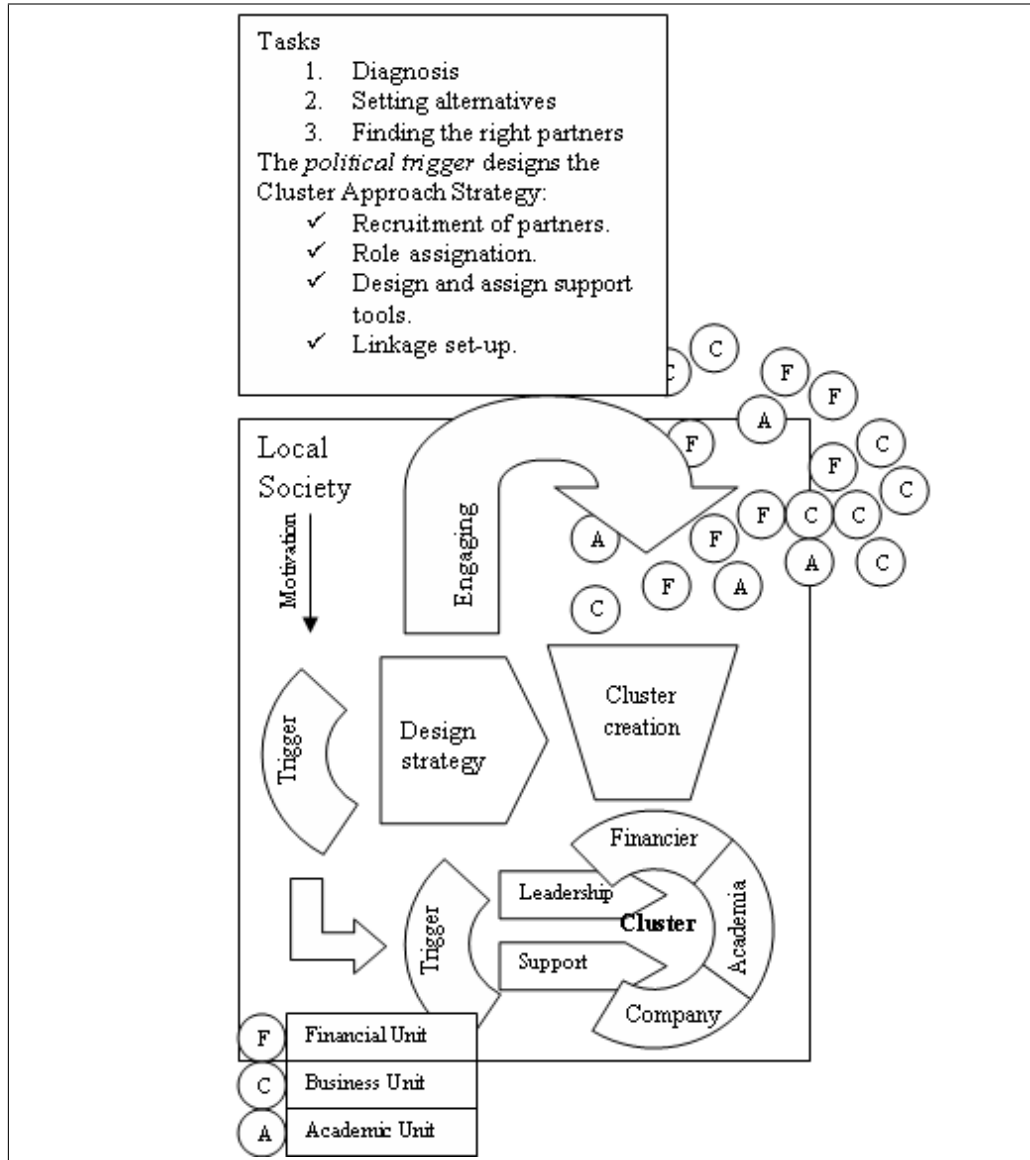


Figure 5.1: Starting the cluster

With the aim of satisfy this goals the trigger has to deliver a strategy to pursuit economic growth considering this as the increase of well-being and the expansion of production.

5.1.3 Towards a definition of public efficiency

In a democracy that enjoys a free economy system, the public representatives have to spread welfare but minimizing the costs for the productive system. Therefore, the trigger tries to facilitate the distribution of resources among competing alternatives in order to minimize total costs or maximize total return. There is a question of resource allocation. The answer to this question is, again, efficiency.

The efficiency will be determined also as the relation between what the end product and scarce resources expended to produce it in terms of value. So, when some situation is described as inefficient is because of the same result may be achieved with a fewer expense. And again, this is related to the idea of factors allocation. The problem is that, considering its motivations, the political trigger may have a scarce understanding of valuable allocation.

Consequently, the trigger engages other participants from different fields as co-operators: in the resulting cluster the trigger integrates itself completing the network created among companies, financiers and academia. The first would apply factors to production, the second would mobilise them and the last would create new ways of allocation.

5.1.4 Limiting the role of a trigger

The process of cluster formation includes the design of a comprehensive strategy. An operative cluster will need as system unity the presence and action of the trigger in order to keep itself together.

Then, the role of the trigger may change from the direct initiator, engaging agent and strategic designer to an indirect role of leadership and support. Such restriction would be afterwards necessary to keep working a system in a situation of markets fluctuations (Andersson *et alia*, 2004[4], pp. 49-51).

This indirect role is vital for avoiding the trigger intromission in market requirements (see Table 5.1). After all, the function of the political representatives has to be the execution of those actions that provide the means to satisfy the greatest of needs and interests of the society as a whole. But, sometimes such maximum may not be the result of the accumulative effect of individual contentment. In other words, the satisfaction of individual needs is of social interest, but the satisfaction of individual interests might not be socially needed.

This can be understood as a philosophical statement but, also, as a rational evidence. If the trigger is political, it decides how to distribute a given public budget most effectively between different activities because of the two motivations explained by Buchanan's Public Choice Theory (See Chapter 3). As it was mentioned the double motivation electoral and administrative (Buchanan and Tollison, 1972[30]) guides trigger's actions. On the

Imagine that there is a tank, like those ones that keep the rain water. Unfortunately, ours has a hole in it. Then, imagine that there is a person with a bucket. Should this person use the bucket to refill the leaky cistern with the lowering level of tap water (hoping for new rain to come) or should he try to fill a brand new deposit without fissures with this water? The reader could consider now a certain area with a single industry that produces both for domestic and international markets but that maintains a progressive obsolete use of factors. In a close system, with this only firm, subsidies are transfers from the public budget that actually originate from the taxes on this only firm.

At the same time, the company is coping with circumstances by adapting the use of factors to demand requirements in terms of cost effectiveness. This means that the firm would use those needed factors that are relatively cheaper and avoiding the use of those relatively less needed and more expensive, increasing the number of unproductive factors in the region. Then, political representatives might decide to actively support this industry with subsidies and tax incentives. They would do so for keeping alive its only source of taxation until market circumstances favourably change on their own.

After a while, if conditions do not improve and the firm does not reassign factors in order to keep competitiveness in its traditional market, the firm would be driven out of the market and so disappear. The result would be that the political representatives will not have to tax anyone and there would be no productive factor in the region.

Table 5.1: A man, a water tank and a bucket

one hand, it needs to obtain the contentment of most of the society in order to assure its support. On the other hand, because of the way to increase the given budget is due to taxation, the political trigger has to increase the amount of income surplus most likely taxable and the number of tax payers. The solution would be to diversify the sources of local wealth by allowing individual endeavour.

5.2 Finding the right strategy

The cluster approach is a proactive tool which purpose is to change the economic conditions of an area: from an unfavourable economic situation to a booming economic growth. There is a social motivation for the appliance of such procedure. Therefore, the trigger acts after the command of social demands. For example, the inefficient use of resources and the increasing lack of competitiveness of domestic business, possibly will add to non desired side effects such as increasing unemployment rates, depopulation and collapse of living conditions (Raines, 2000a[193]²).

The political trigger would act then to solve or to prevent the undesirable situation. A first stage for the cluster approach lies on the design and implementation of the right strategy. For doing so, the political trigger has to resolve a triple dilemma: establishing the correct diagnosis, understanding

²Following the European Commission's explicit placing of a priority on tackling Community-wide unemployment in the 1993 "White Paper on growth, competitiveness and Employment", a jobs strategy for the European Community has been devised and member state employment strategies have been increasingly scrutinized and linked together. Philip Raines, "The impact of European integration on the development of national labour markets", Employment Paper, European Policies Research Centre, University of Strathclyde, Glasgow, 2000.

the cluster environment and finding the right partners.

The notorious novelty of the cluster approach is the significance of the interest harmonisation among heterogeneous partners, with different organizational nature, assorted range of goals and unlike definition of goal acquirement. Any addition in the number of participants represents a potential alteration in the balance of reciprocal interest, needs and capabilities.

However, under some circumstances group incentives are effective motivators even when the opportunity for reciprocation is absent and the benefits of cooperation are so widely shared that a self-interested group member would gain from free-riding on the effort of others (Bowles and Gintis, 2003[23], p. 18. Thus, a growing cluster needs a continuous amendment, searching constantly for a virtuous equilibrium. This would be one in which every component contributes to a rising shared welfare and, simultaneously, it maximizes its particular contentment.

As result of the first stage, the system would be active for the creation of advantageous changes, aimed at developing competitiveness and, also, profiting from a joint vision of cluster goals.

5.2.1 The first step: diagnosis

As it was said, the cluster approach is a model of policy making, a directive to pursuit economic development in a certain area. The first element of such guideline corresponds to a diagnosis of the actual situation of the

economic sectors within the target region. This picture is given after finding the economic elements describing the location, the relationship among such elements within the area and how they relate to those of other locations.

This diagnosis would be based on spatial analysis (Wheeler, Muller, Thrall and Fik, 1998, [247]p. 4) through which it would be possible to understand how competition, infrastructures or environmental characteristics may affect economic performance. It is clear, then that a cluster building strategy would be created after a complex and exhaustive analysis of the major factors that explain location performance.

This explanation will provide a framework for the understanding and evaluation of regional economic change and if necessary, will supply a guideline to introduce the necessary corrections.

As said, the first task for the trigger is information acquisition. This information would be processed and shared with the other policy-partners. But, the trigger would need cooperation from others in this early stage because of the inability to meet the needs of evaluating the research strengths or trade competitiveness of a certain industry. This point is extremely important, because without an appropriate expert consultancy the trigger could take inadequate decisions leading to unwanted outcomes.

In other words, this first step will explain the factors that may determine and influence the location's economic activity. Subsequently, it is basic that the analysis is done with contributions of local actors giving a realistic picture of environmental conditions. The idea is to get an inventory

of common needs for setting priorities and organising goal oriented tasks. For example, if a firm considers the stability of resources' price, it tries to establish the possible capacity to prevent the volatility of its investments.

In addition, the evaluation of the rule of a legal system would suggest the grade of property protection. In a micro level, it would be important to identify monopolies and the ratio between private and public companies. Moreover, in the previous stage of analysis it is vital to identify the various means of financing, the access to credits or the possibility to receive transfers and subsidies.

Finally, the analysis would be accomplished if includes the structure and size of firms, employment rate and labour costs.

5.2.2 The second step: understanding environment

As mentioned, after evaluating the information, the trigger needs to design the strategy to facilitate cluster's formation. The right strategy has also to match three requirements:

1. the trigger has to find partners with compatible goals and equal level of commitment with the region;
2. the trigger has to establish its own limits in order to dissociate itself from the system, not interfering in processes among partners; and
3. even though achieving a full-operative system could take relatively long,

the strategy must define a goal-oriented timeline with fixed characteristics that the cluster should possess in each life period.

The obtained strategy is a regionally-adapted method for economic development. This means that, could be possible that successful plans in other regions are not possible to set out of its place of origin.

In contrast, the political trigger focuses locally, considering the way a change on the treatment of a given partner affects the performance of the others. For example, if the political trigger agrees that it will introduce a specific policy regulating tax breaks, incentives or concessions to benefit one particular firm, the cluster system may suffer a harmful effect in the overall functioning. Therefore, the political trigger has to walk on a thin line of decision making: giving sufficient impulse to the economic engine and constraining own interferences within business system.

It could be admitted that a growth-enabling scenario is the result of several elements that combine as a socioeconomic formula. Then, a trigger policy may be introduced to enhance the development conditions of any of the two terms of the equation (social environment and economic environment) that are somehow related.

Such environment allows the continuous reallocation of factors in order to keep production rates increasing. This might be consequence of the accumulation of the productive factors but, as we have seen above (see Chapter 4), the decreasing marginal utility define an ending panorama where total production growth will decrease.

The situation would worsen if such accumulation eventually finishes available factors. Therefore, the aim would be to keep positive ratios of productivity by increasing efficiency in the use of factors. The socioeconomic environment has to allow taking advantage of technological change. In other words, the political trigger has to focus on knowledge if its interest lies on increasing the growth rate (Romer, 1986[203]).

It seems to be clear: a successful policy has to foment also the spreading of information. In this sense, a political trigger may include in its cluster strategy the policies designed to encourage the production, transmission and implementation of ideas: universal subsidies for education, competitive grants for basic research and patents and copyrights, which offer temporary monopoly profits on ideas (Romer, 2007[205]).

The market introduction of new industries and products rely on the ability to acquire productive innovations through the combination of scientific, technical and market knowledge. As a result, innovation exemplifies the gains of networking³. Empirical estimations confirm that product innovation clusters spatially in regions which provide concentrations of the knowledge needed for the commercialisation and that knowledge contributions reinforce a region's comparative advantage and the competitiveness of local firms (Feldman, 1994). The cluster approach model pursues to set up such economically beneficial environmental conditions.

³Although it is not possible yet to clearly mention the key factors that define an innovative environment, it seems that the major role is played by information flow within companies and even markets. See "A dark art no more", *The Economist*, The Economist Newspaper Ltd., London, 13 October 2007[239], p. 22.

As mentioned, the cluster approach as a model of development described in this paper considers a specific state of affairs based on European soil. For most countries in this area such policies are already there. Then, we might consider a specific region that is interested in pushing a certain scientific field, applying it to local industry and increasing economic growth. But, considering the vast worldwide publicly available supply of knowledge, which scientific fields have to be supported? This is a difficult question to be answered unless one enjoys the rare talent of prophesy.

Sometimes trying to find a rational answer, politicians may be victims of volatile mirages. Sometimes, because a certain scientific field is fashionable or has proved its success in some places, one may be tempted to follow such trace. “If it has worked there, why should not work the same here?” they might wonder cheerfully. “Because comparative advantage or the ability of one economic actor [...] to produce some particular good or service at a lower opportunity cost than other economic actors can” a Ricardian counterpart would answer (Johnson, 2005[93])

The complex combination of procedures and institutions that made possible such success may perhaps only be adopted after spending time, massive amounts of public investment and personal sacrifice. And often, such scientific research would be already available after paying the price of a patent, the subscription to a scientific magazine or after promoting foreign investment and acquiring know how from guest firms.

As an alternative, the trigger could focus on promoting the integration between the research centers and existing firms, while keeping open the scope

for further opportunities keeping high standards in basic education. The reader may well ask the reason for such quite less glamorous alternative. The motive is that this element allows the swift adaptation of labour in case of further training is required because of the transformation of work demand or productive innovation.

In fact, despite the exhaustive analysis suggested as the previous stage of clustering, the political trigger is not able to assure a perfect understanding of local economic interactions. Doing so, the trigger may prevent undesired situations.

On the other hand, the aim of the political trigger that is a public representative and not a company executive, is promoting the life conditions of the citizenship as a whole. Increasing education standards is considered as a proof of the improvement of such living status. This is the reason that motivated the design of the cluster strategy, in which promoting competitiveness of local business and not only local business, is a major tactic.

5.2.3 The third step: finding the right partners

The elements defining an advantageous location are varied. Things like legal or economic policy framework play a crucial role. Hence, it could be necessary to suggest a matrix of major factors in location advantage (see Table 5.2). Such matrix is commonly named as cost-benefit assessment (CBA) and lists a number of location factors that are typically quantified (Wheeler *et alia*, 1998[247], pp. 209-213).

The aim of such technique is to anticipate if the decision to locate in a certain site will or will not generate benefits.

Table 5.2: Site-specific quantifiable location factor

Site and preparation costs (including land)
costs of equipment and infrastructures
Startup and training costs
Labour and fringe benefit costs
Working capital requirements (i. e. Inventories)
Freight and transshipment expenses
Property and business taxes
Workman's compensation premiums
Facility relocations expenses
Facility expansion or downsizing expenses
Product sales and revenue forecast

Source: Wheeler et alia, 1998 [247], p. 210

Considering such matrix, civil servants of a given area may take decisions for attracting investment by providing an attractive economic environment. In this respect, the political trigger acknowledges that to attract certain firms may change the traditional features of the region. At the same time, the trigger decision to draw a specific kind of business would be influenced by its view about such business 's growth potential. This point tries to underline the grade of uncertainty and speculation that affect the own decision of the trigger.

Consequently, if the trigger considers the convenience of pursuit its goal of creating a cluster has to arrive to the second stage of the cluster approach that would be the organization of the recruitment process. This stage starts with the sensitisation of potential partners in order to get the

commitment with the cluster strategy. At this point, the trigger plays the main role as motivator and initiator of others' positive response.

Governments could show at this stage a better performance in leading and moderating the dialogue among partners because, presumably, they are guarantors of people trust and their behaviour would be less vulnerable to particular interest. In fact, the grade of legitimacy that a particular government would enjoy determines its capability to obtain the empathy of counterparts.

The process of engaging new partners is based on the presence of objective elements to evaluate the capacity of the region for performing as a successful productive cluster. As we have seen, parts of such factors are quantifiable. But, most of them are only partially measurable because of they may be adjusted according to changes in market behaviour. Moreover, the evaluation includes a certain level of uncertainty because it is partly the result of forecasting or drastic changes after the arrival of new counterparts in the negotiation process.

All in all, in my opinion, the conditions of this first stage of development are:

1. a positive attitude for change;
2. receptiveness toward innovative ideas;
3. sufficient knowledge for judgment;
4. a moral principle of public commitment; and

5. leadership.

5.3 Making the system

The goal of the cluster analysis is to design a plausible strategy toward economic development. The second stage applies the designed strategy. The cluster formation still needs to be accomplished. Therefore, the trigger is also responsible of the early stages of policy implementation as it is possible to see in figure 5.2.

There are two main things that would happen at this stage. Initially, the existing participants would be still coming together and creating the different interrelations that will keep the cluster working effectively. Furthermore, there would be still a process of recruitment of new members in every field as the needs tend to be more specific and the role assignation more specialized.

Considering this aspect, the growing cluster would attract those necessary partners by the double interaction of marketing efforts and deployed incentives, both financial (tax incentives or capital aides) and non-financial (infrastructures or personal connection via sponsored events). Having identified and attracted the policy partners, the trigger (alone or in cooperation with others) would set functions, defining responsibilities and distributing leadership. As we said, the trigger must count on attractive resources in order to induce partnership creation (i. e., by using subsidies).

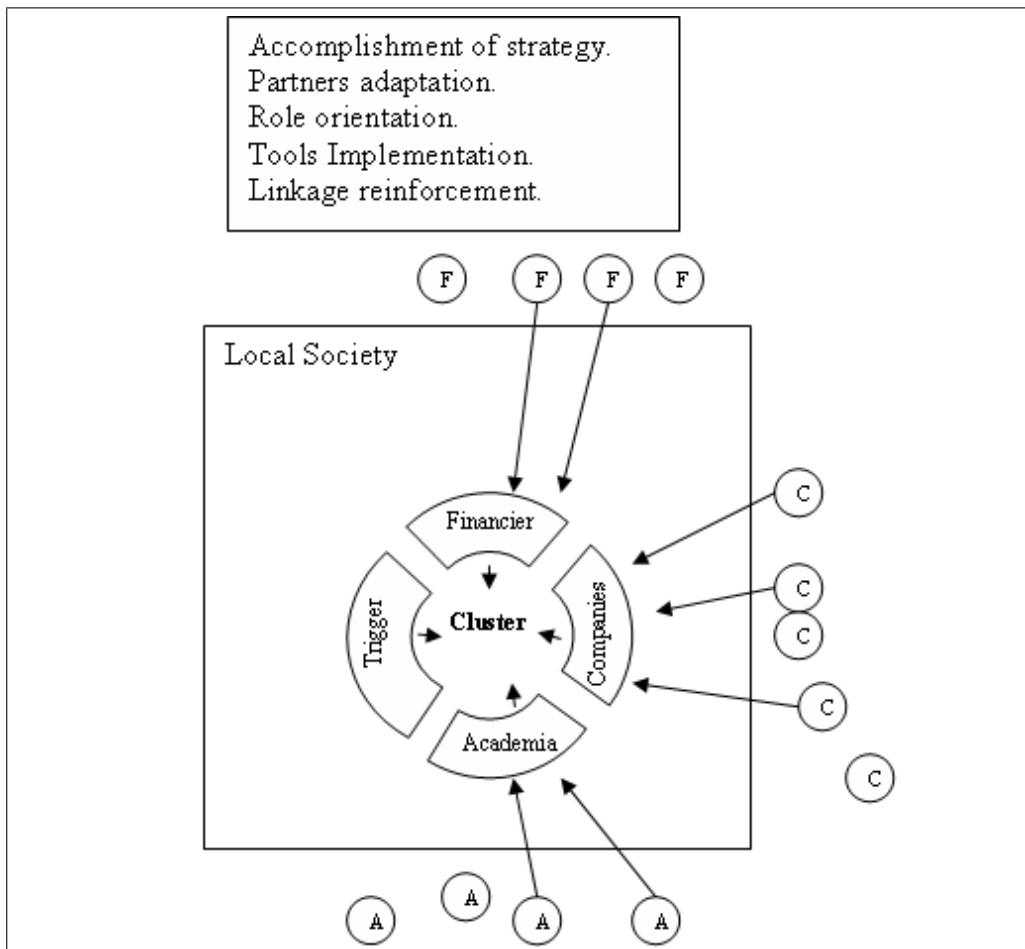


Figure 5.2: The consolidation of the cluster

In order to accomplish the strategy, the trigger might help the partners to adapt and integrate to the cluster circumstances. Possibly, the support of the trigger may be extended to guide the role assignation. As a result, the trigger would implement the system developing the necessary tools and sources of cluster interaction, reinforcing the obtained linkages.

This stage spread the cluster requirements by using tangible actions targeting specific short term purposes. In order to do so, it is necessary to establish cluster management, building route-finder initiatives and transmitting the vision.

Generally speaking, the cluster approach strategy is based on five pillars: the recruitment of business, the modernization of existing facilities, the support of local entrepreneurship, the stimulation of local innovation and holding local synergy.

5.3.1 The recruitment of business

As said, first, the trigger has to attract new partners to the area, making the location attractive for new corporations and improving the conditions of the already existing. For this, the trigger has to consider which incentives have to be offered. Initially, it may use cost incentives for capital investments and taxation. Moreover, the trigger may reduce the cost of information, research, transportation and labour by the use of subsidies, tax reduction or direct public investment for enhancing local infrastructures. The complexity of the possible environmental conditions that may influence the decision of a

firm to locate in a certain area was widely described in the previous section.

Such plans have to consider the most important causes in location search. Some of these causes are based on quantifiable factors affecting the access to markets, both domestic and global, such as population or cost of transportation. related to this last, it would be examined the access to production factors like resources or personnel and their mobility.

There are also some factors that every potential partner has to forecast after analysing the available data. For example, a firm would estimate trends in trade, the ability to compete from the new location or the possible changes in labour environment.

But, despite these elements, there is plenty of room for the political trigger to influence the location search process. Elements like the quality of life, the existence of institutional assistance, tax policies, investment incentives or infrastructures may have a selective treatment according to the specific needs of the counterparts. Such elements, could be negotiated, developed, implemented or promoted in order to underline the strategic relevance of the proposed place.

In addition, the political trigger has a privileged position in relation to the Media. The trigger may be interested in to establish a kind of strategic relationship with this sector. Doing so, the cluster will have a public platform for discuss existing problems and present new projects. Such public presence may reinforce local commitment. Additionally, it may represent an advantage for local actors because it would allow the expansion of marketing channels

available.

The aim is to make clear to the coming partners that their presence would be strength by a whole system of functions and activities that will add value to whatever is the product. This system, named value chain, could be divided into two major groups of activities: primary and support activities (Porter, 1990[186]). As a consequence, the system lets numerous merging forms and so the chance for many to participate.

Michael Porter gives several examples of how the myriad of possible interactions within a region result in several productive functions: main industries and suppliers of machinery, equipment and services. This element is consider a determinant of advantage⁴.

5.3.2 The modernization of existing facilities

A second element is to assist the existing firms in order that they modernise and invest in new technology, improving their facilities and the qualification of their employees. This policy have been use as an option for encouraging territorial competitiveness by focusing on small and medium size firms (OECD, 2001a[163], p. 186).

The trigger may assist giving subsidies for new equipment and buildings, but also could promote the continuous training of the labour force. This enhances the cooperation among the main industries and the suppliers

⁴Michael Porter, *The competitive Advantage of Nations*, Free Press, New York, 1990[186], pp. 100-107.

of services like education (formal and informal). Sometimes, educational institutions could be interested in promoting the training-on-the-job of their students. A resulting agreement between local firms and universities would be a chance for encouraging apprenticeship and a way for companies to obtain a cost-limited source of specialised labour.

This example embodies the need of mutual assistance among different participants. The theoretical research of academia has to be combined with practical knowledge regarding productive technical procedures and market orientation. In this sense, firms and financiers contra balance with their practical understanding of innovation and also provide channel for applying it (Feldman, 1994[65], pp. 51-75).

The efficiency of the cluster lies on the existence of four categories of agglomeration:

1. preparatory,
2. inductive,
3. developmental and
4. productive.

The first one refers to academic concentration. These institutions, like universities and schools, supply of basic training and research. Therefore, their functions are to keep a poll of well-trained individuals as well as developing new fields of innovation. In order to do so, the political trigger has to

keep high educational standards, promoting teaching as a prestigious profession and maintaining a good mixture of theoretical and practical education (Porter, 1990[186], p. 626).

The second one is related to those services aimed at advising, promoting and protecting intra cluster activities. The financier belongs to this category. As an example previously mentioned, venture capitalists provide economic and know-how means for the successful appliance of theoretical research to market demands and facilitate the capital reassignment (Hellmann and Puri (2002)[84], Kaplan and Strömberg (2000)[94], Keuschnigg (2003)[100]).

The third category represents the intensive industrial research and development (R&D). The existence of industrial R&D units would allow the transfer of theoretical knowledge to industry. In this respect, this group plays a crucial role within the innovation process because of the integrating nature. In fact, they would organize the translation of scientific and technical information into marketable products (Feldman, 1994a[65] and 1994b[66]). It also provides an informal knowledge system that would influence the existing industry. This kind of know-how refers to practices that can be adopted through practical demonstration and usage⁵.

The fourth variety would be relevant to define the industrial networks in terms explained by the work of Alfred Marshall, in particular when writing about those characteristics of the *concentration of specialized industries*

⁵This is actually a very common phenomenon. People tend to repeat, adapt or use those processes that seem to be more effective or attractive. Being fashionable an item has better chances to spread among a certain community: presentation techniques, software and so on.

(Marshall, 1938[140]). Such firm network would be a response to the complexity of economic environment. It might be a way for firms to optimize their behaviour acceding to a broader pool of information. Such expanded data would facilitate risk management.

The available information refers not only to prices and markets, but to other factors both economic and non-economic: behaviours, processes or informal knowledge. In this respect, learning comes to be a major centre of attention (Morgan in OECD, 1996[160]⁶, pp. 53-66). Through such network a firm get access to organizational routines that guide its actions. Therefore, the network admits a continual adjustment, transformation and development. Within the cluster, networks of firms combine both interaction and learning processes (Maillat in OECD, 1996[160]⁷, pp. 67-80).

This last category embodies the prospects for the cluster success. The firms' network would affect the whole region economic development as the main productive heart and, consequently, the main purchaser of employment and subsidiary services. Moreover, such network exposes a single firm to a close rivalry that will play a direct role in stimulating improvement and innovation (Porter, 1990[186]). Therefore, the trigger may have a special interest in supporting the agreement of the local entrepreneurship and its capacity to integrate new members emerging from related industries or attracted to the region.

⁶Morgan, Kevin, "Learning-by-interacting: inter-firm networks and enterprise support", in OECD, *networks of enterprises and local development*, Paris, 1996

⁷Denis Maillat, "Regional productive systems and innovative milieux", in OECD, *networks of enterprises and local development*, Paris, 1996

5.3.3 Support of local entrepreneurship

The trigger may encourage local entrepreneurship. Once the process has begun, local government counts on “leading” resources as support incentives to persuade policy participants (i. e., funding) or compelling tools to force certain actions (i. e., laws and regulations). Moreover, local government may be able to correct and balance the undesirable outcomes of the development process using public budget (i. e., for the construction of infrastructures or giving subsidies) or arranging the legal system (i. e., laws to protect property rights and contracts or sensible tax policy).

Nonetheless, the trigger has to be aware of its limited role. This means that there is no policy good enough to counterbalance underlying regional circumstances. But, despite its partial influence, the trigger could enhance the capacity of firms to compete. This means, for example, facilitating the access to markets by selecting the physical point of agglomeration:

If interindustry (complements) are high and transport costs are low, a stable industrial cluster can arise in the peripheral region. “globalization” does not appear to threaten this possibility. [...] Because of the agglomeration in the core region is always an open possibility, the policy maker must somehow “select” the equilibrium where firms cluster in the peripheral region. The role of regional policy appears to be irreplaceable in achieving this outcome (Pontes, 2003[183], p. 2062).

Initially, the trigger could improve factors productivity via public education and training. This element will improve labour skills and abilities. This constant upgrading is necessary even for keeping competitiveness, considering the pressure of market. The trigger educational policy has to combine several elements. At first, the trigger has to maintain high quality standards. The quality of instruction would be maintained by attracting qualified individuals to the profession of teaching as prestigious and socially respected. The academic curriculum would include practical training to improve student's capacity to understand and be understood. The trigger will promote also alternative institutions of high education besides university in order to promote vocational learning and more specialised practical coaching. Finally, the trigger will create and maintain formal connections between academia and industry, permitting the mobility of personnel and joint projects. Nonetheless, the trigger has to encourage the research activity of firms. There is some joint research in science publicly financed and indirectly supported by private companies⁸(Porter, 1990[186]).

As second element of the trigger's support to entrepreneurship appears the improvement of infrastructure. This aspect regards enhancement of transport, telecommunication, logistics, health, culture and leisure. Specially, these last aspects could do more for the retention of qualified labour than the investment in roads. For example, following the German Wende, immense funding was invested in the Neue Länder of the former German Democratic Republic (GDR). Part of this financial support was used to renew the road system in order to suit West Germany standards. In the case

⁸On the other hand, in some cases, the results are not efficiently transfer to society and this has to pay twice the scientific effort: research funding (loans, subventions, scholarships, grants) at first and intellectual property royalties (patents) afterwards.

of Sachsen-Anhalt⁹, such investment could not stop the decay of its traditional industry and the resulting emigration of working force. Evidence demonstrates that individuals in this area tend to leave the higher their level of qualifications is. As a consequence, *fulfilling people's hope and expectations* of a better life could do more in this sense that maintain an awesome road system¹⁰.

In developed areas, infrastructural investments in sectors like culture, health, sanitation and leisure may be of higher effect on human wellbeing than the maintenance of sophisticated road or communication systems. It is possible to picture the idea if it is explained in terms of decreasing marginal output of investment. Besides, it is interesting to notice that the traditional role of governments as creators of such infrastructure could be in many ways played by private actors. Furthermore, privatization of public services could be a way of attracting investments and stimulate savings transfers.

The third element of government's support to entrepreneurship would be the role of the trigger as continuous reserve of broad and accurate information about markets, technology and competition. This information is copious and diverse. Governments could improve its understanding by publishing studies, statistics, indexes, listings and other means of formal content. By doing so, governments expand the information bank available for companies. As a complement, the trigger has to promote the exchange of ideas

⁹According to the Bundesagentur für Arbeit (Arbeitsamt) the unemployment rate for Sachsen-Anhalt in February 2005 was 22,8% of the active population (with almost 300,000 unemployed people). www.arbeitsagentur.de

¹⁰The idea was expressed by the former Ministerpräsident of Saxony, Prof. Dr. Kurt Biedenkopf during a television interview. "Der starke Osten: Welche Chancen haben wir wirklich?". *FAKT ist...!*, Mitteldeutscher Rundfunk (MDR), broadcasted: 14.03.2005

among different actors by opening channels of interaction and, when it is possible, institutionalising them via trading channels¹¹.

The fourth element is the incubation and development of new business. For doing so, the trigger will stimulate financial assistance by providing of a source of venture capitalists. This is a key factor for trigger's success. As mentioned, venture capitalists will provide not only of financial means but, also, of the necessary managerial know how to assure the new firm survival. It should be underlined that clusters can generate a critical minimum demand for new, specialised products or services that cannot be produced profitably elsewhere (Caniëls and Romijn, 2005[34]). This opens an extra field of enterprise opportunities and it has to be considered by the political trigger. Additionally, the trigger may simplify the administrative and legal requirements for the establishment of new firms and reform tax policy in order to improve companies' certainty (Broll, Marjit and Mukherjee, 2003[26]).

Finally, the trigger may also give support to local firms by transferring subsidies. Nonetheless, as mentioned, in many ways subsidies could be a way of jeopardise the system. Firms may shift its role of market competitor to subvention seeker. Therefore, the trigger's direct financial backing motivates that entrepreneurship experiences a market misrepresentation. Such phenomenon could be named as policy induced distortion and would affect firms' performance and ability to hold innovation.

In contrast, the trigger could improve companies' response by the use

¹¹Trade as transaction is intrinsically a joint strategic act by two or more agents (Shubik and Smith, 2006[216], p. 6)

of tax incentives¹².

5.3.4 Stimulation of local innovation

The cluster approach success lies also in the capacity to incorporate productive innovation. Innovation depends on entrepreneurship flexibility and research. The way research would be applied to practices upgrading would be related to the simplicity that information can be obtained in the local environment. The trigger has to promote those means of knowledge exchange, accumulating the innovative capability of firms and providing possibilities for sharing costs and risks of new innovations. In this sense, knowledge is an extraordinary item because is cumulative nature and because can be distributed without capacity loss (Bakkevig, 2003[10]).

Another element is based on the fact that the introduction of innovation by firms is the result of an investment decision (Alfonso and Vazquez-Barquero, 2003[3]). Such decision is a result of an evaluation in which cost and estimated profits are considered. Therefore, there is room for uncertainty. The bigger this insecurity is, the less probable the decision of adopting innovation will be. If, somehow, the trigger reduces such uncertainty there would be more opportunities to adopt new ideas for enhancing processes and products.

The trigger would reduce uncertainty by simplifying and improving the administrative and regulatory environment for the firms regarding es-

¹²Udo Broll and Antonio Roldán-Ponce, "Public-Private Joint Venture, investment and Economic development". *Journal of European Economy* 3, 2004, pp. 139-148[28].

pecially property rights, taxation and copyrights. This legal environment might encourage people to behave in *economically productive ways* (McDowell *et alia*, 2006[145], p. 568).

Additionally, the trigger has to improve the financial environment for business in particular to promote research and innovation. The trigger may attract venture capital using tax incentives and organising encounters among financiers and entrepreneurs. This element has special interest for the promotion of start ups.

The trigger could consider also to take non-financial measures that may be beneficial for entrepreneurship. Firms could obtain profitable returns out of non-financial measures specifically designed for developing training in entrepreneurship and identifying and promoting specific policies for firms. Businesses would access to support services, programmes and networks and improving the coordination of these facilities¹³.

The trigger may also demand some of the product in an early stage of commercialisation of new products and services. Such early demand (Porter, 1990[186]) would incite local suppliers into new areas. Acting in this way, the trigger stimulates business initiatives having a seeding effect on efforts of both academic and firms' research.

The trigger has to keep a competitive environment within the cluster. The local rivalry would be strengthened by regulations on competition. This environment creates dynamism within the system, renewing the way factors

¹³see *European charter for small enterprises*. <http://europa.eu.int/scadplus/leg/en/lvb/n26002.htm>

are used and expanding the services required. Paradoxically, from this rivalry may result the cooperation among firms that recognise clear advantages of integrating particular interests.

Moreover, innovation is also related to the way final products are presented. Therefore, the trigger should give chances for improving local products' marketing (Feldman, 1994[65]). The trigger may promote those initiatives oriented to improve product design and appearance, productivity, pricing, supply stability and reliability. This aspect could be completed by the sponsorship of local brands as symbols of certain quality patterns for safety, product performance and environmental impact (Porter, 1990[186]).

Additionally, the trigger would promote the achievement of those standards internationally recognised (like ISO). This aspect is important because would improve the way local products and services compete internationally. It has to be understood that the new product specifications ought to be adjusted to the desires of the international demand and not only local requisites¹⁴.

At last, the trigger has to support the acquisition of an effective innovation process. Such process establishes three different stages. The first one refers to the scientific research that presumably will lead to a scientific discovery. Afterwards, there is a stage in which such discovery develops and refines in order to obtain a marketable product. Finally, there is the market introduction of the new product that enjoys new features or resulting of new

¹⁴This is particularly important with food. Sometimes, the local idiosyncrasy is very difficult to be assimilated in other areas. Therefore, it is important a certain regulation that anticipates international market wishes considering product identification, hygiene and habits of consume.

productive process. Nonetheless, these stages do not follow a fix sequential pattern. In many ways, innovation may be initiated in any of such stages (Feldman, 1994[65]).

innovation is the result of knowledge and considering the source of it, the innovation maybe the result of market or production origin too. In consequence, the trigger has to enhance the way information is transmitted, translated, synthesised and evaluated. In order to be constant, the innovation process needs of a heterogeneous mass of co-operators that differ in the interpretation of the use of such knowledge. These co-operators may interact with each other benefiting the cluster as a whole with synergetic effects.

5.3.5 Holding local synergy

In order to obtain, the desired synergy it was mentioned previously that the system should integrate different participants in dimension and nature. The cluster approach integrates members of entrepreneurship, finance and academia.

The trigger has to motivate that the differences converge in the scope of market functionality. This does not mean that the academic research necessary would produce useful knowledge for business but that knowledge may have commercial applications whether formal or informal. The cooperation of industry and academic pools would not necessary be intentioned (like in medicine, biology or chemical engineering) but it could be the result of fortuitous advantage (i. e. Internet).

For that reason, it is also vital to set up the first channels of partners' communication, means that could be adapted and reoriented according to the requirements of the participants but, which function is to keep unceasing exchanges. The trigger main effect would be supplementing the credibility of the erected associations out of their progressive formal organization.

The interaction of different actors gives rationality in decision making. Policies tend to maximize goals to fulfil the interest of dissimilar participants. As an example, role assignment is distributed according each actor's virtues. Additionally, regulations are adapted to fit the specific objective.

In the stage of consolidating the cluster, the trigger should accomplish the strategy by helping partners to adapt to the new cooperative oriented environment. The trigger should also provide of means to acclimatise the behaviour of partners in this respect, making easier the access to updated tools and reinforcing again the linkage among participants. Anyway, the trigger ought to keep conscious of the greater sharing responsibility for implementation between private and public sector. This phase is for correcting function's disorder. Therefore, it is vital to keep transparency, balance and reliability in the relation between trigger and counterparts, allowing the influence of the representative groups and undertaking monitoring duties.

Simultaneously, the task distribution and the continuous communication avoid interference, helping to fix agendas organizing the way factors are shared, pursuing integrated actions and, consequently, conducting the good use processes. In other words, there is a net of linkages yet not necessary formal. The aim of the second stage is to create a growth enabling environment

with self-sustainable capacities.

5.4 Making institutional

Once the policy has shown its capability, actors concerns are to maintain policy and sustain goals. The institutionalized cluster strategy is based on a maintained process of planning, implementation, monitoring and evaluation. The process would benefit of the submission of three main policies:

1. It is vital to maintain the conditions that make possible the continuation of the cluster. In this sense, it is possible to include those policies that promote infrastructure, competition, education or investment.
2. it is necessary to institutionalize those services that contribute to increase the competitiveness of the cluster. Such services include consulting, financing, dialog or information supply.
3. it is needed to promote the cooperation between the different parts. There are several ways to reinforce such cooperation. For example, the different parts could benefit of the implantation of training programs and the establishment of cross-evaluation, outsourcing measurement and independently conducted quality audits.

The cluster approach is a tool to improve competition, not to reduce it. The interest would be to establish an effective tool to achieve significant improvements in innovation and competitiveness (Ketels, 2007[98], p. 4).

5.4.1 Setting interactive policies

Hence, the role of the trigger at this stage focuses on efforts to continue institutionalizing the net and updating a permanent set of instruments of controlling and administration. The figure 5.3 describe the late stage of the cluster approach. The cluster is already formed and working.

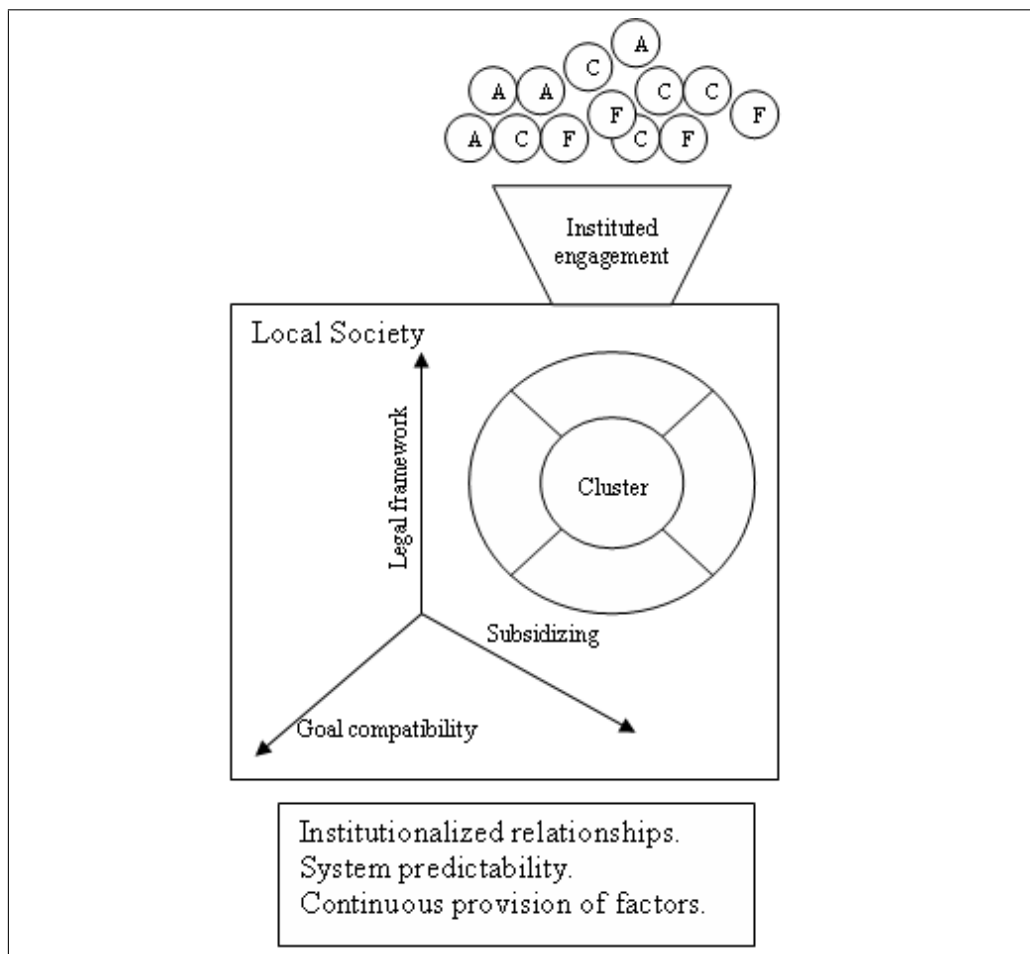


Figure 5.3: The cluster as institution

As can be seen in the figure 5.3, the cluster is established and there

is a created bond among the different participants. Such relationship defines every actor as a cluster member and not as an isolated element. The relationships are established in two levels.

One level defines the interactions among actors related to the same productive sector and the same stage of the value-added chain. In this level, there would not be a hierarchy defined in terms of buyer and supplier. The aims of such level of interaction would be the reduction of cost because of the assignation of production according to the efficiency in the use of factors. If such relation formally affects a reduced number of participants, the diminution of the number of purchasers might make possible the use oligopsonist techniques (improving negotiation power because of the larger quantity of providers) to reduce the price of supplies because of the possibilities of discounts. Moreover, this kind of partnership may also reduce marketing, packing or storage expenditures.

Nonetheless, such reciprocity could also be informal, affecting to a higher amount of counterparts. If so, there would be an exchange of information and opportunities for the relocation of factors or for recycling machinery and equipment already amortised or inadequate for firm's actual requirements.

The next level defines the system of informal linkages of actors belonging to successive production stages. In this system, the members of a stage will adjust production to the requests of the intra-cluster client on the higher stage. The last intra-industrial purchasers within the cluster (the cluster's final demand) will be the ones that introduce product in external market.

This system could be applied to multiple sectors according to the production requirements. Then it would include not only industry related services but financial services, training and development, promotional agencies, research institutes and administration. As a consequence, every actor could partly ensure a guaranteed market and also determine in advance its own supply needs, reducing uncertainty.

Nevertheless, in order to keep the efficiency of the system as a long lasting phenomenon, there are three obliged dimensions¹⁵ that guide the behaviour within the cluster.

5.4.2 The cluster functional dimensions

The first dimension represents continuity in the goal compatibility of the different members. This means that the cluster has to satisfy the interest of every participant. Otherwise, the cluster will develop frictional deterioration and generate declining components. Such elements, if there are not corrected may provoke the collapse of the system and the end of the cluster.

The second dimension is the functional reciprocity. Every member of the cluster has to be able to find a partner in the other members. For example, in case of firms, they would find the means that support productivity in the other actors as source of R&D¹⁶, investment or legal support. This legal support appears also as the last dimension of the cluster. The cluster enjoys

¹⁵The concept of dimension refers to a type of measure (Shubik and Smith, 2006[216], p. 4)

¹⁶Relative trained individuals, with their own laboratories and material, paid with public money or which scholarship or financing, given by companies, have public incentives.

a certain legal standard that protects every participant and balances their influence within the net.

The third and last dimension corresponds to the legal framework. Hence, the political trigger enjoys again a relevant role being the sole actor able to develop, apply, reform and maintain legislation, according to social requirements. The aim of such framework is creating an environment of freedom and equality among all the participants. This aspect is especially important because behind the idea of equal opportunity, comes the spirit of fairness and mutual correspondence but also the chance for individuals to follow their will. Laws, in this sense, ought to be created for the convenience of every single individual and by determining equal duties, protecting individual freedom and rights. Therefore, the complexity of maintaining the functionality of this dimension defines its importance for the cluster system.

The first and second dimensions are somehow measurable in the short run. If the cluster does not satisfy the needs of the participants they will progressively abandon the system and if they are not substituted, causing the failure of the structure. The same would occur with the reciprocity because if one agent does not find the best possible partner within the cluster and it is tempted to maintain the relationship because public incentives, the result would be this agent's diminishing competitiveness.

In contrast, the legal framework needs a longer period of time in order to evaluate its effect on the system. Therefore, any political agent has to be aware of the implicit risk that any economic decision in form of law may involve for the efficiency of the whole system. The policy intervention

in this last dimension has to prepare and maintain economic activities, enhancing the needed infrastructure and public services for the better use of the resources of its region (OECD, 2001a, p. 136[163]). If the cluster approach is applied on a situation of economic collapse, the policy makers has to support the market forces for obtaining the optimal outcomes of economic development.

This optimum describes a situation that balances economic growth, environmental sustainability and human welfare. All in all, this legal framework combines those policies aimed at production factors (land, labour and capital), those focused on enhancing business environment and, finally, those concentrated on improving markets' efficiency. An example of the first may be the promotion of technology transfer through the exploration of new possibilities for legislation concerning business partnership. For the second kind, a legal response could be introduced for the demands of flexibility and openness of local entrepreneurs and capital investors. Finally, regulations may be considered necessary for enhancing job placement, labour laws, quality standards, competition or venture warranties.

The last stage is an affirmation of cluster goals. Therefore, it is important to use achievements for encouraging the need of institutions and rearranging public and private tasks.

5.5 Getting the idea

The cluster approach policy introduces a multi-level concept, which aims to integrate present and future attainments in economical, political and social terms. It is a clear example of the value of economic interaction, because doing so the risk for each individual is less and the gains for each are greater.

The trigger defines the goal, designs the strategy and attracts partners. In the cluster approach model, every kind of actor (no matter its nature is) can be a trigger. The only determinant would be that it controls enough resources to attract or mobilise partners, as well as, possesses a certain analysis capability to design a rational strategy.

Permanent contacts raise the competence of open associations and potential interaction by including new harmonizing processes for acquiring knowledge from other actors. These systems can be even legally instituted even. With these means, no actor is without help. For this reason, communication is required connecting actors for arranging outlines and sharing control.

Actors have to preserve a close bond with the trigger. This maintains a broad point of view of each cluster relationship and all planned area. The straight response to core difficulties, actions and interactions inside the cluster help the trigger to form satisfactory guiding principles. This is favourable not simply for proposing cluster guidelines, besides it provides measures for checking the competitiveness course. Such comprehension reduces any potential policy replication.

Through the observance of reciprocity, diverse actors create confidence about upcoming events what may sanction extra ambitious but risky goals. The motive is that each actor confide in the tie with other cluster elements, confident of their support when in case of potential difficulties.

In the coming pages, we will describe how the cluster is applied in reality (see table 5.3).

It may be possible to apply the basic cluster approach framework to describe the case of Dresden. If so, the trigger would be the state government of Saxony (*Sachsen Landregierung*). At the beginning of the 1990s, the social situation of economic instability and social dissatisfaction, described in a previous paper, demanded an ambitious plan to develop the region. The question was how to attract business to the region. The relative distance from main industrial axis or transport channels determines focusing on non-traditional fields such as heavy industry. Diving in the “inventive tradition” of Dresden and considering the existence of the reputed Technische Universität Dresden, the public leaders chose the high-tech path in the moment when e-business was booming. The “Dresden trigger” attracted investment by the double interaction of marketing efforts and deployed incentives, both financial (tax incentives or capital aides) and non-financial (infrastructures or personal connection via sponsored events). The long-term interest of politicians could be, for example, to assure population fixation to Saxony (guarantying future tax contributions) or to gain political support in the region for the party in office. Companies came to Dresden considering the advantages derived from goal synchrony with political actors as well as the advantage of an investigation centre, source of qualified workers and able to share research and development costs. Moreover, once the localisation process has finished, the company can enjoy the derived externalities (i. e., reduction of supply cost). Finally, the academic centre has ensured its survival as well as possible prestige derived from its liaison with well-know corporations. The role played by every actor changes according to circumstances. Partnerships shape behaviours, interest and needs. In general, it is predictable that the trigger efforts would tend to decrease if the decision was rational. When the growth enabling environment is settled, every actor gains a certain level of predictability and certainty in partners support.

Table 5.3: Cluster Approach in Dresden

Chapter 6

Starting the cluster: Dresden

Previous chapters have explained the main elements that define the cluster approach as a model of development policy. We also exposed the way these different elements interact with each other and we enumerated the diverse stages and levels of cluster development. Then, it is possible to say that the cluster approach would be a descriptive tool for the understanding of economic variations in a certain area.

This point of view is based on the significant capacity of the cluster approach model to integrate different aspects of economic growth.

The cluster approach main axiom is that the industrial specialization geographically concentrated may boost economic development through the increase of firms' competitiveness and innovation, the creation of synergies and the optimisation of factors allocation. Following this dictum, different strategies were defined in order to obtain such concentration of economic

activity.

In the coming pages, an example of the model will be presented: this is the case of Dresden¹.

6.1 A tale about a city

Too frequently, an event is described for the Media as *historical* or *revolutionary*. Fortunately, for scholars and compilers, such events are far much unusual and the chronicle of humankind tends to be written by the continuous dripping of everyday stories in political, economical or social spheres. Nonetheless, it is also true that a certain incident may act as noisy warning of a radical turn in human affairs, affecting every single dimension of behaviour. These are the moments when one witnesses the happening of History.

One of such rare episodes did happen on 9 November 1989. In that Thursday, officials and people started to demolish the wall that had maintained separated West and East Berlin since 1961. The immediate effect was the exodus of tens of thousands of East Germans into West Germany that were emotionally welcomed by Dr. Helmut Kohl, Chancellor of the German Federal Republic (GFR). The lost of control on the population obliged the call for the first free elections in the German Democratic Republic (GDR) in its History. The following March, the Christian Democratic Party (CDU)

¹In the following pages the Dresden cluster will be described. In order to see analytical tools for identifying clusters see Chris DeBresson and Xiaoping Hu “Identifying Clusters of Innovative Activity: A New Approach and a Toolbox” and Alfred Spielkamp and Katrin Vopel, “Mapping Innovative Clusters in National innovation Systems” in OECD, 1999[161].

won the elections and Lothar de Maizière was appointed as chief of Government. In July 1990, both governments agreed the monetary and economic unification of Federal and Democratic Germany. On 3 October 1990, East Germany was dissolved and its people integrated as citizens of West Germany. New elections in December 1990 gave the triumph to Dr. Helmut Kohl's party. Such event was the closing stage of the *Wende* or "turn". Germans label the unification process with this word.

For the population of the *Neue Länder*², the *Wende* had an ambivalent effect. On the one hand, the range of liberties was greater than it was during the "Democratic" period. On the other hand, because of open competition and factors flow, many businesses disappeared and their workers suffered the, until then, unknown situation of unemployment.

To 1990 followed a period of adaptation between elements of the former-socialist system abruptly interrupted and the dynamic market economy of West Germany. As a result of their lack of competitiveness or the immediate loss of traditional buyers and suppliers outside Germany, many businesses of the East were unable to compete under the rules of free economy. Consequently, many of them closed down and the rest survived only via severe re-adjustment policies.

The effect of those decisions was, in many cases, cuts in the number of employees. The Eastern economy, so far unaware of the unemployment phenomenon, suffered a rough collapse of its labour market. Consequently, lots of people, especially of qualified workers and their families fled to West

²"New States" or also, Neuen Bundesländern (New Federal States). This term applies to the former East regions in the unified Federal Republic of Germany

Germany because of the prospect of better living conditions immediately after unification took place³.

However, such emigration has fallen since 1990. The convergence in hourly wages and unemployment information seems to be the reason. Nonetheless, emigrants are disproportionately young and skilled. This intensifies the so-called brain-drain phenomenon, affecting economic competitiveness (Hunt, 2000[87]⁴). Those who stayed were forced, in many cases, to alter their working routines, moving toward new activities or, quite often as well, toward underemployment in unskilled secondary sector. Those who were not in employment and were unable to find work swelled the increasing figures of unemployment.

As an undesired outcome of the political achievement, the economy of East Germany collapsed despite the massive amounts of public funding⁵. After 10 years, the unified Germany even shows a widening gap between east and west⁶. The added tensions between globalization and localization did not help to fill this breach.

³400,000 individuals per year left Germany in 1989 and 1990 (2,5% of East German population per year). See Frederic Pryor, "After Unification: Conversations with East Germans", Foreign Policy Research Institute, Elsevier, 2005b[192].

⁴Jennifer Hunt, "Why do people still live in East Germany?", NBER Working Paper Series, Working Paper 7564, National Bureau of Economic Research, Cambridge, Massachusetts, February 2000[87]

⁵Since unification, the German government has transferred about 1.1 trillion German marks to East Germany. Such sum has been financed mostly by public borrowing and forced Germany to violate the Maastricht Treaty. Hans-Werner Sinn, "EU enlargement, migration and lessons from German unification", CESifo Working Paper Series, Working paper No.182, April 1999, p. 15[219].

⁶From 1988 to 1997, population figures illustrate different schemes between East-West tendencies: Western growing and Eastern lessening. In 1998, East Germany (19.5%) almost doubled the unemployment rate of West Germany (10.5%), Statistisches Bundesamt (Hrsg), Datenreport 1999, Bundeszentrale für politische Bildung, Bonn, 2000. Pp. 27-8, 98, 102-5[227].

The main causes of stagnation could be completed adding inadequate system of infrastructure in some areas, lack of financing for small businesses, the lack of experience in production organization and marketing because of the weaker entrepreneurship culture⁷.

As a result, eastern Germany's rapidly shrinking industrial sector quickly came to depend on subsidies from the German government and on massive new plant investment by corporations based on western Germany. Saxony, as one of the *Neue Länder*, was also part of this phenomenon.

As we see in figure 6.1, Saxony is situated in the south-east of Germany., Saxony share borders with Poland and the Czech Republic. This proximity establish a historical relationship with both central European countries.

6.2 A brief history of Saxony's economy

In the past few years, media has portrayed the region as the cradle of high-tech firms: the *Silicon Saxony*. This term describe the concentration of high-tech companies in Dresden and it is also the name of a network⁸. The official line of Saxony affirms that the region, heir of a long tradition of both innovative and entrepreneur spirits, takes the previous steps for economic reform policies toward competitiveness⁹.

⁷“Why is East Germany lagging behind?”, article published in *Süddeutsche Zeitung*, 23.11.2001.

⁸See *Silicon Saxony*, 2006[217].

⁹“Focus on Dresden: The Capital of Saxony in Figures”. *Landeshauptstadt Dresden*, 2000[119], p. 10. *Der Alumni-Guide 2002*, Technische Universität Dresden, 2002[234], p.

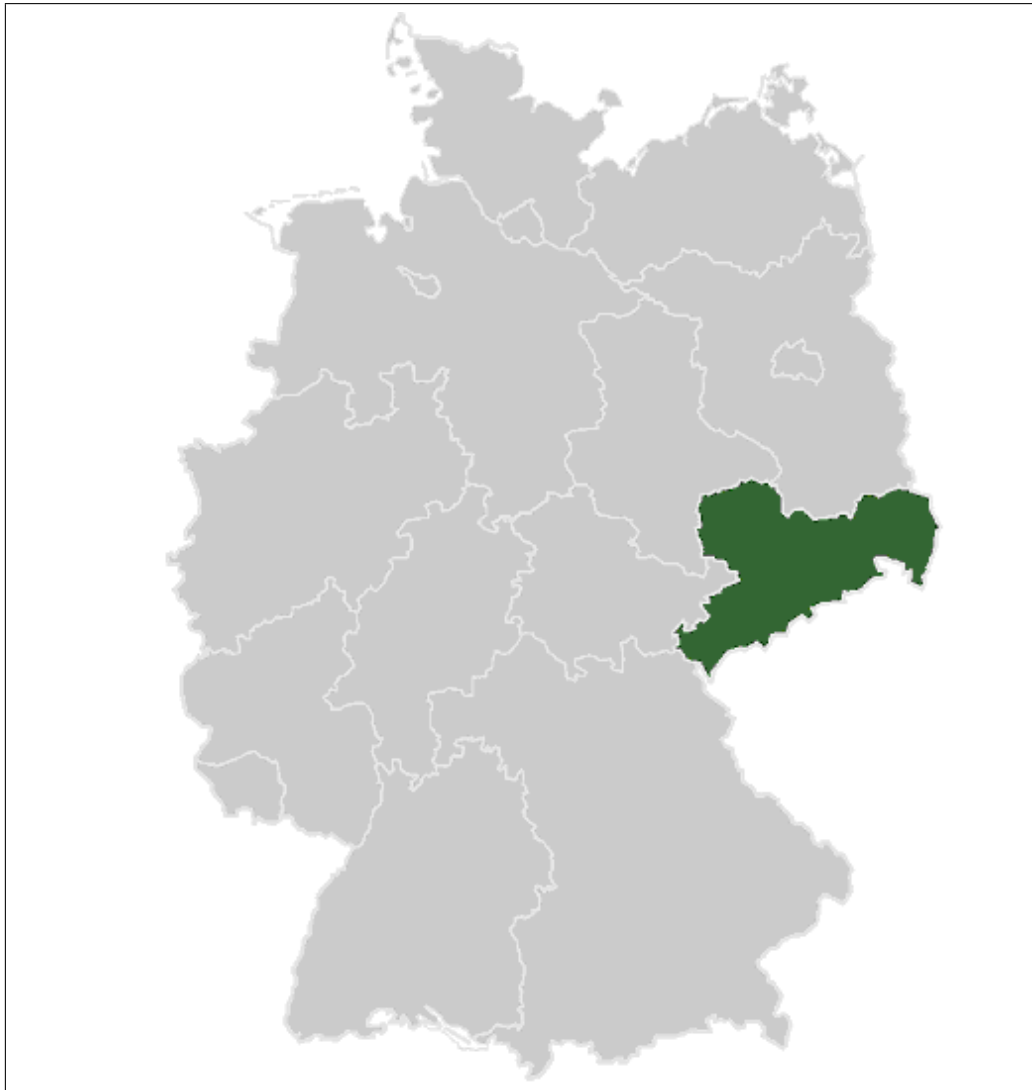


Figure 6.1: Saxony in Germany

Indeed, the record of Saxon findings is impressive. In 1650 the world's first daily newspaper was published in Leipzig. The first German steam locomotive was made in Saxony, as was the first single-lens reflex camera. The first gasworks in continental Europe brought gaslight to Halsbrücke near Freiberg in 1815, while Germany's first district heating works brought central heating to Dresden in 1900. The first CFC-free refrigerator, an environmentally friendly fridge, was also invented in Saxony winning the German environment award in 1993.

This local inventive also affected more ordinary objects. For example, in 1899 and also in Saxony, a lady born in Dresden, Christine Hardt, invented the bra. Also another Dresden woman, Melitta Bentz, registered a patent in 1908 for the invention of the paper coffee filter. Toothpaste tube, teabag, beer mat were also invented in Saxony¹⁰. Silver and coal mining once made the region prosperous. Other traditional sectors are the textile, mechanical engineering and automobile construction industries.

Hence, since medieval times¹¹, Saxony was one of the richest regions in Germany. This economic vitality allowed the acquisition of major politi-

6.

¹⁰See *Sajonia y los Sajones*, Landesregierung des Freistaates Sachsen, 2000[126], p. 13-49.

¹¹From the year 1168 silver mining is dated in the Saxon city of Freiberg. However, in the region was also possible to exploit tin, copper and iron. Christina Flume, Heike Türpe, Sybille Finkous (Ed.), *Saxony. The Facts*, Freistaat Sachsen, State Chancellery of Saxony, 2004[69].

cal¹² and cultural¹³ roles.

During the early years of the 20th century, Saxony, together with Thuringia, northern Bavaria and Saxony-Anhalt, were the largest industrial area of the German Empire. In 1925 there were 2.6 million people employed in industry and trades or 20.5% of all those in Germany employed in these sectors (at the same date in the Ruhr area was 15.7%)¹⁴. With the bordering industrial areas of Bohemia that industrial area expanded into one of the largest industrial landscapes in Europe, with Saxony at its centre.

The high employment rate in the growth sectors led to considerable wealth. In 1934, with an average income of 878 Reichsmarks per resident, Saxony was 9% above the average income level of the German Empire (804 Reichsmarks). And, with 347 residents per square meter, Saxony was the most densely-populated area. All over Saxony, the portion of the population in industry was over 50%; in the Chemnitz area this figure was 66%. 9% were employed in the agriculture or forestry sectors¹⁵.

¹²For becoming Emperor or Kaiser of the Holy Roman Empire, before the candidate had to be designated “King of Romans” by an electoral college with a limited number of electoral princes (*Kurfürsten*). Since the 13th century until the end of the Empire, the Saxon elector was one of the main members of such college and since 1464, after the Wettin family acquired the rank of *Kurfürst* and the name “Saxony” passed to their territories, Dresden was the capital of the elector. Hermann Kinder and Werner Hilgemann, *Atlas histórico mundial: De los orígenes a la Revolución Francesa*, Vol. I, Istmo, Madrid, 1990[106].

¹³In 1409 was founded the Leipzig University. Goethe, Lessing, Nietzsche or Ortega y Gasset studied in it. The cultural effervescence of Saxony was also experienced in many other areas. For example, Saxony was home of composers such as Johann Sebastian Bach, Carl Maria von Weber, Richard Wagner or Felix Mendelssohn-Bartholdy.

¹⁴*Historical developments of the economy of Saxony*. Saxony’s State Ministry for Economic Affairs and Labour. www.smwa.sachsen.de[127]

¹⁵*Historical developments of the economy of Saxony*. Saxony State Ministry for Economic Affairs and Labour. www.smwa.sachsen.de[127]

However, such status was roughly interrupting during and after the Second World War. A dramatic example is the capital of Saxony itself: Dresden (see figure 6.2). The known as the Florence of the Elbe (because of the solemn beauty of its baroque style buildings¹⁶) suffered a devastating bombing on 13-14 February 1945. As a result, the entire inner city was destroyed and thousand of citizens and refugees killed¹⁷. Whether deaths, wounded or unhurt, the bombing was an unprecedented human drama and its impact made countless victims.

The impact of such lost has to be evaluated considering the devastating panorama after the bombing for the survivors: the city almost entirely reduced to rubble, the deaths of ten of thousands, the wrecking of its industries, communications and transportation system.

The heavy bombing affected also Leipzig (1943) and Chemnitz (1945). Then, the three main cities of Saxony and economic cores of the preceding Saxon prosperity were ruined. The region was devastated, bearing heavy burdens on population and resources and with limited raw material supplies.

However that was not the only pernicious turn in Saxony's economic

¹⁶Through the 16th century, Dresden developed into an artistic capital as a political one. At the end of the 17th century was *Residenzstadt* of the Prince Elector of Saxony. With Frederick August the city enjoyed a splendid time. The prince, also king of Poland (Augustus II), made of Dresden a "glorious city built of stone" (Taylor, 2004, p. 23 [233])

¹⁷Total figures are controversial. A total of 400, 000 deaths were estimated by German Ministry of Propaganda close after the bombing during the war. Numbers between 25, 000 and 140, 000 were given by official statistics during the Communist regime. The highest figures were again accepted by some historians but recent studies have reconsidered the figures to circa 35, 000 deaths directly caused by the bombing. In any case, despite the exact amount of casualties, it is a fact that during the firestorm 80% of Dresden was destroyed including the historical centre. See Frederick Taylor, *Dresden. Tuesday 13 February 1945*, Bloomsbury, London, 2004[233], pp. 503-509. John W. Spanier, *Games Nations play*, Praeger Publishers, London, 1972[226], pp. 115-116.

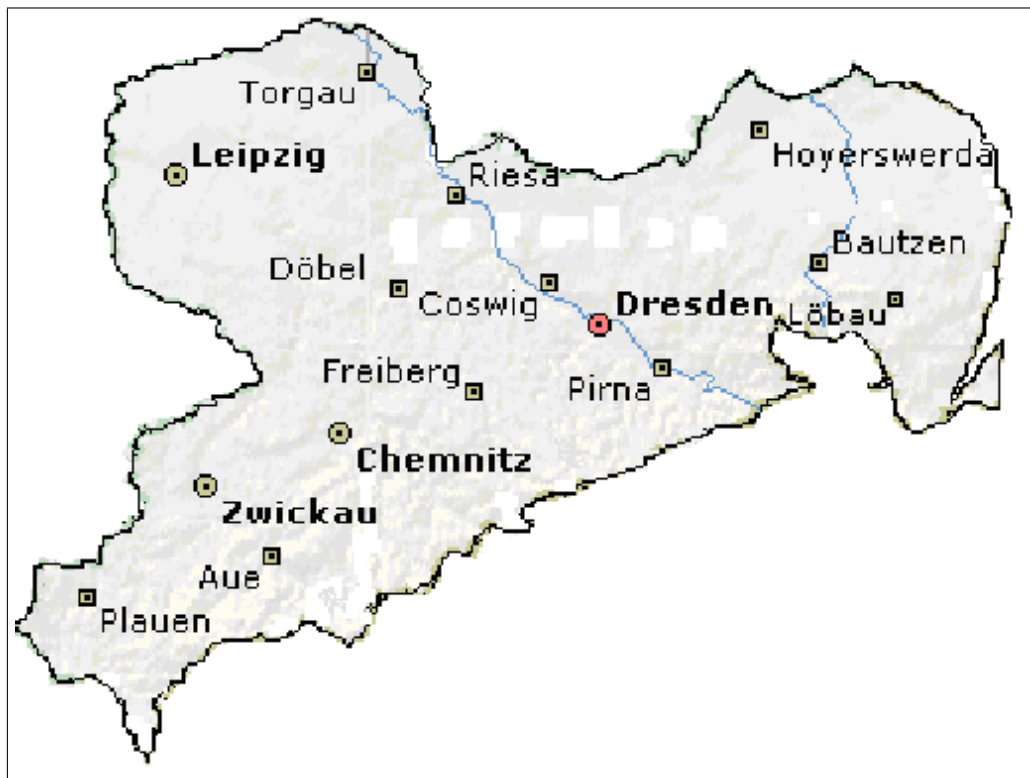


Figure 6.2: Saxony's main cities

fate. After the defeat of Germany, the leaders of Great Britain (Winston Churchill and Clement Richard Attlee), the United States (Harry S. Truman) and the Soviet Union (Joseph Stalin) met in Potsdam from 17 July to 2 August 1945. In this city, close to Berlin, was signed an agreement that decided the immediate post-war but also, with the decision of dividing Germany, create the conditions of a new conflict that affected the whole world until 1991: the Cold War.

Among several resolutions, Germany was divided in four areas of occupation administrated for the military authorities of the United States, the Soviet Union, Great Britain and France. The plan was assuring the complete disarmament of Germany and setting the system of war reparations¹⁸.

Such occupation had to be dissolved once a democratic and stable German Government was created. But, with the Cold War, this occupation was permanent, dividing Germany in two different states (1949), breaking the traditional domestic market and, in the case of the GDR, imposing a centrally planned economy, similar to the one in the former Soviet Union. The new German state established production prices and objectives. It also allocated resources with comprehensive economic plans, ideologically oriented

¹⁸The term war reparation refers to the economic compensation provided to a triumphant nation or coalition from a defeated nation or coalition. Such compensation is meant to cover the damage during the war. Germany was supposed to pay 22 billion dollars in equipment and supplies, mainly to the Soviet Union. The reparations costs imposed on its occupation zone made the process of reorientation and restructuring of the East German economy very difficult. Payments continued into the early 1950s, ending only with the death of Stalin. These payments amounted to about 25% of total East German production through 1953. Becky A. Gates, "The Economy: Economic policy and performance" in Stephen R. Burant (Ed.) *East Germany: a country study*, Federal Research Division Library of Congress, 1987. Call Number DD280.6. E22 1988. <http://memory.loc.gov/frd/cs/gxtoc.html>[33]

and sustained¹⁹. The means of production were almost entirely state owned.

In 1952, in order to strengthen centralist structures, the state of Saxony was disintegrated and as a result three administrative areas were formed: Chemnitz (from 1953: Karl-Marx-Stadt), Leipzig and Dresden (see figure 6.3)²⁰.

As part of the GDR, the territory currently known as Saxony was on top of the socialist world in economic development and performance based on its expanded labour force²¹ and its specific industry²².

Even considering the severe aftermath of the war, the three Saxon districts Saxon (30% of the GDR total population) were transformed into the industrial core of the GDR (46% GDR's industry was located here). Such specialization had to have an impact on the economic performance of the re-

¹⁹Such plans emphasized heavy industry based on Publicly Owned Enterprises or *Volkseigene Betriebe* (VEB). Such VEB were mainly building iron and steel firms, chemicals plants and heavy machinery manufacturing. James Gallagher, "Historical Setting: integration into the Soviet System" in Stephen R. Burant (Ed.) *East Germany: a country study*, Federal Research Division Library of Congress, 1987. Call Number DD280.6. E22 1988. <http://memory.loc.gov/frd/cs/gxtoc.html>[33]

²⁰*Atlas of Eastern Europe*, U. S. Central Intelligence Agency, 1990[36]. Hermann Kinder and Werner Hilgemann, *DTV-Atlas Weltgeschichte*, Deutscher Taschenbuch Verlag, Munich, 2000 (1964)[107], p. 553.

²¹The GDR effectively mobilized women into the labour market. Women constituted about 44% of the labour force by 1985, giving East Germany one of the highest rates of female employment in the world. Becky A. Gates "The Economy: labour force" in Stephen R. Burant (Ed.), 1987[33]

²²According to the official sources, chemical products and machinery were the most important groups in industrial production in East Germany, (each around 20% of the value of total industrial output). They were followed by the agricultural and food-processing industry (13.5%) the energy and fuel industry at 12.2%, light industry (excluding textiles) at 9.5%, metallurgy at 9.4% and electro-technical and electronic equipment at 8.5%. Other significant groups were the textile industry (5.8%), the construction materials industry (2.0%) and the water supply/conservation industry (0.6%). Becky A. Gates "The Economy: labour force" in Stephen R. Burant (Ed.), 1987[33]



Figure 6.3: GDR *Bezirke*(Source CIA, 1990)

gion. As an example, only Karl-Marx-Stadt concentrated more than the 13% of the GDR industrial production (mainly machinery, metal transformation, textiles).

Zwickau was the automobile production centre of the GDR. Coal mining and power generation took place in the area around Hoyerswerda. Finally, Dresden was home of microelectronics and aeronautical industries. Overall, GDR industrial and chemicals centers were located within the Chemnitz-Dresden-Leipzig area.

The achievements were remarkable once considering the circumstances under which it has developed. However, for explaining the relatively successful economic record achieved it is important to underline the nature of the 45 years of socialist economic policy. The aim was the integration of the region within the Soviet system following the dictates of the *Rat für gegenseitige Wirtschaftshilfe* (RGW, Counsel for Reciprocal Economic Aid). Such system was organized on not economic but political basis. Therefore industrial centers were allocated homogeneously through the entire GDR. However, as it was mentioned, the territories of the current Saxony had a relative concentration of activity in the triangle Dresden, Leipzig and Chemnitz(see figure 6.4²³). .

Then, the rigorous economic plans were understood more in terms of ideology than profitability. Therefore, the economic goals and attainments linked to propaganda requirements did not have sustainable effects in the rehabilitation of the post-war Saxon economy (Gross, 2001, pp. 289 299).

²³Source: *Atlas of Eastern Europe*, U. S. Central Intelligence Agency, 1990[36].

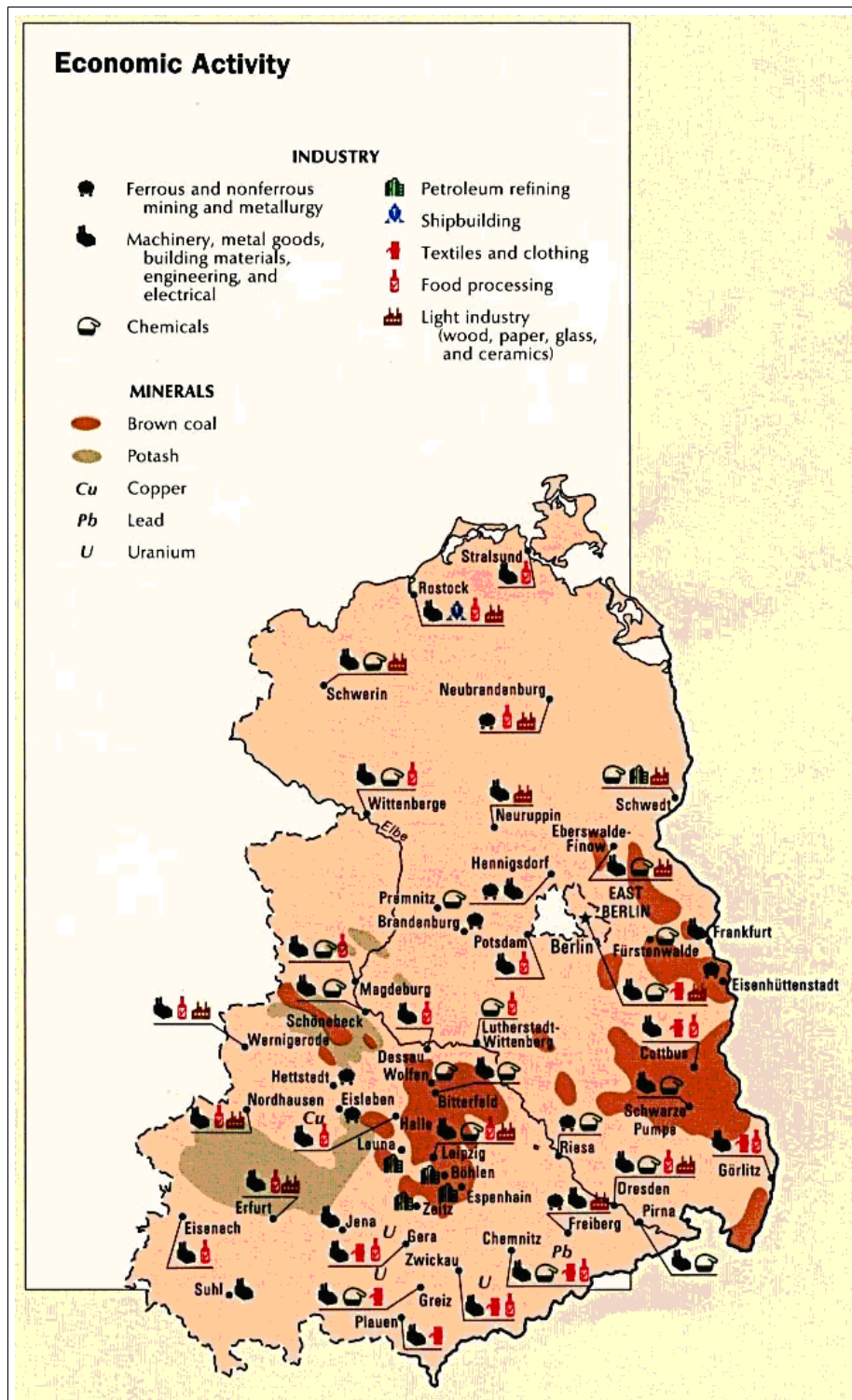


Figure 6.4: Economic activity in the GDR (Source CIA, 1990).

Hence, the change to the market economy, consequence of the German reunification in 1990, cause the widespread collapse of the traditional economic structures, which had been preserved for many years in the communist system. As outcome of four decades of communist rule, Saxony lost its top economic rank in Germany as in Europe.

A main reason was the absence of competitive pressure, which preserved relative obsolete industrial structures in highly concentrated areas. This fact, in combination with the lack of investment, led to a loss of international competitiveness²⁴. companies collapsed after reunification, causing a widespread unemployment especially in the early 1990s. The forced and economically not efficient, transformation of Saxon economic structure undermined the functional relationships among people and environment²⁵.

6.3 Saxony today

After 1990's German reunification, Saxony re-appeared from the former East German districts of Dresden, Chemnitz (formerly Karl-Marx-Stadt) and most of Leipzig, along with a small part of Cottbus. Currently, being almost restored to its historical borders, the region is located in the German-Poland-Czech Republic triangle, which occupies the southeaster portion of what was formerly East Germany. The current territory of Saxony covers an area of 18,337 square kilometres and has 4.5 million inhabitants. The capital is,

²⁴“Economic planning”, *Encyclopædia Britannica DVD 2000 Deluxe Edition*, Encyclopædia Britannica, Inc, 1999-2000[54].

²⁵Siegfried Gerlach, “Sachsen, ein wirtschafts- und sozialgeographischer Überblick”, cited by Reiner Gross, *Geschichte Sachsens*, Dornier, Berlin, 2001[79]. P.298.

once again, Dresden²⁶.

Saxony is the most densely populated of the Neuen Bundesländern (244 inhabitants per square kilometer) and the most industrialised economic region. It also a predominantly urban region (OECD, 2005a[168], p. 180). The rate of unemployment is presently far above the EU average (October 2004: 16.9%²⁷).

Currently, Saxony has Germany's most dynamic economy according to a study conducted by *Initiative Neue Soziale Marktwirtschaft*, the business magazine *Wirtschaftswoche* and the *Institut der deutschen Wirtschaft*. The study²⁸ compared the development in each of Germany's 16 federal states from 2001 to 2003. According to this study and based on available statistic data (2004), Saxony (2.3%) has, with Bavaria, the highest growth rate in Germany. The rest of eastern German states, excluding Berlin, have a rate of 1.5%. Meanwhile, Germany as a whole has a rate of 1.8%). In addition, Saxony enjoys the highest growth rate of all German states²⁹. The reasons of such *strongest potential for the economy of Saxony among the new federal states* may be found *in high technology and industry, as well as tourism and niche products*³⁰.

²⁶ "Saxony", *Encyclopædia Britannica DVD 2000 Deluxe Edition*, Encyclopædia Britannica, Inc, 1999-2000[54].

²⁷ However, Saxony enjoys a relatively better situation in comparison with other former East Germany states. If considering unemployment, the rate for eastern Germany was 17.5% at the date given. *Basic Economic Data for the Free State of Saxony*, Saxony State Ministry for Economic Affairs and Labour Current, November 10, 2004[129].

²⁸ "Deutsche Großstädte im Vergleich", Studie der IW Consult GmbH im Auftrag der Initiative Neue Soziale Marktwirtschaft (INSM) und der Wirtschaftswoche, Köln, 30 June 2006[89]

²⁹ Data for 2003: Saxony, 1.2%; eastern German states excluding Berlin, 0.2%; Germany as a whole, -0.1%. *Basic Economic Data for the Free State of Saxony*, Saxony State Ministry for Economic Affairs and Labour, November 10, 2004[129]

³⁰ "The European Structural Funds in Germany (2000-2006): Sachsen (Saxony)", Eu-

However, Saxony's economic development is asymmetrical according to productive specialization. It is possible to identify three main industrial regions:

1. Between Dresden and Freiberg, lies what is known as "Silicon Saxony". This term is mainly related to microelectronics and electrical engineering companies. This is where AMD, SolarWorld, Infineon and Qimonda have invested.
2. Leipzig is known for its fairs and as a city of books. In this sense, it has positioned itself on the media and logistics branch. In addition, the Halle-Leipzig Airport is an important logistic location³¹.
3. Chemnitz and its surroundings are traditionally known for the textile and machine tool industries. In this sector, has recently settled the firm Niles-Simmons-Hegenscheidt.

These three areas enjoy a greater economic performance³².

On the other hand, the areas of East Saxony and Erzgebirge maintain antiquated branch composition and bear considerably greater problems in coping with the economic change and in creating a modern business image. Here, economic power is below average³³. The reason of such asymmetrical

ropean Commission, Directorate-General for Regional Policy, 2004[61]. http://europa.eu.int/comm/regional_policy/index_en.htm

³¹the logistics company of the Deutsche Post AG (DHL) has an important transshipment centre.

³²Also important in Saxony is the automobile industry. The region hosts Porsche and BMW's factories in Leipzig, as well as Volkswagen's in Zwickau and Dresden

³³"Die Geschichte Sachsens", *Der Spiegel* 32, 1996[48]. *Saxony: The Facts*. Sax-

development may be found in the core of economic policies that were developed in the region after the economic collapse following the fall of the wall and German unification. A description of the Dresden case may explain such uneven growth.

6.3.1 Saxony's trade

The value of Saxony's exports (SMWA, 2005[209]) has maintained stability although last years German negative economic conjuncture³⁴. For example, in 2005, the USA received the most exports (11.3%) from Saxony, followed by Italy (7.3%), France (6.5%), Malaysia (6.3%) and Spain (5.7%). Also in that year, about 58% of goods exported from Saxony went to European Union countries and 9% to non-EU countries in Europe.

The most important export goods were automotive industry products (34%), electronic goods (18%) and mechanical engineering and machine building goods(14%). Those exports from mechanical engineering and machine building are growing (by 4% in 2005) and from electronics are in expansion (by 5% in 2005; SMWA, 2005[209])³⁵.

Saxony's import of goods has increased (by 21% during the first half of 2005 compared to the same period of the previous year), to 5265.5 million

ony State Chancellery, 2002[128]. "Economic core regions and their characteristics: regional examples". http://www.wlu.ca/~wwwgeop/special/vgt/English/ger_mod1/unit8.htm

³⁴The first half of 2005 was 8049.9 million Euros, nearly level with the figure for the same period of the previous year (8154.9 million Euros). See (SMWA, 2005[209])

³⁵However, the value of exports from the automotive industry fell by 9% as compared with the first half of 2004

Euros(SMWA, 2005[209]). In the same year and with a value of 1030.7 million Euros, the most goods imported came from the Czech Republic (20% share of total imports)³⁶. The second place partner is France (435.7 million Euros with 8.3% of total), followed by the USA (404.9 million Euros and 7.7%).

6.3.2 Education system

Considering research and educational facilities in Saxony (see Figure 6.5³⁷), it is important to mention the importance of universities and technical colleges with more than 26,000 employees and 78,000 students in 2000 (Röhl, 2000[201]).

Although the East-German crisis described above, universities and colleges were able to retain the strength of their scientific workforce (private sector reduced its R&D personnel by about 80 % after 1989) specially through contracts with industry. As a result, the number of students has grown by 40% since 1992³⁸.

The elements of the outstanding panorama, also affect basic education. The education policy is based on the analysis of social, cultural, economic and context. At the same time, Dresden hosts the most significant engi-

³⁶The imports from the Czech Republic increased in 2005 +166% over the first half of 2004. This was because of the increase in imports of automobiles, whose import value rose by 0.9 million Euros over the value for the first half of 2004, reaching 556.4 million Euros in the first half of that year. See (SMWA, 2005[209])

³⁷Source Silicon Saxony e. V., www.silicon-saxony.net[218]

³⁸About 15,000 new students begin their studies at Saxony's universities and colleges every year (Röhl, 2000[201]).

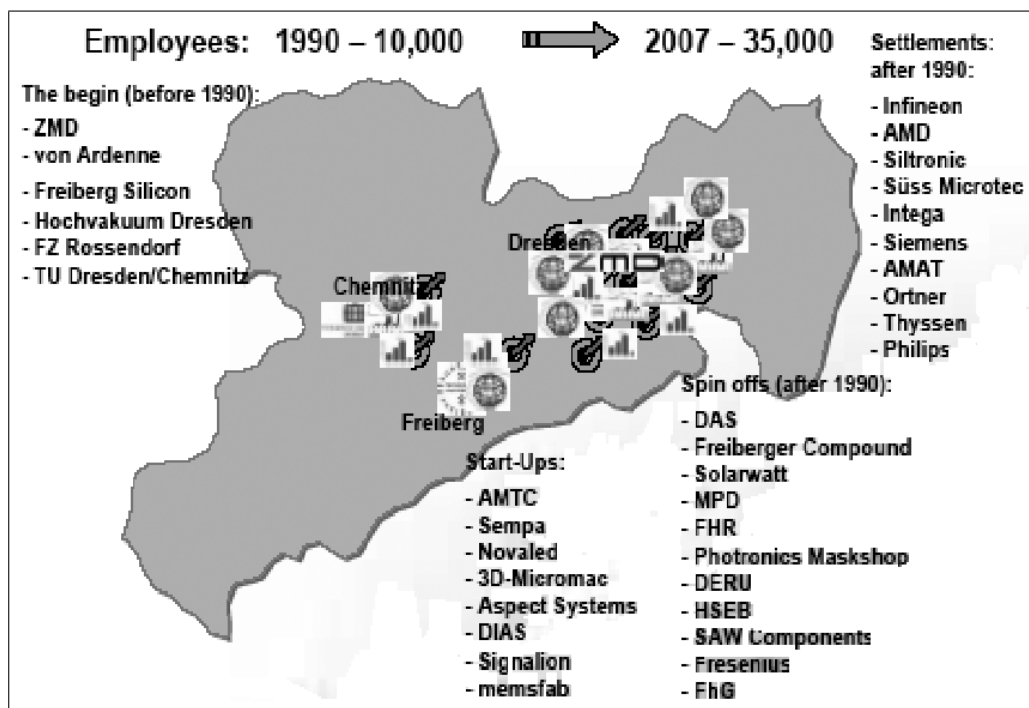


Figure 6.5: Saxon microelectronic industrialisation (Source Silicon Saxony e. V.)

neering and natural sciences R&D in eastern Germany³⁹. The main public centers are the University of technology (Technische Universität Dresden - TU-Dresden⁴⁰) and the University College of Applied Sciences (Hochschule für Technik und Wirtschaft - HTW). However, there are other educational institutions focusing on those fields⁴¹ from undergraduate levels to postgraduate. But, the most remarkable point regarding R&D in Dresden is the the high concentration of reputed research centers in the city: *Max-Planck-Gesellschaft*, *Fraunhofer Gesellschaft*, *Wissenschaftsgemeinschaft Gottfried Wilhelm Leibniz* and the *DFG-Forschungszentrums "Regenerative Therapien"*.

Research covers a wide range of areas from basic and applied research in future technologies (information and communications technology, new materials, material and components surface treatment and biotechnology) to industrial research in almost all the industrial sectors which are represented in Dresden. There are several academic research centers in Dresden. The Dresden Technical University, some Fraunhofer and also Max Planck institutes, the "Gottfried Wilhelm Leibniz" Scientific Association, the Rossendorf Re-

³⁹"Wirtschafts- und Wissenschaftsstandort Dresden 2005 /2006", CD-Rom, Landeshauptstadt Dresden, Amt für Wirtschaftsförderung, 2007[124]. See also <http://www.bmbf.de/de/6574.php>

⁴⁰the TU-Dresden has about 25,000 students and 9,000 employees, including 600 lecturers. Klaus-Heiner Röhl, "Saxony's Capital Dresden- on the Way to become Eastern Germany's first 'Innovative milieu'?", Diskussionsbeiträge aus dem Institut für Wirtschaft und Verkehr, Nr.5/2000, Technische Universität Dresden, Dresden, 2000. <http://www.tu-dresden.de/vkiwv/VWL/home.htm>[201]

⁴¹The Dresden International University (DIU) offers graduate and postgraduate studies in different fields. Considering the context of the cluster, it is important to mention its "Surface Engineering und Nanotechnology Program". The founder and Honoured President of the DIU is the former Minister-President of Saxony, Prof. Dr. Kurt Biedenkopf. <http://www.dresden-international-university.com>. Also in the same field works the Dresden Chip Academy that is a educational centre for High-technology founded by Infineon technologies AG in 2002.

search Centre, the Dresden technology Centre and the Consultancy Centre for technology Transfer and the Promotion of innovation.

Some of these institutions work closely with the private sector (see figure 6.6). As an example here serves the Systemonyc AG - the joint venture founded by some professors of the Technische Universität Dresden to develop third-generation microprocessors and bought by Phillips.

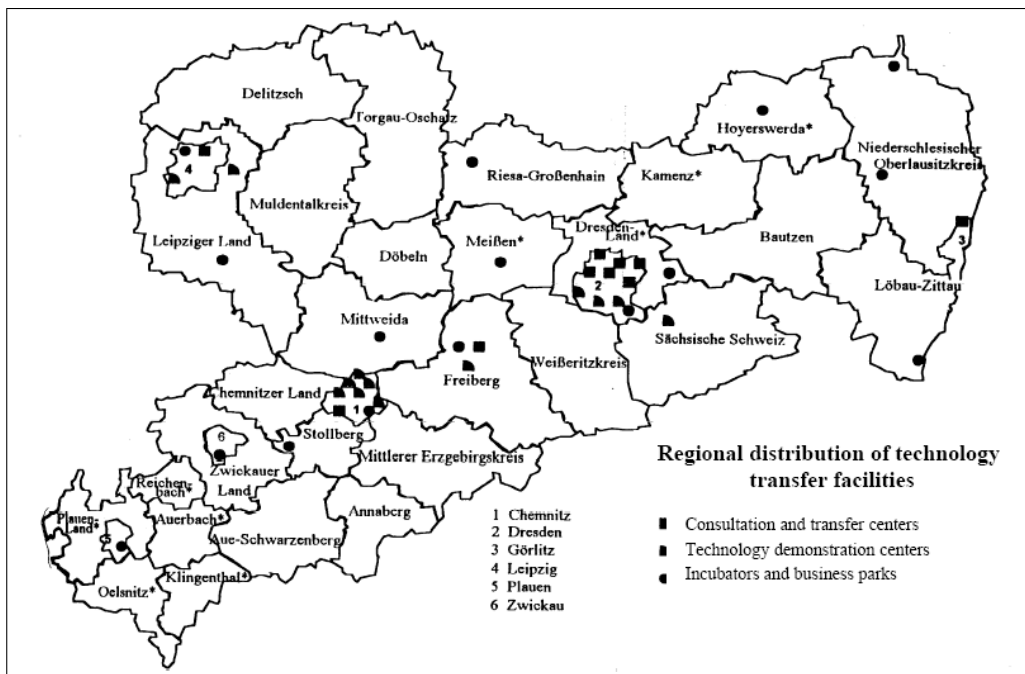


Figure 6.6: High-tech centres in Saxony (Source Röhl, 2000)

6.4 Concluding remarks

Since 1995, when Siemens inaugurated its microprocessors factory, several other companies (see figure 6.7) have come to the capital of Saxony. In-

fineon technologies, a subsidiary of Siemens and Advanced Micro Devices (AMD, another microprocessor factory), Qimonda, Siltronic AG, Toppan Photomasks, Philip Morris, GlaxoSmithKline, ABB, Heidelberger Zement, Gruner+Jahr, European Aeronautic, Defense and Space Company (EADS, before known as DaimlerChrysler Aerospace Airbus GmbH), Volkswagen, ABB and ALSTOM are the most significant new companies that have chosen Dresden as location⁴².

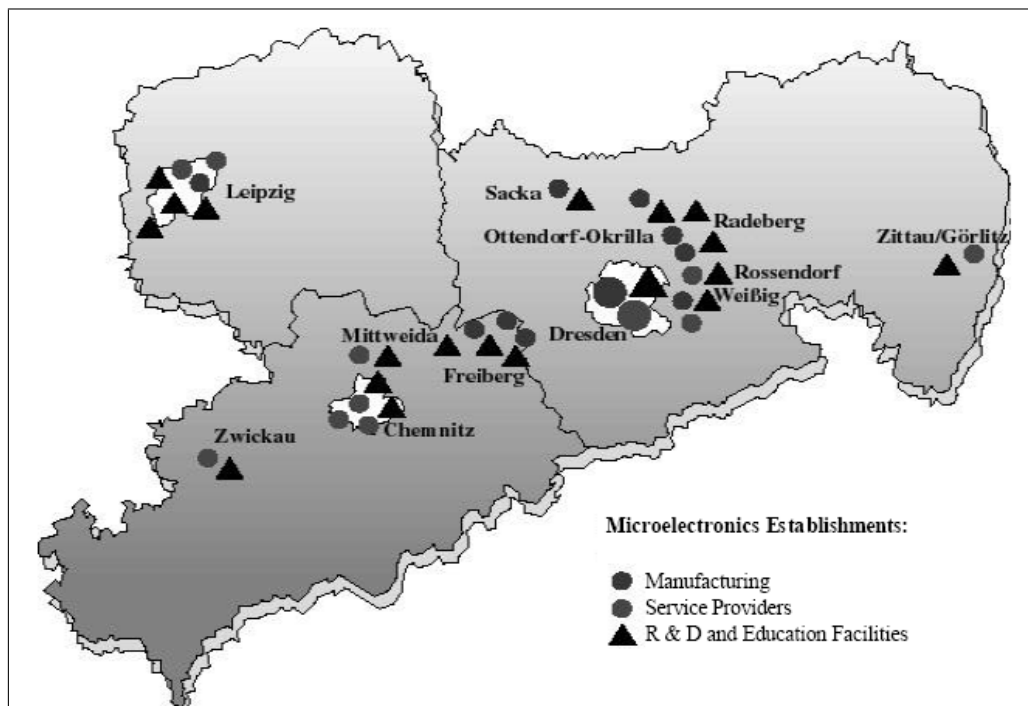


Figure 6.7: Micro-electronics firms in Saxony (Source Röhl, 2000)

In fact, since 1990, more than 28 billion Euros have been invested in industrial and manufacturing sectors⁴³.

⁴²760 companies in the field of microelectronics as well as information and communication technology are currently established in the region of Dresden. The sector generates more than 20,000 employments. http://www.germany.info/relaunch/info/publications/infocus/Saxony/High_tech.htm#1

⁴³The city promotes especially investments in key branches such as microelectronics,

According to records from some interviews to local leaders in Dresden, these first companies came to Dresden because of a specific strategy for enhancing economic performance promoted by the former Saxony's Ministerpräsident Professor Dr. Kurt Biedenkopf (Silicon Saxony e. V., 2006 [217]) and continued until now by his successor in office Prof. Dr. Georg Milbradt (both from the Christian Democrat Union, CDU). The leitmotiv of such strategy was development through innovation, aiming high-tech competence financing new industry cooperative network initiatives. This strategy is part of the "Regional growth" program (SMWA, 2005[209]).

The result of the cluster policy is that Saxony already has the potential to reach the economic level of several West regions (Kronthaler, 2005[111], p. 746). In this sense, seems that there was a good use of European structural funds⁴⁴.

Saxony concentrates many public research institutions and facilities of higher education. In recent years, it is also one of Germany's leading centers of the IT and semiconductor industry with huge establishments by Siemens and AMD and a growing number of smaller firms (See Röhl, 2000[201]).

communications and information technology, pharmacy, environmental engineering, biotechnology and new materials. In addition to these technology sectors, the following fields can be found in Dresden: precision mechanics, machine manufacture, optical electronics, car manufacture, medical engineering, chemicals, printing and publishing, food, civil engineering and, of course, industries related to luxury goods (i. e., porcelain or watches). "Investieren in Dresden", Amt für Presse und Öffentlichkeitsarbeit, Landeshauptstadt Dresden, 2006[125]. http://www.dresden.de/de/07/c_05.php?PHPSESSID=rpq682a7rehtaepg5v8tarr746

⁴⁴In addition to Objective 1, Saxony is granted funding from the Community Initiatives INTERREG III A, B and C for interregional cooperation, URBAN II for parts of the city of Leipzig, LEADER+ for the development of rural areas and EQUAL for combating discrimination and inequalities on the labour market. "The European Structural Funds in Germany (2000-2006): Sachsen (Saxony)", European Commission, Directorate-General for Regional Policy, 2004[61]

Agglomeration economies play an important role in cluster formation. The creation of cooperations between members of the research and enterprise sector (research centers, technology-transfer facilities, high-tech firms and innovative ventures) generates the possibility for synergies.

The development path initiated gives the chance for the formation of a successful cluster.

Chapter 7

The main sectors clustering in Dresden

As we have seen above, the Cluster Approach is built with the interaction of a limited number of agents called actors. The nature of each actor varies according to its capabilities and aims. In this sense, we were able to distinguish four main actors: financial, entrepreneurial, academical and political or trigger. We also mentioned that the Cluster Approach has three main stages of development if considering the structural needs of the system in different development phases. A first step was to locally design and create the productive foundations of the system. The second one was the implementation and correction of the system. Finally, we mentioned the stabilization and institutionalization of the cluster network, allowing sustainability and permanence.

If applying the model to Saxony, we will assign the different roles in the region. But, in order to do so we need to consider which kind of cluster

Since 1998 (see Section 6.3) Volkswagen (VW) has a factory in Dresden. In this location VW produces two vehicles: *Phaeton* and *Bentley*. The factory is a superb building of glass and steel that opens the complete assemblage chain to the eyes of every curious pedestrian. The building, called ‘Die Gläserne Manufaktur’, is one of the most important examples of modern Dresden’s architecture and a tourist attraction.

The factory is also in the very centre of Dresden, an area with intense traffic. This situation made difficult the arrival of necessary supplies and equipment. As a result of a cooperation contract signed in 2000 with the public transport system (Dresdner Verkehrsbetriebe (DVB) AG, VW uses the city’s tramlines in order to bring necessary prefabricated pieces and equipment to the factory. This logistics concept reduces the effect on inner-city traffic, it is environmentally friendly and seems to be beneficial both for the city and company in terms of image.

They are two special *cargo trams* painted in Volkswagen blue (respectful with VW corporate identity) use the existing tram tracks to transport goods. These trams can be loaded with up to 60 tons, equivalent to 3 truckloads.

The prefabricated parts are delivered by road and rail to the material warehouse in Dresden’s suburbs. Then, the specially developed cargo tram is used to transport the car parts from there to “Die Gläserne Manufaktur”. All in all, this kind of cooperation between VW and DVB provides a solution that can be considered as the quintessence of the cluster phenomenon.

Table 7.1: *Die Gläserne Manufaktur*

is in the region.

From all the different activities that take place in Dresden it is possible to identify the following clusters: biotechnology, microelectronics, nanotechnology and new materials.

7.1 Biotechnology in Dresden

The Biotechnology Cluster (see Table 7.2) seems to inherit a long lasting tradition. The city of Dresden claims that the success story of the regional pharmaceutical industry has 120 years¹. Moreover, in 1911, Karl August Lingner² founded a bacteriological department which became the *Sächsisches Serumwerk* and the *Institute for Bacteriological Therapy*. Nowadays, this institution belongs to *GlaxoSmithKline* and the research focus on vaccines³.

However, years before, in 1835, Friedrich von Heyden founded *Drogerie & Färbewaren-Handlung Gehe & Co.* In 1874, this firm was the the responsible of the first commercial scale synthesis of salicylic acid (this chemical substance is also known as aspirin). Lately, this firm jointly with the company *Dr. Madaus & Co* established the *Arzneimittelwerk Dresden*. Now, known as *AWD. Pharma*, is the largest pharmaceutical firm in Saxony.

¹“Living Science: Biotechnology in Dresden”, Landeshaupstadt Dresden, Department of Economic development, Dresden, 2005, p. 3[120]

²entrepreneur related to the first industrial dental hygiene products and founder of the Deutsches Hygiene Museum

³GlaxoSmithKline has invested 94 million Euros in Sächsisches Serumwerk to double its production by 2008. Landeshaupstadt Dresden, 2005a, p. 11[120]

Table 7.2: The Biotechnology Cluster

Business Enterprises
ABX-Advanced Biochemical Compounds GmbH Apogepha Arzneimittel GmbH AWD. Pharma Biotype Gesellschaft für molekularbiologische Analytik GmbH CenixBioScience GmbH Elbion AG Gene Bridges GmbH JADO Technologies GmbH Linde KCA GmbH/Linde AG Pharmatec Pharma-Maschinen GmbH Qualitype AG Sächsisches Serumwerk Dresden/GlaxoSmithKline
Research Facilities
DFG-Forschungszentrums “Regenerative Therapien” Fraunhofer Institute for Ceramic Technologies and Sintered Materials (IKTS) Fraunhofer Institute for Material and Radiation Technology (IWS) Forschungszentrum Rossendorf e. V. Hexal Synthech GmbH Leibniz Institute for Polymer Research Dresden e. V. Max Bergmann Center for Biomaterials Dresden Max Planck Institute for Molecular Cell Biology and Genetics Medical Faculty Carl Gustav Carus TU-Dresden Biotechnological Center (Biotec) TU-Dresden Medical Theoretical Centre
Educational Facilities
Berufschulzentrum für Agrarwirtschaft “Justus von Liebig” Berufliches Schulzentrum für Gastgewerbe BSZ Radebeul Technische Universität Dresden (TU-Dresden) Dresden Hochschule für Technik und Wirtschaft (HTW-Dresden) Berufsakademie (BA)-Sachsen-University of Cooperative Education in Saxony Max Planck Research School for Molecular Cell Biology and Bioengineering Sächsische Bildungsgesellschaft für Umweltschutz und Chemieberufe mbH
Networks
BioSaxony BioMeT (Biology-Medicine-Technology)e. V. GMBU Society for Development of Medical, Bio and Environmental Technologies
Technology transfer centre
BioInnovationsZentrum

Source: own data and www.dresden.de/business.

It is also remarkable the phenomenon of spin off related to these companies. As an example, the firm *Elbion AG* that emerged in 2002 from the research department of the *Arzneimittlerwerk Dresden*. This firm gives jobs for approximately hundred scientist that develop drugs against disorders in the nervous system and respiratory tract. These works are developed with joint research with *GlaxoSmithKline*⁴. This example perfectly support the assumption that, in a cluster model, firms that can be seen as global competitors are able to joint efforts in local basis.

This cooperation has an institutionalized tool with the *BioInnovation-Zentrum*. The centre is a joint project of the *technologieZentrum Dresden GmbH* and the *TU-Dresden*. The infrastructure available includes offices or laboratories that are use together by the *TU-Dresden* and private companies⁵. In addition, the *BioinnovationsZentrum* offers to its members not only technology but entrepreneur services (legal advice or marketing).

Another example of institution is *BioMet e. V.* . This network combines three areas of interest: medical, biological and technological research⁶. The network also works with the *BioinnovationsZentrum* and receives public funding⁷.

⁴GlaxoSmithKline purchased the exclusive rights for the development, certification, production and sales of the drug “AWD 12-281” consequence of the research done by *Elbion AG*. *Landeshauptstadt Dresden*, 2005a, p. 4[120]

⁵JADO Technologies or *Cenix BioScience GmbH*

⁶The members of the network are: the *Deutsche Forschungsgemeinschaft (DFG)-Forschungszentrums “Regenerative Therapien”*, the *Biotechnological Center of the TU-Dresden*, *Leibniz Institute for Polymer Research Dresden e. V.*, *Max Planck Institute for Molecular Cell Biology and Genetics*, *Max Bergmann Center of the TU-Dresden*, *Fraunhofer Institute for Material and Radiation technology and Research Center Rossendorf e. V.* *Landeshauptstadt Dresden*, 2005a, p. 7[120]

⁷The official amount is 24 million Euros until 2006. *Landeshauptstadt Dresden*, 2005a, p. 5[120]

According to the President of the Committee of BioMeT e. V., Prof. Dr. Kai Simmons:

Only four years after its initiation, (BioMeT e. V) has become Germany's greatest structured program for doctoral candidates (in molecular cell biology and Bioengineering) and a top address in Europe (Landeshauptstadt Dresden, 2005a, p. 2[120]).

The research is so interdisciplinary that in the field of biomaterials, there is a cooperation for developing biopolymers to be used as connectors by the IT and microelectronics industry⁸.

7.2 Microelectronics in Dresden

Microelectronics has become the brand sector in Dresden. The term "Silicon Saxony", widely repeated, describe the Microelectronics Cluster (See Tables 7.3 and 7.4). This area concentrates the most impressive record of innovative semiconductors, electronic and microsystem industries in Europe: 20% of every microchip sold in the world comes from Dresden (Landeshauptstadt Dresden, 2006[123], p. 2-3).

Indeed, the city of Dresden concentrates diverse companies of this

⁸It seems that due to their specific characteristics such DNA-like molecules allow smaller distances between conductors compared to conventional materials. The aims of these research centers seem almost taken from a science-fiction novel: regeneration of human tissues avoiding transplantation or genetic reconstructions. Landeshauptstadt Dresden, 2005a, p. 6-7[120]

Table 7.3: The Microelectronics Cluster

Selected Business Enterprises
Advanced Mask Technology Center GmbH & Co. KG (AMTC)
AMD Saxony LLC & Co. KG
Applied Materials GmbH
ASML Lithography Germany GmbH
DAS - Dünnschicht Anlagen Systeme GmbH
Infineon Technologies GmbH & Co. OHG
Qimonda Dresden GmbH & Co. KG
KSW Microtec AG
Photronics MZD GmbH & Co. KG
MPD Microelectronic Packaging Dresden GmbH
Ortner cleanroom logistic systems GmbH
SAP Systems integration AG
SAW COMPONENTS Dresden GmbH
Schäfer IT-Systems
Tokyo Electron Deutschland GmbH
XENON Automatisierungstechnik GmbH
Zentrum Mikroelektronik Dresden AG (ZMD)
Selected Research Facilities
Fraunhofer-Gesellschaft Institute of Photonic Microsystems
Fraunhofer-Gesellschaft Institute of Integrated Circuits
Fraunhofer-Gesellschaft Institute for Material and Radiation Technology (IWS)
Fraunhofer-Gesellschaft Institute of Non-Destructive Test Procedures
“Gottfried Wilhelm Leibniz” Institute of Solid-State and Material Research
Rossendorf e. V. Institute of Ion Beam Physics and Materials
TU-Institute of Applied Physics
TU-Institute of Applied Photophysics
TU-Institute of Software and Multimedia Technology
TU-Institute of System Architecture
TU-Institute of Artificial Intelligence
TU-Institute of Theoretical Informatics
TU-Institute of Technical Informatics
TU-Institute of Applied Informatics
TU-Institute of Automation
TU-Institute of Electrical Engineering
TU-Institute of Basics of Electrical Engineering and Electronics
TU-Institute of Acoustics and Voice Communication
TU-Institute of Telecommunication Engineering
TU-Institute of Solid-State Electronics
TU-Institute of Semiconductor and Microsystem Technology
TU-Institute of Material Sciences
TU-Institute of Surfaces and Production Measurement Technology

Source: own data and www.dresden.de/business.

Table 7.4: The Microelectronics Cluster (cont)

Business Design Centres
AMD European Design Center ZMD AG Design-Center
Selected Educational Facilities
TU-Dresden Faculty of Mathematic and Natural Sciences TU-Dresden Faculty of Informatics TU-Dresden Faculty of Electrical Engineering and Information Technology TU-Dresden Faculty of Mechanical Engineering HTW Department of Electrical Engineering HTW Department of Informatics/Mathematics BA-Sachsen-University of Cooperative Education-Commercial Computer Science BA-Sachsen-University of Cooperative Education-Bioinformatics Dresden Chip Academy of Infineon Technologies-Siemens Education-Silicon Saxony
Networks
Silicon Saxony Network Nano-CC-UFS MFD-Nanotechnologie-Kompetenzzentrum Dresden e. V. Competence Network "Mikrotechnische Produktion" MYTEQ Microtechnology Equipment
Technology transfer centre
GWT-TUD Association of Knowledge and Technology Transfer mbH BioMeT e. V. BTI Technologieagentur Dresden GmbH TechnologieZentrumDresden GmbH

Source: own data and www.dresden.de/business.

sector as AMD, Infineon, Qimonda, Siltronic, AMTC and ZMD. These firms have established a the Europe's largest microelectronic network, Silicon Saxony e. V.⁹ that it is also supported by regional and local governments. This system integrates the whole production chain (from research and design to commercialisation), related services and suppliers. The network generates a turnover of 2 billion Euros and has 15,000 employees (considering only the private sector (Milbradt, 2005 [150])).

The cooperation allows that different companies participate in the production of a single good. For example, Qimonda produces its chips on 300mm Silicon disks. These disks are produced by Siltronic AG (that is the third world's largest producer of this good¹⁰. The own supplier of basic product to Siltronic AG is Freiburger Compound Materials AG. This firm is also located in the Dresden area. In the other side of the chain works Microelectronic Packaging Dresden (MPD) GmbH that is a spin off from Zentrum Mikroelektronik Dresden (ZMD) AG.

The importance of the sector has also an impact generating employments. For example, Infineon technologies AG gives work to 2,300 employees. Qimonda AG (that is also a spin off of Infineon) employs 3,100 workers and is planning to increase the figure in future as focuses on applications in the

⁹The network include 220 businesses, public institutions and research centers. They exchange information, knowledge, share resources, coordinate activities. The network is supported with special software for exclusive use developed by Arbeitskreis Software, a joint venture of the main software companies in the region (Landeshauptstadt Dresden, 2006[123], p. 6). *It is the vision and mission of the association to develop the Saxon region to become one of the leading European microelectronic clusters and to focus and co-ordinate information and expertise in this sector*, see Kompetenznetze, 2006[190], p. 148.

¹⁰In order to do so, the company has invested approximately 430 million Euros (Landeshauptstadt Dresden, 2006[123], p. 3).

field of graphics or mobile communication¹¹.

However, the most important firm, in terms of investment and employess, is Advanced Micro Devices Inc. (AMD). This company has invested already 8 billion US dollars in two factories that employ 3,300 people (Landeshauptstadt Dresden, 2006[123], p. 4). AMD could be consider the heart of Silicon Saxony and cooperates with most of the research centers and main firms (including Qimonda) for the creation of public-private production¹² and research¹³ partnerships. AMD has also its own research facilities with the Dresden Design Center (DDC) that employs around hundred engineers that develop new solution for network access, multimedia applications and industrial computers(Landeshauptstadt Dresden, 2006[123], p. 5).

It is also possible to find firms that focus on the development, application and distribution of operating systems, software and databases. The most important¹⁴ is SAP Systems integration AG that works with the EADS-Elbe Flugzeugwerke GmbH (also located in Dresden). The new fields of research in this field are varied: for example, the analysis of biometric data as identification tool¹⁵.

Even AMD has established the Operating Systems Research Center

¹¹The investment of both firm rise the amount of 4.8 billion Euros in Dresden only (Landeshauptstadt Dresden, 2006[123], p. 4)

¹²Advanced Mask technology Center GmbH & Co KG (AMTC) is a joint venture of AMD, Qimonda and Toppan Photomasks (Landeshauptstadt Dresden, 2006[123], p. 4)

¹³Research Center Nanoelectronic technologies (CNT) is a joint project with the Fraunhofer-Gesellschaft and Qimonda with an initial investment of 170 million Euros (Landeshauptstadt Dresden, 2006[123], p. 4)

¹⁴Although there are 400 companies in Dresden and around (Landeshauptstadt Dresden, 2006[123], p. 6).

¹⁵For example, Cognitec Systems GmbH that cooperates with Australian airports and Japanese nuclear plants(Landeshauptstadt Dresden, 2006[123], p. 6).

(OSRC) for the optimisation of software of several operating systems and its own future microprocessors (Landeshauptstadt Dresden, 2006[123], p. 6).

7.3 Nanotechnology in Dresden

Very much related to the advances in microelectronics is the nanotechnology sector. Nowadays and surely in future, it is one of the most innovative branches of Science (Landeshauptstadt Dresden, 2005b[121], p. 2). The Nanotechnology Cluster in Dresden (see Tables 7.5 and 7.6) include areas like microelectronics, biotechnology, new materials and systems engineering. It also concentrates one of every five companies in Germany of this sector¹⁶.

The reason of that concentration has to be found in the several research centers existing in the region. These research centers have very modern facilities that allow scientist to explore these fields as real pioneers of knowledge¹⁷. This research is transfer into marketable products due to the cooperation with private companies. This is because, considering the special nature of the final product (on the edge of scientific research), most of the companies are spin offs from university and research centers facilities.

A usual way to cooperate is for example to create a mini-lab that

¹⁶There are around 80 firms located in Dresden that also hosts about 50 scientific facilities (Landeshauptstadt Dresden, 2005b[121], p. 3)

¹⁷Rosendorf e. V. Institute, "Gottfried Wilhelm Leibniz" Institute, Fraunhofer-Institute for Material and Radiation technology (IWS) or Max Planck Institute are in the region with specific labs for these research fields. The tools available are very expensive and only affordable in cooperation. For example, an existing pulsed magnet field used for basic research or industry oriented semi-conductors' tests was an investment of 25 million Euros. Landeshauptstadt Dresden, 2005b[121], p. 3.

Table 7.5: The Nanotechnology / New Materials Cluster

Business Enterprises
BIOP Biopolymer GmbH CREAVAC - Creative Vakuumbeschichtung GmbH DAS - Dünnschicht Anlagen Systeme GmbH DSL Dresden Material-Innovation GmbH IMA Materialforschung und Anwendungstechnik GmbH Dresden Institut Fresenius Angewandte Festkörperanalytik GmbH MAT PlasMATEc GmbH aus Dresden m-pore GmbH Namos GmbH Nanoparc GmbH Southwall Technologies VON ARDENNE Anlagentechnik GmbH VTD Vakuumtechnik
Research Facilities
Rossendorf e. V. Institute of Ion Beam Physics and Material Research “Gottfried Wilhelm Leibniz” Institute for Solid State and Materials Research “Gottfried Wilhelm Leibniz” Institute of Polymer Research Fraunhofer-Institute for Material and Radiation Technology (IWS) Fraunhofer-Institute for Ceramic Technologies and Sintered Materials (IKTS) Fraunhofer-Institute for Manufacturing and Advanced Materials (IFAM) Fraunhofer-Institute for Photonic Microsystems (IPMS) Fraunhofer-Institute for Non-Destructive Testing (IZFP) Fraunhofer-Gesellschaft Center Nanoelectronic Technologies (CNT) Max Planck Institute for Chemical Physics of Solids Max Planck Institute for the Physics of Complex Systems TU-Dresden Faculty of Mechanical Engineering TU-Dresden Faculty of Science TU-Dresden Faculty of Electrical Engineering and Information Technology Max Bergmann Center of Biomaterials GMBU Gesellschaft zur Förderung von Medizin-, Bio- und Umwelttechnologien e. V.

Source: own data and www.dresden.de/business.

Table 7.6: The Nanotechnology / New Materials Cluster(cont)

Educational Facilities
Technische Universität Dresden (TU-Dresden) Dresden Hochschule für Technik und Wirtschaft (HTW-Dresden) Max Planck Research School “Dynamical Processes in Atoms, Molecules and Solids” BA-Sachsen-University of Cooperative Education-New Materials and Nanotechnology
Networks
Nanotechnology Competence Center “Ultra-Thin Functional Films” (Nano-CC-UFS) Materials Research Network Dresden European Research Society “Thin Films” Network “InnoZellMet” Saxon Network Micro and Biosensoric Measuring Technology
Technology transfer centre
GWT Gesellschaft für Wissens- und Technologietransfer der TU Dresden mbH BioMeT e. V. BTI Technologieagentur Dresden GmbH TechnologieZentrumDresden GmbH Institut für Korrosionsschutz Dresden GmbH Institut für Holztechnologie Dresden gGmbH Papiertechnische Stiftung PTS

Source: own data and www.dresden.de/business.

consider a specific research topic. In this mini-labs a research institute offers its facilities to a firm in order to test or develop specific products. This is very convenient for the company because it has access to the otherwise expensive facilities and to the newest scientific knowledge and the research institute receive guidance about the fields that may have potential demand in future (adapting the theory to actual practical issues). An example of this joint project is the cooperation among the *Rosendorf e. V. Institute* and the firm *Nanoparc GmbH* that is developing diagnostic devices to be used for controlling environment, food and water facilities or human health (Landeshauptstadt Dresden, 2005b[121], p. 4).

In addition, there are also joint ventures with big corporations like AMD or Infineon. One of the latest projects, the Fraunhofer-Gesellschaft

Center Nanoelectronic technologies (CNT), is the result of the cooperation among the Fraunhofer-Gesellschaft, the TU-Dresden, AMD and Infineon in the area of semiconductors. Companies have come to Dresden considering the advantages derived from goal synchrony with political actors as well as the advantage of an investigation centre, source of qualified workers and able to share research and development costs. Some examples of the advantages of Dresden are the relative amount of high-trained individuals, with their own laboratories and material, paid with public money or which scholarship or financing, given by companies, have public incentives.

The Fraunhofer (IWS- Institute for Material and Radiation technology) also has a joint venture with AXO GmbH for develop new masks and lenses to be applied for writing on future silicon chips (Landeshauptstadt Dresden, 2005b[121], p. 7). Another company, Novaled GmbH cooperates with the TU-Dresden and the Fraunhofer-Institute for Photonic Microsystems (IPMS) in the research of technology that will allow to display digital information on any object, even on transparent surfaces. Such displays are already in experimental use for cars and planes (Landeshauptstadt Dresden, 2005b[121], pp. 7-8).

The importance of Dresden as location for research on and production of nanotechnology is remarkable and the city strengthens this role by supporting events as seminars or fairs. In 2005, for example, Dresden celebrated the “Year of Nanotechnology” and the same year organized the “4. Internationales Nanotechnologie Symposium”¹⁸.

¹⁸This was the second time for Dresden. The event is a project organized by Dresden, Karlsruhe, Strasbourg and the Association of German Engineers (VDI). The partners in industry were coming from automotive, electronics, life science, materials, optics and surfaces areas. www.nanofair.com and www.vdi-wissensforum.com

Interesting is ceramics' "back-to-the-future". As mentioned, Saxony was the place where the European porcelain was invented and, nowadays, the Fraunhofer-Institute for Ceramic technologies and Sintered Materials (IKTS) develops ceramics with extreme strength. The main characteristic of this product is that it is transparent what means that it can be substituted for conventional bullet-proof glass. The immediate application of this new material is found in the chip production. As known, the environment of production in this case has to be perfectly protected. Normally the production halls have windows of quartz glass that need to be replaced every six months. These windows are also heavy and thick what means that they increase montage costs. The ceramic glass is not only more resistant but also lighter and thinner (almost 40%). This reduces the price of using it. Additionally, the demand for such product can be found very close home (Landeshauptstadt Dresden, 2005b[121], p. 9).

Other interesting fields of nanotechnology in Dresden can be found in the development of biomaterials. These materials are designed in order to avoid the usual danger of body rejection. This product is the result of joint projects between medicine, biology and technology laboratories¹⁹.

Many times, the result of such cooperation is a company. In this case, the research centers offered not only expertise but leadership. An example of a successful spin off is Namos GmbH that combines outstanding research on engineering and biology (coming from "Gottfried Wilhelm Leibniz" Institute for Solid State and Materials Research and the TU-Dresden Institute for

¹⁹Max Bergmann Zentrum für Biomaterialien: this centre is the result of the cooperation between TU-Dresden and "Gottfried Wilhelm Leibniz" Institute of Polymer Research. Landeshauptstadt Dresden, 2005b[121], p. 8

Genetics). This is possible because Dresden maintains institutions responsible of transferring knowledge such as BioMeT ((Landeshauptstadt Dresden, 2005b[121], p. 10).

7.4 New materials in Dresden

Dresden is one of the most important locations for research on new materials that may be applied into production innovations in a near future.

The applications of the findings are many, affecting industries like automotive, construction, optics, computing, communications, energy and so on (Helmut Eschrig in Landeshauptstadt Dresden, 2005c[122], p. 2).

Dresden is home of more than 1,000 material scientist that work in the branches of microelectronics, biotechnology or industrial engineering. The main agent in this field is the Materials Research network Dresden (MFD, see figure 7.1²⁰). This institution promotes the cooperation of more than 20 research organizations (from university to firms).

As seen in the figure 7.1, the research in new materials in Saxony combines the effort of three different and highly reputed research institutions: Leibniz Institut, Fraunhofer-Institut and Max-Planck-Institut. Independently administrated, they cooperate with ten different departments (coming from several faculties at the Technische Universität Dresden, both of pure or applied sciences). Finally, the net is completed with the con-

²⁰Material- Forschungsverbund Dresden e. V, 2007. www.mfd-dresden.de[143]

tributions of a private owned firm (IMA Material und Anwendungstechnik GmbH Dresden).

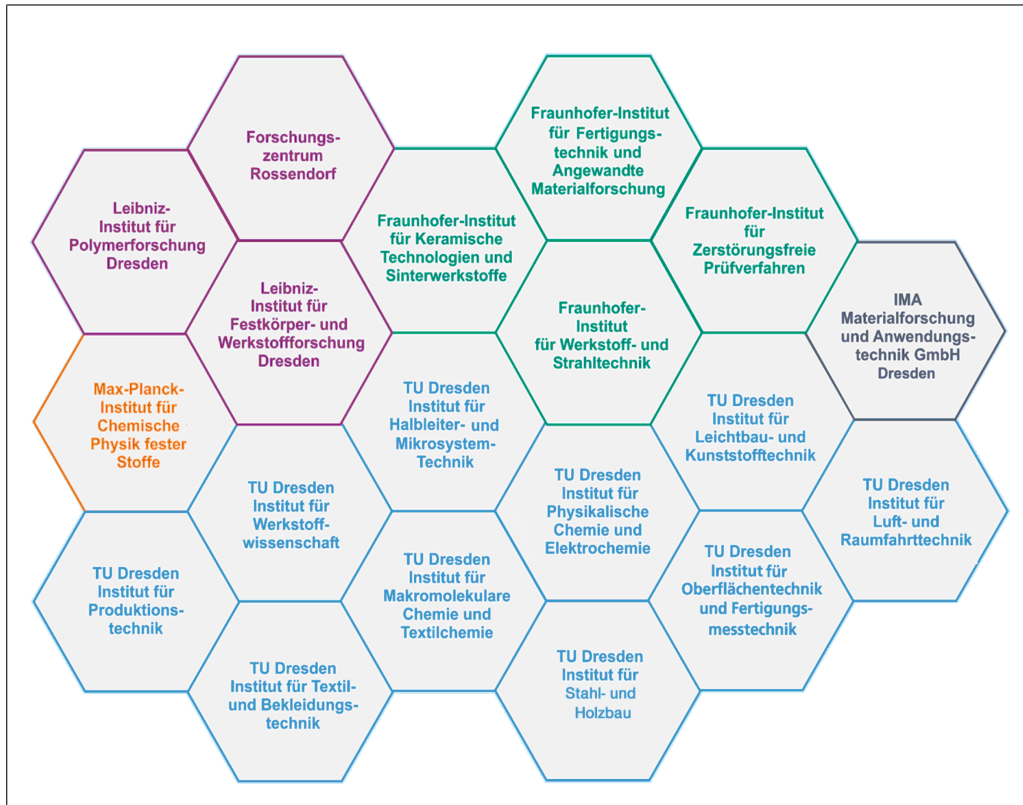


Figure 7.1: Research networking in new materials (Source MFD, 2007)

This unique situation helps attracting firms to the region:

Smart Material GmbH has settled in Dresden because here we are able to find first -class research partner and suppliers. We are a German-American company working with NASA patents and the know-how of the Dresden Fraunhofer Institute for Ceramic technologies and Systems (Thomas Daue, Managing Di-

rector Smart Material GmbH²¹).

In this case, scientist assist and support companies in every stage of the product chain, from the first concept to the final production. And this research profit also from the close relationship between the research centers and the myriad of firms that provide not only a specific demand but also possibilities for testing. In this sense, the firm IMA Materialforschung und Anwendungstechnik GmbH Dresden cooperates with the Fraunhofer IWS in order to develop structures to be used by Airbus in the construction of the plane *Airbus A 380*. The cooperation combines testing with simulations, both with computers and special laboratories, similar to the ones needed for testing bio- and nanotechnology materials (Landeshauptstadt Dresden, 2005c[122], p. 5).

Dresden is also a main address for lightweight engineering. In this case, it is important the TU-Dresden Institut für Leichtbau und Kunststofftechnik (ILK) that organize a yearly symposium on lightweight engineering. From the research of the ILK result impressive achievements like mechanical components (i. e., rotors) made of textile material (Landeshauptstadt Dresden, 2005c[122], pp. 6-7). This is a bionic application, inspired in the structure of trees and bones' cells and result of the joint work with the Fraunhofer Institut²².

The Fraunhofer Institut (this time IWS) also cooperates with IBM

²¹Landeshauptstadt Dresden, 2005c[122], p. 4

²²Other institutes, like the Leibnitz or the Max Bergmann, already mentioned above, cooperate also with the TU-Dresden developing biodegradable fibers to be used as implants that help the body to regenerate tissues and then degrade themselves. Landeshauptstadt Dresden, 2005c[122], p. 8

Deutschland GmbH for developing a new material carbon based which characteristics (as hard as diamonds, malleable as metal and thin) seem great to be used in computer hard disks (Landeshaupstadt Dresden, 2005c[122], p. 8).

Again, it is possible to find start ups coming from those research centers. In 2004, Evico GmbH was found by three scientist of the Leibniz IFW. Now, the firm is the European leader in the research on superconductive wires, massive superconductive ceramics and magnetic bearings (Landeshaupstadt Dresden, 2005c[122], p. 9). And still, they cooperate with the TU-Dresden giving lectures²³. Or, sometimes, the companies offer training to students because of the cooperation with the university (i. e. ThyssenKrupp AG cooperates with the TU-Dresden offering work tours, traineeships and receiving courses for employees at the TU-Dresden²⁴).

7.5 Summing up

High technology and industry form the potential for the economy of Saxony, which is the strongest among the new federal states (European Commission, 2004[61]).

Saxony has a settlement structure which is especially advantageous for regional growth. There is a high population density and integration of

²³Like the Chairman of Audi AG, Prof. Winterkorn that give lectures at the TU-Dresden. Or scientific employees of the Fraunhofer Institut that give lessons both at the TU-Dresden and HTW-Dresden (Landeshaupstadt Dresden, 2005c[122], p. 10)

²⁴In fields like mechatronics or molecular bioengineering. Landeshaupstadt Dresden, 2005c[122], p. 10

business activities with highly qualified research and educational facilities within a small area. In addition, there is a strong cooperation among different agents within a sector.

Moreover, Saxony has a varied education landscape, with universities, specialized colleges and research institution working closely together. This environment boasts innovation if considering the density of technology business in the region.

Chapter 8

Cluster Approach in Saxony?

8.1 Focusing on the cluster

In July 2006, the results of a research of the Institut der deutschen Wirtschaft Köln (IW) were published in *Wirtschaftswoche*¹. The *Institut der deutschen Wirtschaft Köln Consult GmbH* is a research centre related to the Initiative Neue Soziale Marktwirtschaft (INSM). This institution is financed by the Arbeitgeberverbände der Metall- und Elektro-Industrie². The study “Deutsche Großstädte im Vergleich” compared the economic performance and potential of the main German cities. In the paper, Dresden was among the 10 first cities of the country and was the best placed of all East German cities (including Berlin). It was also the most dynamic city German wide if considering

¹“50 Städte im Test”, *WirtschaftsWoche* 27/2006. Article based on “Deutsche Großstädte im Vergleich”, IW Consult GmbH Köln, 30. Juni 2006. http://www.wiwo.de/pswiwo?fn=ww2&sfn=deep_link&wert=staedte

²Association of Entrepreneurs of Metal and Electric Industries

the accumulated development ratio between 2000 and 2005³.

Such remarkable performance was based on its ability attracting foreign investment, the existence of a high-qualified working force, the high occupation ratio among elder citizens, the growing figures of GDP and income per head and, finally, its productivity⁴.

So far, it has been possible to recognize enough elements to define Dresden as a *cluster of the high-tech industry*. Again, this term refers to the tendency of some companies to cluster in certain locations. Usually, this fact is more the result of the creation of communication and cooperation nets between companies in an area rather than the product of corporative decisions. These nets are established on the existence of research institutes, universities, financing services and public agencies in an environment of internal cooperation and external competition (Raines, 2001[195]).

But, is it possible to identify such cluster? As it was explained in previous chapters, the term cluster in the proposed model says more than the concentration of firms in a certain area. The cluster approach considers a conscious strategy of economic development based on the cooperation of differentiated actors. The approach considers four main kinds of players named trigger, entrepreneur, financier and academia. Each one of them exploits its specific skills making compatible the particular interest with the common goal that maintains networking.

³“Deutsche Großstädte im Vergleich”, IW Consult GmbH Köln, 30. Juni 2006. Pp. 22-26

⁴“Stärken-Schwächen-Profil Dresden”, IW Consult GmbH Köln, 30. Juni 2006. <http://www.iwconsult.de/downloads/grossstadtvergleich/2006/Dresden.pdf>

Fact is that the Landeshauptstadt Dresden includes information about administration, courts and services following the information about industry and research in the same section named “Economy” in its internet page⁵. Fact is that the region presents a remarkable record of new settled firms and research centers strongly related to the high-tech brand. Moreover, the city of Dresden belongs to the European Cluster Alliance (Ketels, 2007[98], p. 11).

The term cluster goes beyond the concentration of business in a specific industry. In this case, high-tech and applied research are the result of an innovative milieu with a myriad of effects in many fields.

As we have seen above, the Cluster Approach is built with the interaction of a limited number of agents called actors. The nature of each actor varies according to its capabilities and aims. In this sense, we were able to distinguish four main actors: financial, entrepreneurial, academical and political or trigger.

We also mentioned that the Cluster Approach has three main stages of development if considering the structural needs of the system in different development phases. A first step was to locally design and create the productive foundations of the system. The second one was the implementation and correction of the system. Finally, we mentioned the stabilization and institutionalization of the cluster network, allowing sustainability and permanence.

⁵[Http://www.dresden.de](http://www.dresden.de)

If applying the model to Saxony, we will assign the different roles in the region.

8.2 The Dresden trigger

For the case of Dresden, it would be possible to identify the trigger with the government of Saxony, which, chasing the economic reactivation of the region, welcomes the allocation of new firms and promotes system interactions. At the beginning of the 1990s, the social situation of economic instability and social dissatisfaction, described above, demanded an ambitious plan to develop the region. In addition, Saxony's role is supported locally by the Department of Economic development of the Landeshauptstadt Dresden.

The key idea was to attract business to the region. However, the relative distance between Saxony and the main industrial axis or transport channels determines focusing on non-traditional fields such as heavy industry. As an opportunity the horizon of enlargement was present, now as an unchangeable situation. Diving in the "inventive tradition" of Saxony and considering the existence of the reputed educational institutions, the public leaders chose the high-tech path in the moment when e-business was booming.

The supported sectors are brand as high-tech and innovative activities. The interesting thing is that, in general, the sectors are supported as a whole and not considering specific firms. The focus is on creating a system of

networks with research centers⁶, university, public agencies (for example, the Department of Economic development of the Landeshauptstadt Dresden⁷), entrepreneur associations⁸ and, recently, with a wide range of services.

The services provided by the Department of Economic development are⁹:

1. approval management
2. real state management;
3. promotion of business start ups;
4. contact with research institutions and networks;
5. location marketing; and
6. lobbying.

The Dresden trigger has attracted investment by the double interaction of marketing efforts and deployed incentives, both financial (tax incentives or capital aides) and non-financial (infrastructures or personal connection via sponsored events). The long-term interest of politicians could be, for example, to assure population fixation to Saxony (guarantying future tax contributions) or to gain political support in the region for the party in office.

⁶See above

⁷www.dresden.de/business

⁸For example, The Entrepreneur Club or Dresden International Friends. Both institutions organize several events from seminars to concerts that maintain a fluid communication among the main Dresden personalities

⁹All this information is provided by the Department of Economic development itself (see previous footnote). The final statement is specially interesting because, as mentioned, the Department belongs to the City of Dresden's public administration)

The current Saxony's Ministerpräsident, Prof. Dr. Georg Milbradt, mentioned the important effort of Saxony. Between 1995 and 2005 there were about 2,800 R&D projects with an estimated investment up to 1.6 billion Euros. The half of the money (800 million Euros) came from Saxon technology Funding Programs (75% financed with European funds)¹⁰. All in all, Saxony invests in R&D around 2.5% of its GDP.

The reasons of investing in this areas were based on an existing infrastructure. For example, in 1991, Dresden had a net of institutions related to electronics (Milbradt, 2005 [150]):

1. basic research(molecular electronic, Prof. Hartmann, since 1961);
2. semiconductor materials (Freiberger Elektronikwerkstoffe: at that time with 1,600 employees);
3. development of microchips(Zentrum Mikroelektronik Dresden: 3,300 employees); and
4. production of computers and printed circuit boards(Robotron: 30,000 employees)

However, this institutions were unable to face international competition after losing the COMECON primary market. Suddenly, a very qualified human capital was available. This potential was used in order to build the network Silicon Saxony and maintain employment. The impact of the investment

¹⁰Prof. Dr. Georg Milbradt, "Innovation and the Regions Cohesion and the Lisbon Agenda in the Free State of Saxony since 1991", Speech given at the Conference on Cohesion and the Lisbon Agenda, Brussels, 3 March 2005 [150].

can be seen in table 8.1 that consider the contribution of AMD and Infineon only¹¹. In the study of the Deutsches Institut für Wirtschaftsforschung

Table 8.1: Effect on job creation of AMD and Infineon investments in Dresden

	1994	1996	1998	1999	2000	2001	2002	2006*
Direct employment	100	1230	3100	3800	4650	5800	6300	8700
Service and equipment	0	815	1224	1512	2273	2387	2572	3800
Income effect	346	653	1505	1391	2154	2441	2341	4600
Construction	1269	541	1638	198	1612	1482	401	200
Total	1715	3239	7467	6901	10689	12110	11614	17300

Source: Deutsches Institut für Wirtschaftsforschung (DIW) 2002 (*: estimated)

(DIW) published in 2002 (Edler, 2002[53], pp. 9-11), it is possible to find the fiscal effects of “Silicon Saxony”. The state was able to amortize the huge investment by 2006. According to the same study, only due to direct taxation Saxony will obtain a 38% surplus from the investment by 2010¹². The study underlined, even in the worst possible scenario, a prognosis of a positive effect in Saxony’s fiscal system.

8.3 Financial actor in Dresden

The financial actor, as mentioned in the presentation of the model (see section 3.2) is part of the different networks that it is possible to find in Dresden: Silicon Saxony or BioMet (see table 8.2).

¹¹As seen above (see Section 7.2 of this chapter) there are more than 200 companies related to the Microelectronics network “Silicon Saxony”. The data will surely change in future, considering the plans of AMD to increase investment (2.5 billion US dollars) because of the opening of a new factory (Landeshauptstadt Dresden, 2006b[124], p. 99)

¹²Without considering the reduction in social security expenses (0.944 billion Euros) and additional social security proceeds (2.988 billion Euros). The authors contemplate, for example, the reduction in unemployment subsidies. Edler, 2002[53], p. 10.

Table 8.2: The venture capital in Dresden

Network Financial Services in BioMeT Dresden
3i Deutschland GmbH
Baden-Württembergische Bank Filiale Leipzig
BC Brandenburg Capital GmbH
bmp AG
Creathor Venture Management GmbH
Deutsche Bank AG Globale Banking, Firmenkunden Deutschland Filiale Dresden
Deutsche Zentral-Genossenschaftsbank AG Geschäftsstelle Leipzig
Dresdner Bank AG Private & Business Banking Sachsen-Ost
Dresdner Volksbank Raiffeisenbank eG
Kreissparkasse Meißen
Mittelständische Beteiligungsgesellschaft Sachsen mbH (MBG Sachsen)
Ostsächsische Sparkasse Dresden
SAB Sächsische Aufbaubank - Förderbank
Sachsen LB Corporate Finance Holding GmbH
SIB Innovations- und Beteiligungsgesellschaft mbH

Source: <http://www.biomet.de>.

In the list of financial partners, there is a mixture of traditional banking¹³ and venture capitalists. In this sense, according to a study of the Stiftungslehrstuhl für Gründungsmanagement und Entrepreneurship (Heinz Klandt and Lutz Krafft, 2000[108], p. 42) Saxony is the region that concentrate a higher number of venture capital firms (almost 50%) from the territories of the former GDR (excluding Berlin)¹⁴.

The TU-Dresden also has some ways of promoting start ups with institutions like *Dresden exists*¹⁵. This organization helps graduate and undergraduate students to start an own business offering individual counseling

¹³Please, notice that in the table 8.2 there are only the members of the network *BioMet*. This does not include other existing banks in Dresden like: ABC Privatkunden-Bank GmbH, BBBank eG, BHW Bank AG, CC-Bank AG, Citibak Privatkunden & Co., Commerzbank AG, CreditPlus Bank AG, GE Money Bank GmbH or HypoVereins Bank AG.

¹⁴The TU-Dresden has also a Chair sponsored by SAP on Venture Capital. The Professor is Michael Schefczyk who has published several articles about the topic.

¹⁵www.dresden-exists.de

and maintaining a network of useful contacts. The idea is to guide the future entrepreneur during the whole process of creating a business : structuring the ideas, market and technology analysis, measuring the potential of the idea, creating a business plan, information about the financing possibilities and legal support for business foundation. In order to do so, the organization works closely with members of the university, as well as private companies¹⁶ in order to adjust the offer to the actual needs of market.

In previous pages (see section 3.2.4), it was mentioned that the financier function is to give answer to two different kinds of needs. First, a company needs financial support for any of its development stages. Secondly, in some cases, a firm requires management support. This support that can be defined as cradle services because it is specially important in the early stages of development of a new business, is taken by Dresden-Exists: it would collect information about the specific company, the market and product possibilities. Specially if consider pioneer areas with little tradition of formal financing or banking, the agency creates connections with Venture Capitalists as informal financial suppliers.

8.4 Summarising results

As it was mentioned above (see section 2.4) Martin Stuchtey considers four measures for identifying a cluster: the industry output concentration, the

¹⁶It is quite interesting the role played by consulting firms. For example, The Boston Consulting Group or Bain & company maintain contacts with the university, participating in a fair offering career opportunities for the TU-Dresden graduates. In Dresden there are also *hundreds* of consultant companies registered. And this in a population of just 500,000 people.

existence of cluster externalities, the presence of central actors and finally, a certain local culture (Stuchtey, 2000, pp. 40-42[229]). All these elements are present in Dresden. Therefore, it is possible to admit that there is a cluster in Saxony's capital.

The next question is if it is possible to identify the cluster approach also in this region. Applying the basic cluster approach framework to the case of Dresden, the trigger would be the government of Saxony. At the beginning of the 1990s, the social situation of economic instability and social dissatisfaction, described in a previous paper, demanded an ambitious plan to develop the region. The key idea was to attract business to the region.

The relative peripheral situation of the area (distance from main industrial axis or transport channels) determines focusing on non-traditional fields (like heavy industry). Confronted with the challenge, it was possible to find an imaginative solution: Diving in the "inventive tradition" of Dresden and considering the existence of the reputed Technische Universität Dresden, the public leaders chose the high-tech path in the moment when e-business was booming.

The Dresden "trigger" attracted investment by the double interaction of marketing efforts and deployed incentives, both financial (tax incentives or capital aides) and non-financial (infrastructures or personal connection via sponsored events). The long-term interest of politicians could be, for example, to assure population fixation to Saxony (guarantying future tax contributions) or to gain political support in the region for the party in office.

Companies have come to Dresden considering the advantages derived from goal synchrony with political actors as well as the advantage of an investigation centre, source of qualified workers and able to share research and development costs. Some examples of the advantages of Dresden are the relative amount of high-trained individuals, with their own laboratories and material, paid with public money or which scholarship or financing, given by companies, have public incentives.

There is an outstanding scientific community in key areas of future industrial development: microelectronics, biotechnology, nanotechnology or new materials. These areas maintain also institutionalized connections with industry and service sector because of the joint participation in formal networks.

Finally, there is also a important presence of financial sector. Not only of traditional formal banking but also venture capital. Moreover, this venture capital takes part also in sector networks and maintaining constant contact with academia.

Chapter 9

Conclusión

Los capítulos previos han explicado los principales elementos que definen el enfoque de conglomerados como un modelo de política de desarrollo. También se ha expuesto la forma en que esos elementos interactúan y se han enumerado y explicado las diferentes etapas que llevan a la formación de un conglomerado. Así, se ha considerado la forma en que el enfoque de conglomerados puede ser utilizado como herramienta descriptiva para la comprensión de las variaciones de actividad económica en un área geográfica. Se ha visto la forma en que beneficios sociales e inversión actúan como incentivos al gasto de empresarios en mejoras en la producción.

Los conglomerados crean un entramado que expande las capacidades de un actor económico a través de las oportunidades generadas en la red de especialización e innovación, ayudando a las regiones a fortalecer su imagen como lugar de asentamiento empresarial dinámico y atractivo. Este asentamiento de empresas, matrices y subsidiarias, acrecienta las oportunidades

productivas y favorece la prosperidad económica (Ketels, 2007[98], p. 4).

El sistema de reciprocidad es consecuencia del fenómeno de competencia en la economía de mercado y la diferenciación de la actividad a partir del ajuste en las ventajas productivas. Estas ventajas pueden ser exploradas, explotadas y expandidas con políticas específicas. En este sentido, el enfoque de conglomerados. aporta un sistema integrado de políticas que considera la multiplicidad de actores, el reconocimiento de las ventajas competitivas de las empresas, el papel de apoyo de las redes de intercambio y el papel decisivo del tiempo. El enfoque subraya que son las empresas y no las regiones las que compiten entre si. A pesar de ello, existen ciertas interdependencias dado que la competitividad puede beneficiarse de la concentración regional de empresas. Por otra parte las ventajas de estas empresas se pueden basar en factores existentes localmente.

El enfoque de conglomerados considera el uso eficiente de todos los factores productivos existentes en una región. Esto permite que aplicado como política de desarrollo facilita el control pleno del potencial económico regional. Será este potencial, y no un sector económico elegido arbitrariamente, el que determinará la especialización. Entre todo los elementos de valor para obtener ventajas destaca la innovación. Esta innovación se alimenta de la experiencia intercambiada de agentes diversos gracias al apoyo de redes de intercambio. El enfoque de conglomerados está dirigido a crear ese sistema de apoyo a la innovación, combinando la concentración, la comunicación y la reciprocidad.

Este enfoque es el resultado de la convergencia de varios conceptos de

sobra conocidos y usados por los economistas. Sin embargo, en ausencia de propuestas inéditas, la novedad radica en la integración de lo ya sabido en la explicación del fenómeno de conglomerados que permita su comprensión y, quizás, su recreación en nuevos lugares a través de políticas conscientes.

El primero de estos términos que se acumulan en la idea de conglomerados es el de especialización. El principio de escasez subraya la inmensa disparidad entre nuestros deseos y capacidades. Si consideramos todas las cosas que queremos hacer hoy o en nuestras vidas, hemos de pensar en los recursos de los que disponemos sean estos tiempo, energía o demás. De ello, se deriva la necesidad de organizarnos, definiendo prioridades y gestionando el uso de los recursos de acuerdo a su disponibilidad y eficacia en la consecución de los fines pretendidos. Siendo incapaces de tomar infinitos cursos nos vemos obligados a optar por un número finito de posibilidades.

Considerando que la especialización tiende a incrementar el rendimiento económico de las empresas y que dichas firmas tienden a establecerse en una área específica es posible preguntarse si las ventajas competitivas de esas compañías afectan de alguna manera la prosperidad de la región anfitriona. De ser así, podría considerarse el interés de la región en mejorar las habilidades productivas de las empresas que hospeda. Además, si se pueden describir los elementos que confluyen en un ya exitoso aglomerado de empresas (digamos, Silicon Valley) es razonable considerar la forma en que tales elementos se pueden reproducir para desarrollar nuevos aglomerados en nuevas zonas.

En este sentido, es importante plantearse la pregunta en términos

adecuados. No se trata de saber por qué algunas regiones tienen éxito y otras no en los mercados internacionales sino *cómo una región consigue convertirse en hogar de competidores internacionales exitosos en una industria* (Porter, 1990, p. 1[186]).

La asignación de factores depende de las ventajas comparativas que cada región posee. El reconocimiento de estas propiedades ayuda a las autoridades locales a diseñar una estrategia ganador-ganador sin los riesgos derivados de la mera importación de actividades productivas que hubieran tenido éxito en otras zonas¹. El método recomienda la participación de la red de conglomerado desde la fase de diseño, dado que reconoce los intereses específicos de los agentes políticos. Estos intereses podrían forzar la aplicación de modelos improcedentes. Habría que preguntarse porque un político puede ver lo que está oculto al mercado.

Como resultado de estos mecanismos de correspondencia, cada miembro del conglomerado se beneficia de un sistema que satisface sus necesidades y amplía sus intereses, incluso en situaciones de fuerte competición global. El conglomerado refleja la existencia de spill overs y la cooperación a través de líneas institucionalizadas.

El enfoque de conglomerados está orientado a resultados y son los ob-

¹Las decisiones basadas en la consideración de una determinada coyuntura puede provocar apuros innecesarios. Que una industria haya producido extraordinarios beneficios en un determinado lugar no asegura que produzca los mismos resultados en otro. Además, la movilización de recursos desencaminada en el establecimiento de un complejo estratégico errado puede dañar la capacidad productiva existente. Esta afirmación pudiera demostrarse con el ejemplo de una persona empeñada en tocar un instrumento musical con la esperanza de convertirse en virtuoso: si carece de las facultades necesarias será vano el tiempo invertido pese a su voluntad. El deseo por si solo no asegura el logro.

jetivos cumplidos los que mantienen la colaboración entre compañías, agencias gubernamentales, centros de investigación y educativos, instituciones financieras y otros organismos relevantes. Más aún, el conglomerado llega a ser más visible y atractivo cuanto más y más fuertes son los nexos entre los diferentes actores y mayores las posibilidades para aprender unos de otros.

Así entendido, el enfoque de conglomerados favorece políticas a varios niveles, con el objetivo de integrar los logros presentes y futuros en términos económicos, políticos y sociales. Será, por lo tanto, un ejemplo claro del valor de la reciprocidad que de esta forma reduce el riesgo para cada individuo a la vez que ofrece mayores oportunidades de provecho.

Para mantener la eficiencia, la claridad ha de ser una característica constante en la relación entre las partes. La misma se asentará sobre tres puntos: la definición de objetivos, el mantenimiento de una continua comunicación entre los actores y el sostenimiento de la asistencia mutua.

La comunicación continua incrementa la eficiencia de los enlaces existentes y la interacción futura a través de la creación de nuevos metodos complementarios de intercambio de información entre los actores e, incluso, institucionalizándolos².

De esta forma ningún actor puede ser aislado de los demás. Con ello, la comunicación es una necesidad entre actores para la organización de agendas y la distribución de liderazgo. El resultado es una relación simbiótica donde

² *Los actores cuentan con la información disponible para tomar sus decisiones estratégicas para el intercambio económico, y esto a largo plazo institucionalizará fórmulas locales de acción social dentro del armazón legal dado y la ordenación política.* Nakano y White, 2006[154], p. 2.

cada actor obtiene fin tras aceptar una labour particular definida tanto por su tamaño y su propio objeto. Más aún, sus obligaciones se derivan de las capacidades. Finalmente, por el mantenimiento de la asistencia mutua, permite a los diferentes actores adquirir certidumbre sobre el futuro y fomenta el diseño de planes más ambiciosos. El vínculo entre los miembros del conglomerado da confianza en caso de crisis transitorias.

El modelo de conglomerado que presenta este documento llamará a cada uno de los partícipes *actores*. Éste es aquel ente de naturaleza variable (política, empresarial, educativa o financiera) que ejerce un papel claramente identificable en la red y en la creación del conglomerado en cualquiera de sus fases: diseño, implementación, supervisión, generación, desarrollo, adaptación o mantenimiento.

Al mismo tiempo, cada actor habrá de contar con la suficiente capacidad analítica para entender su cometido en la economía local y/o la capacidad funcional para intervenir en la mejora de los procesos que posibilitan el desarrollo, económico, competencias ejecutivas en el proceso de toma de decisiones y establecimiento de acciones o recursos para apoyarlas.

En consecuencia, es posible considerar cuatro actores que interactúan dentro del modelo de conglomerados. éstos son el iniciador político, el empresariado, la institución académica y las finanzas³.

³Cada actor será definido con más precisión en páginas siguientes (ver Capítulo 3

9.1 Los actores del conglomerado

9.1.1 El iniciador

El enfoque de conglomerados puede ser considerado un modelo de desarrollo⁴. Por esta razón, hay que asumir que el conglomerado tiene que ser de alguna manera iniciado. Así, el enfoque como modelo de desarrollo de políticas habrá de usarse en principio en aquellas regiones en o bajo los límites de su capacidad económica (cuando los recursos disponibles no son usados plenamente o lo son de manera ineficiente deteriorando la competitividad de las empresas) o en aquellas zonas donde no exista concentración de actividad específica.

Para diseñar una política de conglomerados, el iniciador facilita activamente la participación de todos los miembros dinámicos del sistema en la planificación y ejecución de las tareas. Estos miembros dinámicos se denominan en este documento actores. Aunque el propio enfoque favorece la multiplicidad de agentes estos pueden ser identificados de acuerdo a cuatro categorías definidas por su campo de actividad: el iniciador político, el empresario, los centros de investigación y formación y las instituciones financieras.

El iniciador aporta los mecanismos formales de la política desarrollo de conglomerados sólo cuando estos sean necesarios, limitándose a si mismo a un papel de apoyo y usando las herramientas con mayor potencial y capacidad

⁴*La aglomeración de trabajadores cualificados y su actividad en I+D y producto [...] son un estímulo explícito e implícito en [...] modelos de crecimiento regional.* Malecki, E. J., y Varaiya, P., "Innovation and changes in Regional structure", en Nijkamp and Mills, 1987[155], vol. I, pp. 638-639.

de generar resultados.

En el enfoque de conglomerados cualquier tipo de actor (independientemente de su naturaleza) puede ser un iniciador. El determinante sería en cada caso si el candidato dispusiese de los recursos suficientes para atraer y movilizar socios y de la capacidad analítica para planear una estrategia racional.

Frecuentemente, el papel de iniciador será ejercido por una gran corporación empresarial que concentra y se beneficia grandemente de la aglomeración de capital. También puede ser un centro académico prestigioso que realice investigaciones de valor en un campo específico con posibilidades de ser aplicado para satisfacer una cierta demanda social. Por otra parte, puede tratarse de un inversor compromeedo con acceso a una caudalosa fuente de capital a la espera de ser gastada en nuevos y ambiciosos desafíos empresariales. Sin embargo, en este documento se ha considerado que el iniciador es un sujeto político.

Este iniciador político ha de contar con cuatro características fundamentales:

1. La eficiencia de las políticas de conglomerado se mide de acuerdo a la capacidad de la región para sostener la innovación. El iniciador promoverá las aptitudes creativas de los agentes locales para el desarrollo y adopción de cambios que mejoren la eficiencia en el uso de los factores productivos. De esta forma, será posible ajustar los procesos que sostienen la mejora de la productividad, manteniendo así la competi-

tividad de las empresas participantes en el conglomerado.

2. Las políticas de asistencia de los gobiernos locales no están pensadas para crear estructuras competitivas sino para apoyar y difundir la innovación basada en las empresas o en los centros de investigación y formación. Éstas son las auténticas fuerzas motrices. En otras palabras, el iniciador no aporta innovación pero crea las condiciones para que ésta aparezca.
3. El iniciador político es capaz de influir la conducta de aquellos que viven en su área de responsabilidad. Esto significa que el iniciador puede actuar efectivamente como gobierno o ese que exitosamente adapta sus medios para obtener objetivos legítimos.
4. El iniciador político distribuye el presupuesto público dado entre diferentes actividades tras analizar los costes y beneficios, directos e indirectos, de cada acción particular. Este método establece criterios racionales para determinar que actividades deben ser apoyadas y cual debe ser el gasto relativo en cada una de ellas. Como consecuencia, el iniciador político se abstendrá de realizar gastos que pueden ser asumidos por otras partes con el mismo coste y resultados para el común.
5. Finalmente, el iniciador político aparecerá bajo las condiciones correspondientes a un escenario político y económico determinado.

El enfoque de conglomerados refleja las cambiantes necesidades de un aglomerado innovador. En otras palabras, reconoce un ciclo de vida: movilización de factores existentes, emergencia de nuevas capacidades, variación de las estructuras productivas de un aglomerado con ventajas competitivas

menguadas. Así pues, el iniciador político tiene que fortalecer y expandir las fórmulas que favorecen los aportes de financiación (como capital de riesgo), apoyan la investigación científica y crean una red funcional que mantenga la plena capacidad innovadora. El iniciador político es incapaz de alcanzar su interés particular o cubrir sus necesidades sin la cooperación de otros. Como resultado de esta dependencia, el iniciador redactará un borrador de política donde habrá identificado el objetivo principal, las líneas estratégicas y los socios tácticos.

Este borrador desarrollado por el iniciador incluirá los siguientes aspectos:

1. mecanismos de identificación de la ventaja comparativa;
2. limitación de su labour propia de apoyo; y
3. mejora de la interacción entre actores.

Estos otros intereses expanden la lista de actores en la red del conglomerado. La interacción de agentes tan heterogéneos sería posible por la existencia de una flexible y moderna red de industrias, servicios, inversores, educación y gobierno. Todos ellos aportarían a las nuevas soluciones requeridas sus diferentes facetas, vitalizando las fortalezas de los negocios y compensando sus debilidades por la posibilidad de externalizar procesos productivos clave.

De esta forma, el gobierno local o iniciador político lideraría la red formada, buscando el compromiso de las partes y aportando los medios e infraestructuras de contacto para todos. Las empresas actuarán como unidades

productivas y como fuente principal de recaudación fiscal. Los centros de investigación y formación aportarán el conocimiento y el plantel de individuos bien entrenados. Finalmente, las finanzas actuarán como correa de transmisión o lubricante apoyando a las empresas con financiación y, en algunos casos, asesorando⁵.

Con el uso del enfoque de conglomerados para la creación de políticas de desarrollo, el administrador público local intenta establecer una compleja red público privada con enlaces institucionales, financieras y de conocimiento. Este entramado favorece la relación entre las partes permitiendo la división de tareas y ayudando a combinar el interés individual hacia un objetivo común de crecimiento económico regional.

9.1.2 El operador financiero

El operador financiero es el complejo de entidades capitalistas que dan apoyo monetario a las empresas. Son *instituciones financieras* como bancos, compañías de seguros o fondos mutuos. También se pueden incluir los mercados financieros de bonos, acciones y transferencias internacionales. Todo ello resulta en la creación de un complejo sistema financiero.

Normalmente, tales elementos aparecen ya integrados en la red económica regional y estarán organizadas como empresas estándar. Estas compañías pueden ofrecer un tipo de producto muy específicos pero puede ges-

⁵La razón no es necesariamente altruista: como fórmula para proteger la inversión el financiero puede ayudar al empresario inexperto a considerar aspectos concretos del negocio que favorezcan la viabilidad comercial

tionarse con parámetros funcionales similares a los de cualquier empresa. Sin embargo, en aquellos entornos con escasa tradición o desarrollo de mecanismos financieros formales, el capital de riesgo actuará como intermediario financiero informal. Además, dado que el enfoque de conglomerados trata de impulsar la situación económica de un área específica con la interacción de múltiples agentes, este tipo de recursos pueden aparecer también en zonas que ya cuenten con un complejo formal de capital.

Estos también se beneficiarán de las ventajas competitivas regionales y, de alguna forma, será sujeto de innovación por la posibilidad de crear y experimentar con nuevos procedimientos de financiación. Estos intentos habrán de permitir situaciones que sigan ofreciendo las recompensas para la especulación aunque asumiendo mayores costes de incertidumbre que una entidad financiera estándar. Un agente de capital de riesgo se integraría en la red dado el potencial de beneficios que se ofrece en las eventuales prácticas.

9.1.3 El empresariado

Un empresario es una persona que acomete lances comerciales. ésta asume la responsabilidad y con ella el riesgo implícito de un determinado negocio para obtener un beneficio. El empresario decidirá que producir tras seleccionar y usar parte de los factores disponibles. Además, el empresario actúa consciente de que si el proyecto tiene éxito obtendrá una ganancia o, en el caso contrario, tendrá que asumir una pérdida.

La figura del empresario aparece si se dan las condiciones para su

existencia. Éstas suelen ser de tipo legal (protección de la propiedad privada y vías formales de intercambio comercial) pero también existen condicionantes psicológicos y sociológicos. Así, por ejemplo, que se reconozca un cierto estatus social para el empresario o, básicamente, que existan oportunidades abiertas para la actividad privada en la sociedad anfitriona.

Este camino está basado en la reputación que el individuo que asume el reto de crear una empresa tenga en el colectivo social. Sin embargo, hay que añadir que tal actividad también puede ser resultado de la necesidad en aquellas sociedades deprimidas con limitadas oportunidades de empleo a cuenta ajena y que empujan a la persona al autoempleo.

9.1.4 La investigación y la formación

Las instituciones de investigación y educación son aquellas entidades académicas que aportan individuos altamente formados⁶, apoyan la transmisión de conocimiento, desarrollan la investigación y, finalmente, son vivero de trabajadores altamente cualificados. Estos elementos se transmiten al ciclo productivo que contará con un aporte constante de mano de obra cualificada con costes de formación bajos para la empresa dado que el adiestramiento es asumido por los propios centros académicos o por el gobierno local.

El principal cuerpo académico es la universidad que puede ser considerada la más alta institución educativa. Además, pueden ser también

⁶Entiéndase en este caso el termino como sinónimo de educado o entrenado. Obviamente no se hacen consideraciones sobre la personalidad. Sin embargo, pueden considerarse como factores de cualificación las destrezas de saber informal: hablar en público, organizar agendas, desarrollar proyectos. . .

centros de investigación u otros organismos que formen o investiguen. La investigación puede ser tanto básica como aplicada. Aunque en un principio parezca que deba enfocarse más en esta última, la investigación básica normalmente estará dirigida a objetivos más amplios y ambiciosos que de cumplirse amplían el volumen de conocimiento en un área determinada.

9.2 El desarrollo del conglomerado

Se ha visto que el modelo de conglomerados necesita considerar la evolución de un sistema. Para hacerlo, ha sido necesario reducir el número de participantes teóricos y encontrar un conjunto de reglas que organice su interacción. Se parte de la premisa de que el mantenimiento del conglomerado, en el tiempo relativamente amplio que lleva de su génesis a su madurez, depende del provecho que cada actor obtenga de su participación. Esto significa que en el caso de que la red de conglomerado no beneficie a uno de los actores principales el sistema sufrirá colapso. Por lo tanto, todos y cada uno de los esfuerzos orientados a hacer del conglomerado un fenómeno duradero tienen que ser compatibles con esta regla. En caso contrario, no puede decirse que la acción emprendida sea efectiva para el conglomerado. El iniciador político actuaría para resolver o prevenir esa indeseada situación.

Una primera etapa del método de conglomerado es el diseño e implementación de la correcta estrategia de implantación. Para llevar a cabo esta tarea el iniciador político tendrá que resolver un triple dilema: establecer el diagnóstico correcto de la situación local sin arbitrariedad, apoyar la formación del conglomerado sin dirigismo y, finalmente, atraer a los partici-

pantes correctos sin inducir intereses equívocos para con la naturaleza de sus actividades⁷.

Para atraer nuevos agentes participantes en el conglomerado regional, el iniciador político tiene que aumentar el atractivo del lugar para los recién llegados y mejorar las condiciones de los ya asentados. Para ello, el iniciador debe considerar los incentivos que pueden ser ofrecidos: incentivos sobre los costes de inversión de capital e impuestos, información, ayuda a la investigación, infraestructuras de transporte e información locales e iniciativas de capacitación laboral. El uso de subsidios se complementaría con reducciones fiscales, inversión pública directa y regulaciones legales.

Como se ha visto, el enfoque de conglomerados introduce un concepto múltiple con objeto de integrar logros económicos, políticos y sociales a corto, medio y largo plazo. Esto se consigue mediante la transmisión permanente de intereses a través del creciente contacto entre las partes. Este contacto se desarrolla en una red de geometría variable. Así, se entiende aquella formada por grupos de relación interconectados con características muy heterogéneas en el grado de formalidad y naturaleza de sus miembros: asociaciones profesionales, clubes de empresarios o fundaciones pueden ser algunos ejemplos.

Esta multiplicidad incrementa el potencial de interacción y armoniza los procesos de adquisición de conocimiento entre los actores. Estos sistemas pueden incluso ser legalmente instituidos, ofreciendo garantías especiales a algunas fórmulas de reciprocidad. La comunicación así establecida facilita el

⁷Con esto quiero decir que los organismos públicos que quieren incentivar una determinada actividad productiva a través de subsidios, corren el riesgo de que las empresas implicadas reorienten su interés no a los beneficios derivados de la comercialización de sus productos sino a la obtención de la subvención misma.

desarrollo de proyectos conjuntos entre varios actores que pueden organizar tareas y compartir su control.

Por su parte, los actores deben preservar un vínculo estrecho con el iniciador político que es quién posee la perspectiva más amplia sobre los vínculos mantenidos en el conglomerado y las diferentes tareas en ejecución⁸. La flexibilidad de la red permite respuestas inmediatas a las principales dificultades. Asimismo, el registro de las interacciones dentro de la red de conglomerado ayuda al iniciador político a formular principios e indicaciones satisfactorias. Esto no es sólo favourable para la propuesta de las políticas de creación del conglomerado sino que, más aún, aporta los medios para la evaluación del sistema, considerando su efecto en el incremento de la competitividad de las empresas y su sostenimiento. Además, esta supervisión mejora la eficiencia del sistema evitándose la potencial duplicación de políticas.

A través del respeto del principio de reciprocidad, los diversos actores adquieren confianza sobre situaciones venideras lo que puede autorizar objetivos más ambiciosos y, por ello, más arriesgados.

9.2.1 El proceso

La estrategia de conglomerado habrá de enfrentarse con obstáculos dentro de la región por la substitución, si decadentes, de las tradicionales actividades económicas, la asimilación de mejoras tecnológicas, la adaptación de actividades a las demandas del mercado y la reconversión en el uso de los

⁸Por ejemplo, el iniciador puede mantener una base de datos con las diferentes iniciativas, los agentes que las desarrollan y sus objetivos.

factores. Como resultado, nuevas empresas podrían surgir, otras habrían de sufrir colapso y algunas serían transformadas. El iniciador político habrá de ampliar las oportunidades productivas, laborales, educativas y financieras del conglomerado sin afectar su eficiencia.

Para lograrlo, el iniciador habrá de apoyar políticas que tengan una influencia directa en el sistema aunque se pueda beneficiar también indirectamente de las ventajas derivadas de regulaciones externas.

Se ha asumido que la competitividad está relacionada al uso eficiente de factores. Así entendida, la competitividad será el resultado de un punto óptimo de eficiencia de asignación de factores que puede estar vinculado a la concentración geográfica de la actividad en el espacio. Este óptimo se obtendrá tras la expansión de las posibilidades para compartir los factores dentro del sistema sin que ello signifique la coordinación de estrategias comerciales⁹. En otras palabras, el enfoque de conglomerados favorece la reciprocidad entre los diferentes agentes y, al mismo tiempo, insta al mantenimiento de la competencia como una medida de presión creativa para la obtención de mecanismos mejorados para la eficiencia del proceso de asignación.

La eficiencia estará determinada también como la relación entre el producto final y los recursos usados para producir en términos valorables. Así, se dirá que un proceso es ineficiente si se puede obtener el mismo resultado con un gasto menor. Ante esto, las motivaciones propias del iniciador político¹⁰ pueden provocar una interpretación deteriorada de lo que sea la

⁹Por ejemplo, se puede hacer uso de un mismo programa informático para el control logístico, colabourar en campañas de promoción, compartir espacios para almacenamiento o canales de transporte. Todo ello manteniendo la independencia comercial

¹⁰Recuérdese que los logros económicos son un medio más para el cumplimiento de

asignación más conveniente.

Así, el iniciador, aunque tiene un papel destacado en el diseño estratégico, es más importante como agente motivador del compromiso y la relación, aspecto que define su liderazgo y soporte del conglomerado. Esto implica la propia restricción de su influencia, aspecto necesario para mantener un sistema operativo en situaciones de fluctuación de mercados¹¹.

Con todo, la tarea del iniciador político varía con el tiempo.

Así, en un principio deberá adquirir información sobre la región. Ya desde este momento, necesitará la cooperación de otros agentes para procesar e interpretar los datos obtenidos. Aún asumiendo la mejor voluntad política, los servidores públicos podrían ser incapaces de cumplir los requisitos imprescindibles que permitan la evaluación independiente y objetiva de la competitividad comercial de industrias concretas o la excelencia científica de las instituciones académicas locales. Sus legítimas motivaciones *buchanianas* y sus intereses (Buchanan and Tollison, 1972[30]) pueden no armonizar con aquellos del sector privado. Habrá que subrayar una vez más la importancia de este punto: sin el consejo experto, el iniciador corre el riesgo de tomar decisiones inadecuadas que pueden derivar en efectos indeseados.

Una estrategia de creación de conglomerado es un método regional-

los objetivos políticos de una autoridad pública. De tal manera, que ésta puede apoyar medidas contrarias a la racionalidad económica que, sin embargo, sean coherentes con sus propósitos: ganar las próximas elecciones, ampliar su presupuesto. . .

¹¹Los recursos disponibles por un representante público suelen superar los de cualquier empresa con lo que, sin la presión de la competencia en el mercado, puede mantener artificialmente fórmulas de asignación obsoletas, es decir, ineficientes

mente adaptado para el desarrollo económico ya que un plan exitoso en una zona puede no ser aplicable fuera de su lugar de origen. Sin embargo, la clave es común: la difusión de información. Así, el iniciador incluirá como parte de la estrategia las políticas para la creación, transmisión e implementación de ideas: subsidios universales para la educación, becas competitivas para investigación básica o regulaciones sobre patentes y propiedad intelectual que permitan el monopolio temporal de las ideas (Romer, 2007[205]).

La introducción en el mercado de nuevas industrias y productos se apoya en la habilidad de adquirir innovación productiva a través de la combinación de conocimientos científicos, técnicos y comerciales. Como consecuencia, la innovación ejemplifica los beneficios de una red. El enfoque de conglomerados persigue, desde su mismo origen, la aplicación de tan ambiciosas condiciones medioambientales.

La segunda etapa es la de aplicación de la estrategia diseñada. En estos momentos se abren dos vías. Por un lado, los participantes irán desarrollando el contacto mutuo y creando los diferentes vínculos que mantendrán el conglomerado efectivamente operativo. Por otro, se mantendrá el proceso de adquisición de nuevos miembros en toda área puesto que las necesidades tenderán a ser cada vez más específicas y las tareas asignadas más especializadas. El iniciador político podría usar incentivos de coste o fiscales para atraer la inversión de capital. Mientras, tratara de reducir los costes de información, investigación, transporte y mano de obra con el uso de subsidios, reducciones de impuestos o inversión pública directa para la mejora de infraestructuras locales. De esta manera, el gobierno local sería capaz de corregir y equilibrar los efectos indeseados del proceso de desarrollo usando

presupuestos públicos o adaptando el régimen legal¹². Esta etapa puede considerarse la de consolidación del conglomerado, y en ella el iniciador político deberá completar un programa que permita a sus *socios* adaptarse al nuevo entorno de reciprocidad. Así, podrían darse eventuales modificaciones de comportamiento, favoreciendo el acceso a los actualizados instrumentos y reforzando una vez más los vínculos entre las partes.

En la tercera etapa, una vez que las políticas han demostrado su capacidad, las inquietudes de cada actor para con el conglomerado se responderán al mantenimiento de los procesos y el sostén de los objetivos. La política institucionalizada de conglomerado mantendrá fórmulas de replaneamiento implementación, supervisión y evaluación. Éstas son necesarias ya que no existe un óptimo de desarrollo de conglomerado estable dado que hay que equilibrar el crecimiento económico, la sostenibilidad medioambiental y bienestar humano.

9.3 Abriendo la innovación

La innovación es la esencia de la competitividad. No es la mera invención sino la renovación de procesos y servicios. La innovación puede crear riqueza y bienestar social. Esta idea establece la base para el desarrollo del conglomerado. La innovación es también algo que puede compartirse, ayudando a la prosperidad común. El flujo creciente de conocimiento es la clave de la innovación y se favorece por la organización en red. Estos sistemas per-

¹²Desarrollando leyes para la protección de la propiedad o simplificando las normativas locales para fomentar la creación de nuevas empresas

miten la búsqueda de las ideas brillantes fuera de una organización específica. Además, esta forma de organización es coherente con el principio de que no es tan importante tener buenas ideas propias como aplicar bien buenas ideas. Frecuentemente, aquellos que han aportado una nueva tecnología no son quienes la comercializan.

El enfoque de conglomerados reconoce la importancia de los gobierno en la creación de las condiciones e infraestructuras que el mercado no puede procurar por si mismo. Además, existen ciertas expectativas sociales que afectan a lo que se espera de un responsable político que determinan los intereses de este. De tal manera que aunque pueda desearse el desarrollo independiente de estos programas no se puede negar la evidencia de la participación de la autoridad pública en los procesos económicos. Sin embargo, habrá que repetir una vez más que la competitividad no es una característica de una región sino que depende de las capacidades de las empresas. Estas pueden mejorarse dentro de un hábitat definido y no usando sólo subsidios a industrias arbitrariamente elegidas. El ejemplo de Dresde muestra que las inversiones en capital social, como educación o investigación básicas, junto con el establecimiento de un conjunto formal de interacciones son los recursos valiosísimos para la obtención de mejoras.

Después de todo, la competitividad podrá ser el juego pero la forma de jugarlo es en equipo.

Appendix A

Modelling the cluster approach: complex systems

A.1 Introduction

The cluster approach¹ policy introduces a multi-level concept, which aims to integrate present and future achievements in economical, political and social terms. It is a clear example of the value of collaborating, because doing so the risk for each individual is less and the gains for each are greater. However, the level of complexity of the proposed system induces the use a special kind of analysis²: the pursuit of general laws governing complex networks (Mitchell, 2006[149], p. 2).

¹For a modified version of this appendix see Roldán-Ponce, Antonio, “Modelling the Cluster Approach: Complex systems”. Berichte Forschungsinstitut der Internationale Wissenschaftliche Vereinigung Weltwirtschaft und Weltpolitik (IWVWW) e.V, Januar/Februar 2008, Nr. 178/179, 119-125[202]

²<http://www.santafe.edu>

A complex system is a large network of relatively simple components, in which emergent complex behaviour is exhibited. Although the standard definition does not consider a central control³, it would be possible to adapt the tools of this theory in order to study the interaction within the cluster.

The cluster approach arises from the collective actions of actors whose behaviour is conscious. The complexity⁴ of the cluster is based on: the behaviour pattern (degree of cooperation, cooperative or non-cooperative aptitudes), the process of information (and its exchange) and the degree to which this pattern formation and information processing are adaptive for the system⁵ (Mitchell, 2006[149], p. 2).

A.2 Network analysis

One of the tools that can be used is the network analysis. In this restricted sense, a “network” would be simply a collection of nodes and links between nodes. In the cluster approach the nodes are people (or organizations of people, our actors) between whom there are certain different types of possible relationships (Mitchell, 2006[149], p. 3). The nodes are characterized according to the number of linkages that they maintain. Then, it is possible to speak about degrees.

³That could be the case of the trigger: its role within the cluster is supportive. Indeed, this actor could advise the other participants but it is basic that the initiative remains in all cases with the firms, the academia and the financial agent.

⁴For a definition of “complexity” see Murray Gell-Mann and Seth Lloyd, “Effective Complexity”, in Gell-Mann and Tsallis, 2003[76], pp. 387-398.

⁵Very interesting point if considering that the aim of the cluster approach is the creation of innovative network, where “information” is constantly renewed and applied (R&D).

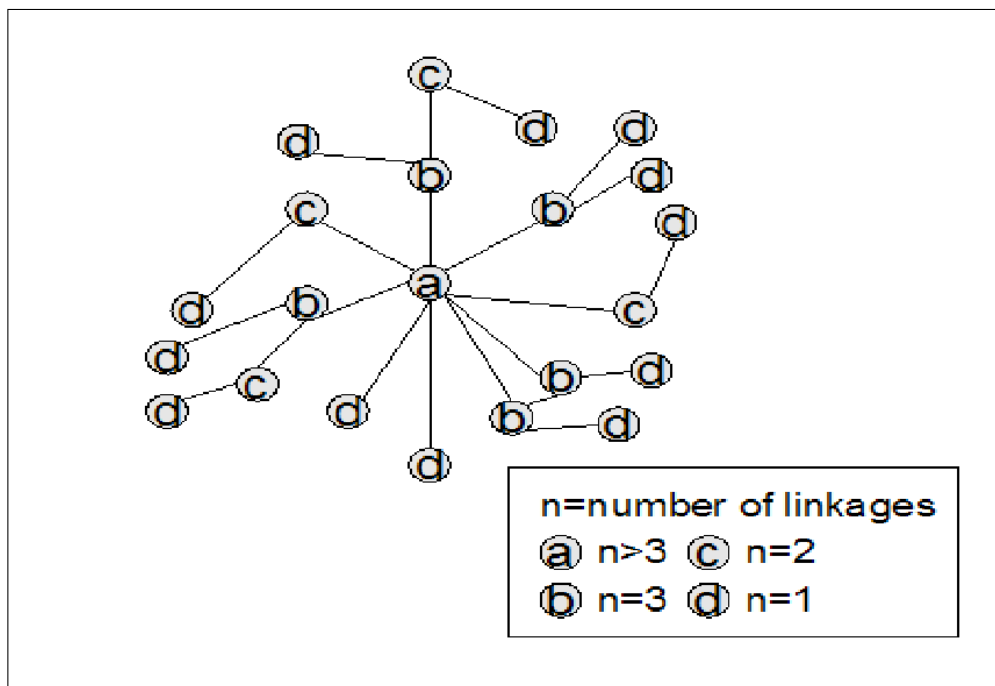


Figure A.1: An example of network

In figure A.1, there are different nodes with different degrees according to the number n of connections or linkages that they maintain. In the figure there are four degrees a , b , c and d :

- A node a has a number of linkages $n > 3$
- A node b has a number of linkages $n = 3$
- A node c has a number of linkages $n = 2$
- A node d has a number of linkages $n = 1$

There are several models for understanding a network. However, one applies nicely: *the model of Scale-Free networks* (Barabási and Albert,

2002[13]). If considering the relationships among individuals it is possible to understand that there some that have more connections than other. For example, there are people that, whatever the reason (sympathy, attractiveness?), have with more social contacts than other (shyness?). For the model this is irrelevant. However, the evolution of the system is predictable: people with many friends tend to meet more new people and thus make more new friends than people with few friends.

The network growth model proposed by Barabási and Albert is as follows: the network starts out with a small number of initial nodes. At each time step, one new node is added, and is connected to m existing nodes, for some m . The probability of making one of those connections to node i is proportional to the degree of node i . In other words, the node with more connections would tend to have more connections the more units are added. So, at the end, the units will tend to cluster around the node with more connections⁶. In fact, “clustering” is one of the properties of the Scale-Free network model.

It is also known (Mitchell, 2006[149], p. 9) that scale-free networks are very strong in facing random failures of nodes or links because of they retain the basic structural and communications characteristics. In the other hand, such networks are not resilient to failures of their hubs and are thus quite vulnerable to accidental failures. In the cluster approach this centre of interest has to be preserved by the trigger and, because of that, it is important to have effective policies⁷.

⁶The model that not include intrinsic variables such as “quality” of linkage. It also not consider the possibility of changing patterns between nodes (i. e., a person that is not sympathetic any more). See Mitchell, 2006[149], p. 7.

⁷The cluster approach means specialitation and the vulnerability of such phenomenon

A.3 Mapping networks

Another important application of network analysis is the problem of finding sub-networks or community structures, in a given network that contain dense interconnections. For example, if we consider a given cluster the members of the academic community will tend to create more interconnections among each other than with members of the financial community. In a study on metabolic networks written by Guimerá and Amaral and cited by Mitchell⁸ it is possible to find very interesting implications for the cluster approach.

In the Guimerá and Amaral network, two nodes i and j are connected by a link if there is a reaction in which i is a substrate and j a product or vice versa. With this simple rule they were able to describe different roles for nodes:

1. hubs of community (nodes with many connections within their community);
2. ultra-peripheral nodes (all links are within the node's community);
3. peripheral nodes (most links are within the node's community)
4. non-hub connectors (nodes with many links to other communities); and
5. non-hub kinless nodes (links homogeneously distributed among all communities).

can be clearly understood if thinking in the idiom “to put all the eggs in the same basket”.

⁸R. Guimerá and L. A. Nunes Amaral, “Functional cartography of complex metabolic networks”, *Nature*, No.433, 2006, pp. 895-900 in Mitchell, 2006[149], p. 11

They also found three sub-roles for hubs: provincial (the vast majority of the node's links are within the node's community), connector (the node is both a hub in its community and has many links to most other communities) and kinless (the node's links are homogeneously distributed among all communities).

They found that ultra-peripheral nodes are the least conserved and that connector hubs are the most conserved (if we consider the cluster model, the less linkages an actor has the more vulnerable is). They also found that non-hub connectors are more conserved than provincial hubs (the more diverse the connections of an actor are, the stronger the actor is). The communities themselves play functional roles, with functions that can be implemented by a variety of specific individuals, so a particular set of individuals implementing a function need not be conserved. However, connectors play a structural role, so must be preserved. In their words, *the global role of nodes in the network might be a better indicator of their importance than degree.*

A.4 Information flow

Another interesting element coming from the research on complex systems has to do with the way networks process information in adaptive ways. Information processing in all these systems emerges from multiple feedback mechanisms and allows the system to generate and use the right resources at the right place and right time in order to benefit the entire system *in a continually changing environment and in the face of multiple, often conflicting requirements* (Mitchell, 2006[149], p. 22).

The principles of effective information process within a network are:

1. Global information is encoded as statistics and dynamics of patterns over the system's components (the environment is represented, in a dynamic way, by the statistical distribution of individuals on space⁹ and the overall state is represented by the dynamic distribution of individuals performing different tasks¹⁰).
2. Randomness and probabilities are essential in order for a comparatively small population of simple components to explore an enormously larger space of possibilities, particularly when the information to be gained is statistical in nature and there is little a priori knowledge about what will be encountered¹¹.
3. The system maintains a simultaneous exploration of many possibilities. However, the resources given to each exploration at a given time depends on the perceived success of that exploration at that time (many possibilities are explored simultaneously, but not all possibilities are explored to the same depth¹²).

⁹The cluster environment would be then the geographical continuous where the different cluster units are located and interact.

¹⁰The evolution of numbers will give information about the status of the cluster. For example, an increase in the number of suppliers will eventually inform about the expansion of production requirements and vice versa.

¹¹This principle support the benefits of investing in basic education and research. For a cluster trigger would be more beneficial to support a good education system that to greatly invest in very specific research areas.

¹²Information is used as it is gained to continually reassess what is important to explore. At all times, paths are dynamically allocated exploration resources in proportion to expectation. However, unpromising paths continue to be explored as well, though with fewer resources. For example, a university could support a special research program on chemistry without meaning the end of the research on, let us say, linguistics (interesting field that is bringing new lines of development for artificial intelligence). Human inventive follows many times random and unpredictable, patterns.

4. An information system should maintain both planned and random processes. Early stages of a cluster would be frequently based on a limited amount of information (what we have). As information is obtained the processes gradually become more focused (what we need). Therefore, the cluster creation has to begin with the identification of the actual advantages and not to set policies based on expectations.

A.5 Complex systems advantages

A cluster, any cluster, could be modelling as a network, using the tools of complex system theory in order to identify norms of behaviour¹³ between the given actors. Such norms of behaviour can be influenced by the trigger because is the only one able to design and administrate policies.

These policies could influence terms of employment, the amount of money people save or spend, taxation or the individual sense of duty¹⁴. In reality, behaviour is influence by a myriad of factors and using this method it is possible to integrate them because of the modular organization of the analysis.

This method allows also to break the cluster in minor functioning units (for example, considering the interaction among a limited number of firms or between academia, finance and firms¹⁵) or to vary number and function

¹³A *norm is a rule of behaviour that is self-reinforcing*, see H. Peyton Young, “The Power of Norms” in Hammerstein, 2003[82], p. 389

¹⁴Promoting values in the education system. In this sense, the possibilities of developing policies are immense because an expanded power of diffusion.

¹⁵It could be used the same methodology suggested for complex metabolic networks.

of units as soon as the cluster network develops.

It is important to underline that the term *complex* refers to the resulting system and not to the rules that organize it. For example, if using rules affecting cooperation or exchange it is possible to build a very complex scenario and, even, predict its behaviour¹⁶. Doing so, it could be possible to describe the different interactions but also, predict the evolution of the cluster. In this way, there would be tools for evaluating policies.

A.6 Cluster approach and complex analysis

It is possible to apply such models in order to analyze the cluster approach. The cluster approach considers the creation of a concentration of activity in space resulting of networking. If applying the model to the case of the cluster, the more interactions are created among actors the higher the frequency of interaction will be in the future with the addition of new units. The result would be the more interactions are created the more beneficial would be as

For example:

- Given two substrates, academia S_a and financier S_f , a start up firm P_s would be their *metabolic* product.
- Given two substrates, academia S_a and entrepreneur S_e , a spin off firm P_s would be their *metabolic* product.

Obviously, both examples are simply explanatory and have to be reconsider and revised. Consider the effect of two constants α and β that affect the substrates in the way:

$$\alpha S_a + \beta S_f = P_s$$

In this case, both α and β could also be understood as the influence of a specific trigger policy. Again a *imagine-if* case, the author appeals for understanding.

¹⁶For examples showing the exciting possibilities of complex ity see <http://www.santafe.edu> and <http://education.mit.edu/starlogo>.

the model assumptions imply the benefit of such interaction. For example, if considering the transmission of knowledge, the discovery of new items on the underlying network opens perspectives for the discovery of new items (Lambiotte, Thurner and Hanel, 2006, p. 6).

If adapting the model to our cluster¹⁷, the actors would be more categories than actual individuals (with the possible exception of the trigger). This means that, for example, in the category “firms” would be a number of individual entities that play together the role of the “actor” firm. Within this category there is a hierarchy meaning that not every individual company has the same importance (there are suppliers and buyers, there are major suppliers and so on). A firm could also be the core corporation in the community “firm” and enjoy connections within and outside the category. In this sense the function of supplier can be taken for different entities without affecting the functionality of the community “Firms”. On the contrary, it is very difficult to find a substitute for the core firm and therefore.

In the cluster approach model, the trigger is the node in the network with a more frequent connection with other nodes¹⁸.

¹⁷In Dresden, there is a network of microelectronics. If we consider some examples of the community “firms”: Advanced Micro Devices Inc. (AMD) would play the role of connector (community hub and many links to other communities), Freiberger Compound Materials AG would play the role of ultra-peripheral node (it is a supplier of Siltronic AG that is a supplier of Qimonda) and, finally, Advanced Mask technology Center GmbH & Co the role of peripheral node (it is a joint project of AMD, Qimonda and Toppan Photomasks)

¹⁸In reality, the trigger could be considered an homogeneous single actor in contrast with firms, academia or financier that would fit more with the term category.

Appendix B

Las agrupaciones empresariales innovadoras

B.1 Introducción

Con el nombre de *Agrupaciones Empresariales Innovadoras* se traduce indistintamente, y de forma oficial desde 2006, los términos: *cluster* or *micro-clusters*¹. Otras denominaciones utilizadas oficialmente en castellano son: la *Unidad Empresarial Productiva* y el *Sistema Productivo Local* (Müller, 2007[153], p. 2). En las próximas páginas se utilizará el término “conglomerado”.

Un conglomerado tecnológico es un fenómeno novedoso aunque sus rasgos formales, el *apiñamiento* de actividad en el espacio, inviten a confundirlo con la concentración de actividad. Aspecto este de gran importancia en

¹www.mityc.es/AgrupacionesEmpresariales

Según la ANAIP, la institución que representa a la industria plástica española, se produjeron en 1998 200 millones de juguetes. A parte del valor de la cifra, lo interesante es que, según las mismas fuentes, alrededor del 40 % de las 350 empresas del sector se concentran alrededor del municipio valenciano de Ibi. La primera empresa de juguetes en Ibi fue Payá que, dedicada a la producción de juguetes de hojalata, fundó su primera fábrica en 1905. Como consecuencia del colapso en el suministro de materias primas en los años cuarenta, la empresa llevó a cabo un programa de reajuste optando por la producción en plástico. En la actualidad, las principales empresas son Hasbro, Payá y Famosa. La Comunidad Valenciana mantiene en la actualidad una red de apoyo con centros de innovación empresarial especialmente desarrollados para el sector juguetero (AIJU). Este centro, fundado en 1987, mantiene diversos institutos técnicos que apoyan a la industria con servicios de desarrollo (test de calidad), formación, apoyo tecnológico (investigación) y comercialización. Además, AIJU se mantiene como una red de enlace entre las empresas participantes, apoyándolas incluso en sus iniciativas de promoción con el desarrollo de un catálogo conjunto de productos.

Cuadro B.1: La industria del juguete en Valencia

España si se consideran industrias tradicionales como la textil, el calzado o el juguete (ver Tabla B.1²).

En cualquier caso, parece que en España no se había desarrollado ninguna política nacional de conglomerados hasta 2006 cuando asume la responsabilidad la Dirección General de Pequeña y Mediana Industria (DGPYME) dependiente del Ministerio de Industria, Turismo y comercio³. Ésta puede ser la razón de la relativa escasez de concentraciones especializadas de negocio, a excepción de los centros turísticos⁴.

²www.aitex.es/aiju

³Este organismo se encarga de crear y mantener el Registro Especial de Agrupaciones Empresariales Innovadoras. Este es resultado de una regulación de 19 de diciembre de 2007 del Ministerio de Industria, Turismo y comercio. Orden ITC/3808/2007 publicada en el Boletín Oficial del Estado, núm. 308, p. 53182, referencia 22249, 25 diciembre 2007[20]. Ver también www.ipyme.org/IPYME/es-ES/AEI/RegistroAEI/

⁴[...] *Spain needs more local innovators. In many countries these tend to gather in business "clusters", as in Silicon Valley. The nearest thing Spain has to a cluster-apart from its holiday resorts-is the talent that pours out of its famous design school in Barcelona. "Conquistadors on the beach", The Economist, 3 May 2007[238].*

A nivel de Comunidad Autónoma, las primeras en desarrollar una política de conglomerados han sido las regiones de Cataluña (Conejos *et alia*, 2005[39])y País Vasco (Müller, 2007[153], p. 22). Sin embargo, es la Comunidad de Madrid la que cuenta con un conglomerado más desarrollado (Montejo y Chaminade, 2000[152]).

Las políticas de innovación y tecnología en España se aplican a las siguientes áreas:

1. proyectos de I+D;
2. recursos humanos para I+D;
3. transferencia de tecnología;
4. infraestructura científica y tecnológica;
5. cooperación internacional; y
6. desarrollo de una cultura científica y tecnológica.

En este sentido, la institución que habría de desarrollar una mayor capacidad sería el Ministerio de Educación y Ciencia, pues de él dependen las políticas de impulso a la investigación científica y tecnológica y la investigación universitaria (con sendas secretarías(Müller, 2007[153], p. 24). A nivel de Comunidad Autónoma se han desarrollado Planes de Desarrollo Tecnológico (por ejemplo, en el País Vasco y Navarra) con un interés en el desarrollo de un tejido de cooperación tecnológica entre la universidad y la empresa, sobre

todo en el área de tecnologías de la información⁵.

En cualquier caso, en España no existe hasta el momento un listado de conglomerados tecnológicos de tal manera que, pese a la frecuencia del uso del término, no se cuenta con una herramienta para comparar diferentes iniciativas, estrategias y recursos⁶. Dicha utilidad permitiría desarrollar políticas de apoyo local enfocadas en aquellos sectores con capacidad para desarrollar un conglomerado.

B.2 El caso de España

Desde 1992, España intentó desarrollar una propia capacidad de investigación y desarrollo (I+D) al desvanecerse las capacidades de protección aduanera con sus principales socios comerciales, a la sazón miembros de la Comunidad Económica Europea (CEE). El objetivo ha sido crear un sistema competitivo de investigación científica para:

1. la reactivación de un tejido industrial por la decadencia de sectores tradicionales expuestos a un mercado de mayor competencia (Marcano González, 1996[138]); y
2. apoyar estrategias de desarrollo local en regiones específicas.

⁵La información que proviene del Instituto Vasco de Competitividad es citada por (Müller, 2007[153], p. 24)

⁶En el futuro se consideran varias iniciativas a cargo del Ministerio de Industria, Turismo y comercio para el apoyo a conglomerados que pasan por la identificación y descripción de los ya existentes. Ver Müller, 2007[153], p. 22.

La transición hacia la integración de ciencia, tecnología e industria evidenció la necesidad de estructurar la relación universidad-empresa. Las iniciativas han sido las siguientes (Marcano González, 1996[138]):

- parques tecnológicos y científicos;
- centros europeos de empresas e innovación;
- centros tecnológicos;
- centro para el desarrollo tecnológico industrial;
- fundaciones universidad-empresa; y
- oficinas de transferencia de resultados de investigación.

Los parques tecnológicos y los parques científicos son iniciativas de diversos gobiernos autonómicos geográficamente localizadas. Dicho entorno trata de mantener relaciones operativas y formales entre universidades, centros de investigación y otras instituciones de educación superior⁷ para alentar la formación de empresas basadas en investigación científica.

El modelo adoptado para la construcción de parques ha sido el anglosajón (Marcano González, 1996[138]) donde las empresas de alta tecnología se localizan en las proximidades de grandes ciudades y, si es posible, cerca de una universidad. Los primeros parques datan de finales de la década de los años ochenta: Zamudio (el Parque Tecnológico del País Vasco o Tecnopolo

⁷Hay 51 parques miembros de la Asociación de Parques Científicos y Tecnológicos de España, de los cuales 18 son operativos y el resto están en fase de proyecto. Los parques se reparten en 16 Comunidades Autónomas. Ver Asociación de Parques Científicos y Tecnológicos de España, 2005[5]. www.apte.org

del Norte, en Bilbao), Tres Cantos (Madrid), Vallés (Barcelona) y Paterna (Valencia). Una segunda generación de parques tecnológicos estuvo integrada por los parques tecnológicos de Andalucía (Málaga), Llanera (Asturias), Boecillo (Valladolid) y San Ciprián (Orense, Galicia). A finales de 2004, el número de empresas e instituciones miembros de un parque tecnológico era 1781. Estas empresas pertenecen principalmente al sector de Información, Informática y Telecomunicaciones (23%). Los sectores con más crecimiento en los últimos años han sido Agroalimentación y Biotecnología (59%). Además el empleo obtiene la cifra de 45592 de los que la mitad son universitarios (APTE, 2005[5]).

Los Centros Europeos de Empresas e Innovación (CEEI) son instituciones para el apoyo en la creación de nuevas empresas o líneas diversificadoras de empresas ya existentes (CEEI, 2007[6]). Un CEEI ofrece un sistema de servicios integrados a empresas como la orientación profesional, la formación empresarial, la búsqueda de información o el apoyo en la detección de mercados potenciales y servicios de infraestructura para nuevos proyectos.

Los Centros Tecnológicos son organismos para el desarrollo económico y social (FEDIT, 2007[64]). Su estrategia es apoyar e impulsar todos los procesos de innovación y desarrollo tecnológico para mejorar la competitividad de las empresas. Los servicios ofrecidos son múltiples: proyectos de innovación, asesoramiento, difusión de tecnologías, normalización industrial, información, formación, cooperación internacional o fomento de nuevas actividades. Estos centros mantienen unas infraestructuras de transferencia tecnológica además de desarrollar investigación propia.

El Centro para el Desarrollo Tecnológico Industrial (CDTI) es una entidad pública empresarial dependiente del Ministerio de Industria, Comercio y Turismo (CDTI, 2007[37]). Las actividades de este organismo son: la evaluación técnica Económica y la financiación de proyectos de I+D+i; la gestión y promoción de programas de cooperación tecnológica internacional⁸; la promoción de transferencia tecnológica; y el apoyo a empresas de base tecnológica. El personal está formado por 200 personas en su mayoría universitarios.

Las Fundaciones Universidad-Empresa (FUE) son el resultado del interés del empresariado⁹ en la creación de un vínculo con la Universidad. Los objetivos son, por un lado, favorecer la cooperación entre ambas entidades en los campos de formación, el empleo y la investigación y, por otro lado, fomentar la investigación y su difusión en proyectos que satisfagan el interés concreto del mercado. En la actualidad hay 45 universidades españolas implicadas en el proyecto y más de 1000 organizaciones empresariales. En el año 2005 se integraban 72033 empresas principalmente en los aspectos de formación y prácticas.

Las oficinas de apoyo de transferencia de tecnología de las universidades están específicamente dedicadas a transmitir conocimiento de las universidades a las empresas (FECYT, 2007[71]). Sus objetivos serían varios. Primero, el fomento de la investigación y desarrollo tecnológico a través de la coordinación de actividades de política científica y tecnológica. Segundo, la promoción de la cooperación entre organismos de ciencia y tecnología na-

⁸ Agencia Europea del Espacio (ESA), laboratorio Europeo para la Física de Partículas (CERN), Sincrotrón Europeo (ESRF), Hispasat o Eumetsat son ejemplos de proyectos internacionales gestionados por el CDTI (CDTI, 2007[37])

⁹ Por ejemplo, la Cámara Oficial de Comercio e Industria de Madrid promueve la creación de la primera FUE en el año 1973 (REDFUE, 2007[198])

cionales y extranjeros. Y tercero, el desarrollo de una cultura de ciencia como base competitiva. Este último aspecto ha determinado la creación de un sistema de infraestructuras tecnológicas de apoyo, entre las que destaca la *Web of Knowledge* (WOK)¹⁰. La WOK integra una base de datos bibliográfica para la elaboración de estudios científicos y tecnológicos. El servicio gratuito está proporcionado por la FECYT y el Ministerio de Educación y Ciencia (MEC).

B.3 El caso de Alemania

La reunificación de Alemania permite, tras años de prohibición, la movilidad de individuos y factores en el país sin ningún impedimento legal. Los años siguientes son un periodo de adaptación entre los elementos del antiguo sistema socialista, interrumpido de manera abrupta, y la dinámica de una economía de mercado que se desarrollaba en Alemania occidental. Como resultado de la falta de competitividad, muchos negocios del Este estaban incapacitados para competir bajo las reglas de la libre economía. Consecuentemente, muchos de ellos cerraron y los restantes sobrevivieron solo tras duras políticas de reajuste.

El efecto de tales decisiones fue, en muchos casos, recortes en el número de empleados. La economía del este, que hasta el momento no había conocido el fenómeno del desempleo, sufrió el duro colapso de su mercado de trabajo. Como resultado, mucha gente se dirigió a Alemania occidental. Otros mu-

¹⁰Hay que decir que la WOK es propiedad de la empresa Thomson Scientific. Este proyecto recibe casi el 50% del presupuesto total de la FECYT. Ver FECYT, 2007[71], pp. 90-91.

chos reorientaron su actividad hacia nuevos empleos y bastante a menudo al subempleo en el sector secundario que no necesitaba trabajadores especializados.

Aquellos que no tenían empleo y no podían encontrarlo engrosaron las crecientes cifras de desempleo. Después de 10 años, la Alemania unificada muestra una creciente grieta entre este y oeste. Las tensiones añadidas entre globalización y localización no han ayudado a rellenar tal brecha.

Sajonia, como uno de los *Neue Länder*, no es ajena al fenómeno. Por ello, resulta especialmente interesante que en los últimos años los medios de comunicación se han referido a la región como la cuna de las compañías de alta tecnología: the Silicon Saxony. Es un bulo de la prensa o hay algo detrás que lo justifique? La línea oficial de Dresde afirma que la ciudad, heredera de una larga tradición empresarial e inventiva, está dando los primeros pasos para una reforma económica de sus políticas hacia el fomento de la innovación.

Desde 1995, cuando Siemens (en Dresde ahora Infineon technologies) inauguró su fábrica de microprocesadores, algunas otras compañías han elegido la ciudad como sede. Infineon technologies, una filial de Siemens, y Advanced Micro Devices (AMD, otra fábrica de microprocesadores) son las más importantes compañías del nuevo sector de la electrónica. Además, Infineon y Motorola han empezado un proyecto de investigación conjunto para desarrollar la nueva generación de microchips. Otras compañías en la ciudad son Volkswagen, DaimlerChrysler Aerospace Airbus GmbH, ABB y ALSTOM. Por lo tanto, existen razones ciertas para apoyar el mensaje publicitario oficial de la ciudad.

Al mismo tiempo, hay varios centros de investigación en Dresde: la Universidad Técnica, algunos institutos Fraunhofer y algunos institutos Max Planck, la Asociación Científica “Gottfried Wilhelm Leibnitz”, el centro de investigación Rossendorf, el Centro Tecnológico de Dresde y el Centro de Consultoría para la Transferencia de Tecnología y Promoción de la Innovación. Algunas de estas instituciones trabajan estrechamente con el sector privado. Un ejemplo de ello es Systemonyc AG -proyecto iniciado por algunos profesores de la Universidad Técnica de Dresde para desarrollar microprocesadores de tercera generación, que ha sido comprada recientemente por Phillips.

Por ello, es posible reconocer suficientes elementos para definir Dresde como un *conglomerado* de la industria de la alta tecnología. Este término se refiere a la tendencia de algunas compañías a *apiñarse* en ciertos lugares. Normalmente, el hecho es resultado de la creación de redes de comunicación y cooperación entre las empresas en un espacio, más que el producto de una decisión corporativa. Estas redes se establecen sobre institutos de investigación ya existentes, universidades, servicios financieros y agencias públicas en un medio ambiente de cooperación interna y competitividad externa.

La idea no es nueva. Proviene del concepto de Marshall de *innovative milieu* pero recibirá una nueva luz tras el trabajo del prestigioso gurú de la economía Michael Porter titulado “La ventaja competitiva de las naciones” publicado en 1990. Desde entonces, el término conglomerado se relaciona con las estrategias de desarrollo, especialmente cuando estas afectan a aquellas regiones que hospedan firmas de la industria de alta tecnología. El enfoque de conglomerado se fija en aquellas concentraciones empresariales cuya actividad

ya ha demostrado su fortaleza y viabilidad en la economía de mercado. Pero el énfasis se hace sobre el uso intensivo del conocimiento y el facilitar la interacción constructiva entre las diversas partes de la red. El nuevo enfoque basado en conglomerados ha obtenido más popularidad especialmente desde que los gobiernos se han empezado a concentrar en sus fuerzas específicas.

Así, incluyo el último elemento del modelo del enfoque de conglomerados: la política. De acuerdo a las entrevistas hechas a líderes locales en Dresde, las primeras compañías que vinieron a la ciudad lo hicieron como resultado del trabajo del anterior Ministerpräsident, el Profesor Dr. Kurt Biedenkopf. Puede que esto sea o no verdad, pero el hecho es que los medios oficiales de Dresde incluyen la información sobre la administración y los servicios públicos en el mismo epígrafe “Economía” donde aparecen aquellas compañías y centros de investigación tecnológica.

La mezcla del sector privado, mundo académico y gobierno, toma una relevancia especial en la dimensión preactiva del enfoque de conglomerados como una estrategia de desarrollo económico basada en la competitividad.

Por ejemplo, la compañía consultora americana “On the Frontier”¹¹ aplica la teoría de Michael Porter de competitividad estratégica para construir una cultura de competitividad-innovación.

Esto incrementa la competitividad de las compañías y los conglomerados facilitando un cambio significativo y duradero. Esta empresa insiste en que la competitividad internacional emerge de la concentración geográfica

¹¹<http://www.onthefrontier.com>

en conglomerados industriales. Más aún recomienda a naciones y estados a intentar construir aquellas ventajas dadas sobre la inversión física, capital de conocimiento y recursos humanos.

La popularidad del concepto de *conglomerado* se incrementa porque es la pieza clave de la estrategia de desarrollo basada en la tecnología. En este sentido, las asociaciones regionales interesadas en desarrollar el conglomerado cuentan con un esquema de decisiones con mucha fortaleza. Las políticas de desarrollo de conglomerados han proliferado en la última década, incluso cuando los objetivos y medidas de los políticos han sido tan diferentes, incluyendo su actitud ideológica sobre la intervención del estado en la economía. Muchos elementos, hacen el caso de Dresde interesante. En primer lugar, la identificación de los principales elementos funcionales de la aglomeración en términos de conglomerado tecnológico y su papel en el desarrollo local. En segundo lugar, la interacción de esos elementos dentro de la región (cooperando) y globalmente (compitiendo).

Hay que subrayar que en la ciudad hay cooperación entre empresas que compiten en el mercado internacional. En tercer lugar, la relación entre el conglomerado existente y las políticas para su desarrollo. Por último, la conveniencia de esta especialización en alta tecnología en Dresde en términos de su impacto para mejorar los niveles de desarrollo de la ciudad y el bienestar de sus ciudadanos.

B.4 Lo que puede hacer el Estado

La intervención del Estado resulta decisiva. El Estado debe aportar el entorno apropiado y la base apropiada para el desarrollo de empresas privadas vigorosas y competitivas. Asimismo, el estado debe fomentar la formación de personal de alto nivel (licenciatura y hasta doctorado). Además, el Estado debe incentivar deliberadamente la I + D en ciertos campos específicos relacionados con sectores objetivos de la economía. Para poder hacer esto hay que desarrollar la investigación básica académica (universitaria).

En las distintas etapas de desarrollo es importante la elección de las industrias fundamentales para que actúen a manera de detonante. Ello también tiene que ver con la elección de la tecnología; más concretamente con el énfasis que se haga en I + D a nivel local. El criterio más recomendable es el de escoger aquella área en la cual un determinado país posee ventajas comparativas. De todo ello, se puede considerar el siguiente resumen de las políticas a aplicar:

1. Se debe poseer una estrategia de desarrollo clara.
2. Se debe invertir en las ventajas comparativas; cada país las posee y sobre ellas debe centrar sus esfuerzos en la creación del parque industrial.
3. Se debe poseer una visión a largo plazo.
4. Hay que identificar de dónde viene la innovación, para lo cual resulta decisiva la existencia de una relación investigación-industria, en ambos sentidos. Las universidades son claves en este proceso, pero no siempre.

5. Se necesita construir las redes de información desde el principio, cuando se toma la decisión de crear el conglomerado de empresas de nuevo tipo.
6. Por último, pero no por ello menos importante, se debe evitar caer en el pesimismo ante el eventual fracaso de un proyecto en particular.

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