

**2nd Regional Development and Governance Symposium
25-26 October 2007**

organized with the cooperation of
TEPAV, Aegean University, Aegean Region Chamber of Industry and
The Scientific and Technological Research Council of Turkey
Izmir, Turkey 25-26 October 2007

REGIONAL GOVERNANCE

IN THE KNOWLEDGE ECONOMY:

policy strategies and policy-making models

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This work has been made possible by the funding of the VIth EU Framework Programme, within the context of **two projects**:

- **“IKINET - International Knowledge and Innovation Networks for European Integration, Cohesion and Enlargement”**, <http://www.economia.uniroma2.it/dei/ikinet/> and
- **EURODITE: “Regional Trajectories to the Knowledge Economy: a Dynamic Model”**, <http://www.eurodite.bham.ac.uk/papers.asp>

The **European economy is characterized by the existence of clusters of small and mediums size firms** working in intermediate technology sectors, where tight vertical and horizontal linkages integrate the various firms and the level of trust and formal cooperation is high. However, a greater focus on innovation is needed and an explicit joint innovation strategy is still lacking.

The IKINET project has focused its analysis on **the process of innovation in medium tech sectors** which represent the largest share in the European industry and have different characteristics than high tech sectors. Technology in these sectors is characterized by an high complexity, as products are made by an high number of heterogeneous physical components requiring specific knowledge.

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- 1. The strategic factors in the process of regional development**
- 2. A new model of innovation**
- 3. The model of multilevel governance**

1. The strategic factors in the process of regional development

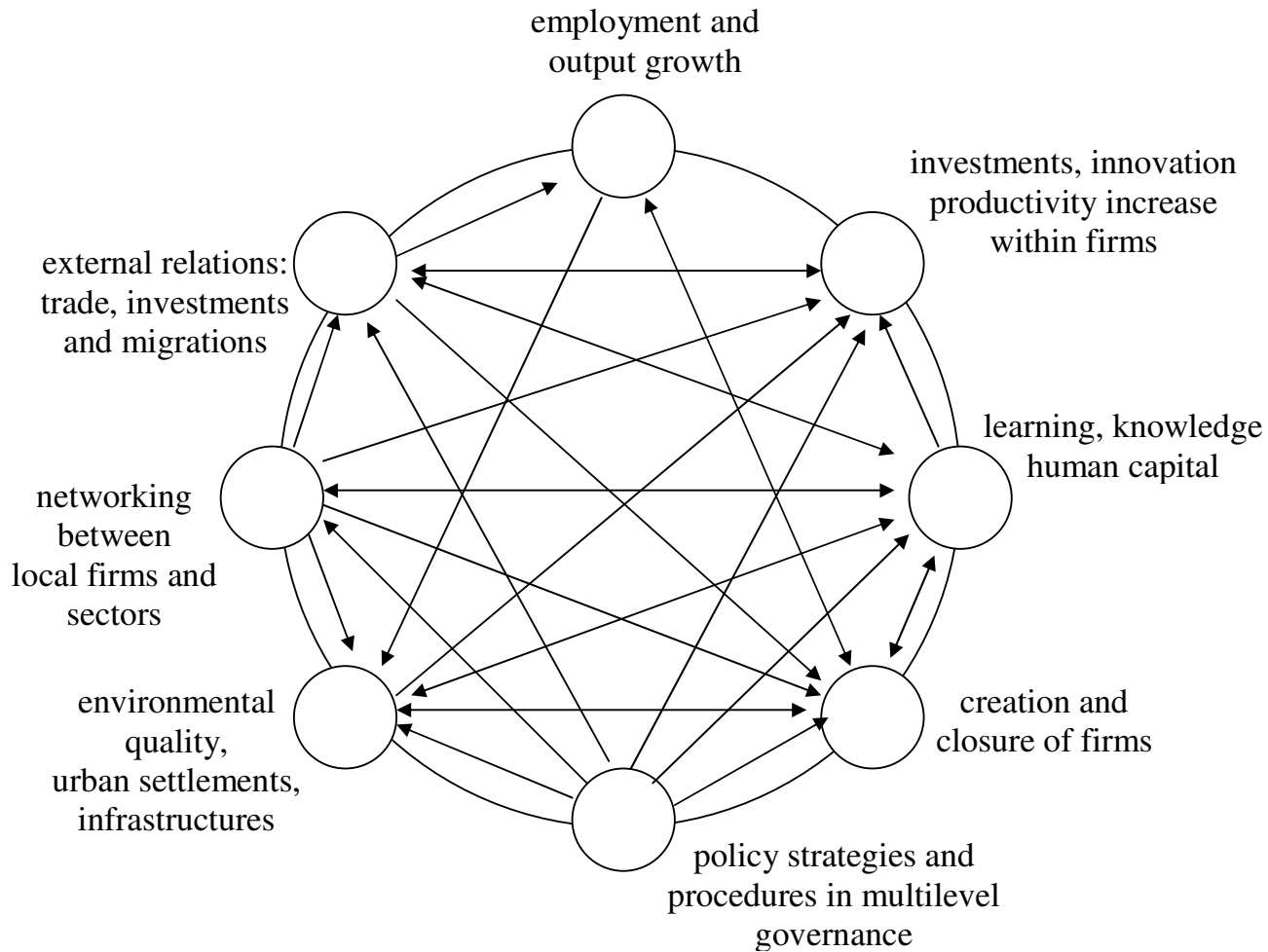


Figure 1: Factors and key links in the process of socio-economic development

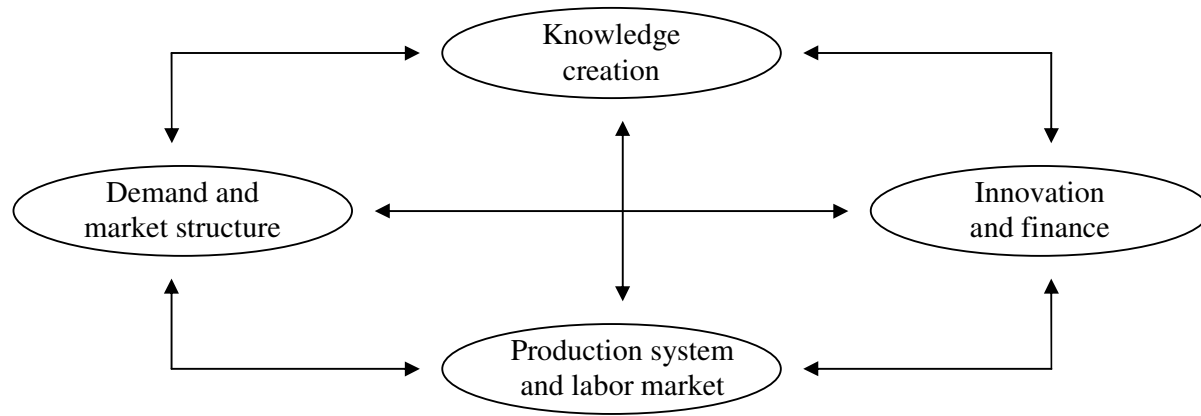


Figure 1: The relationship between knowledge creation and innovation

Table 2
The process of innovation in SMEs and in medium technology sectors
Differs from that of large firms in high tech sectors

| | Linear approach | Interactive approach |
|-----------------|--|--|
| Key word | Technology | Knowledge |
| Stimulus | Cost competition Supply - New equipment | Market orientation Demand - User needs |
| Process | In house R&D | Interactive learning |
| Outcome | Productivity increase | Continuous innovation |
| Policies | Public finance Public regulation | Multi-level governance Public-private partnership |

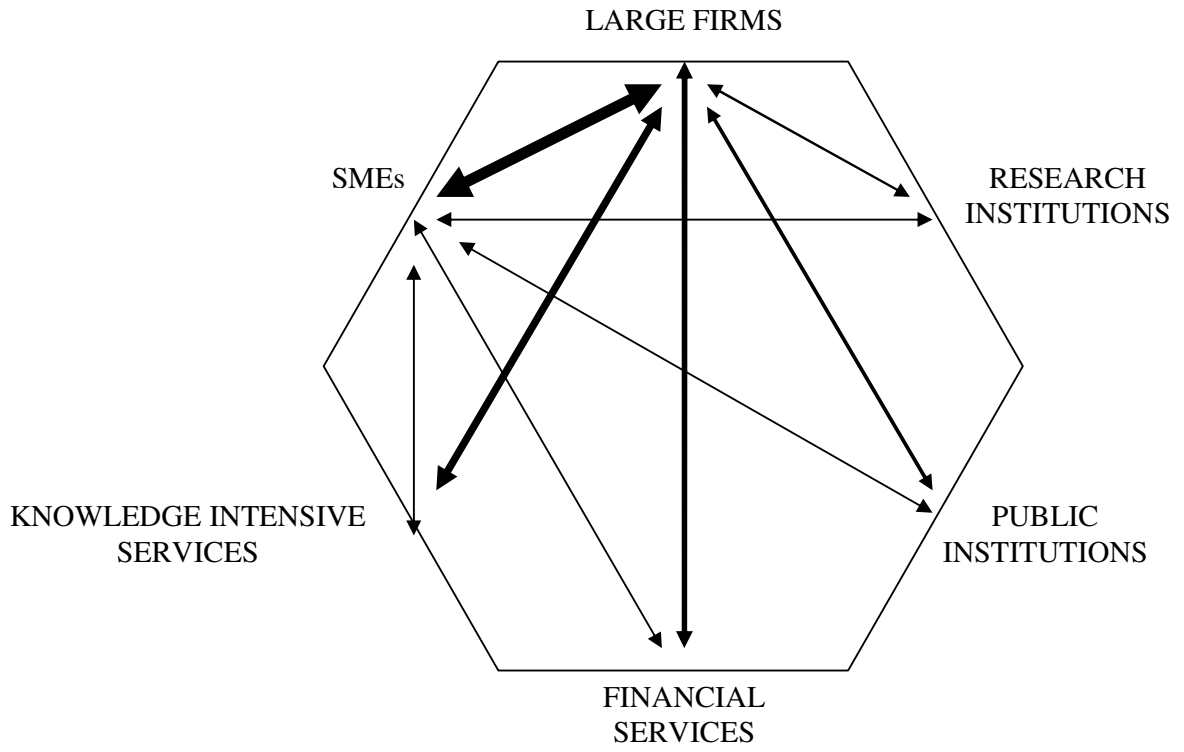


Figure 2 - Information and knowledge links in a regional innovation system

Clusters may be characterized by three different types of networks and of cognitive relationships between the various actors (Table 3):

- **‘Ecology networks’** are characterised by **strong unintended interactions** between various actors and facilitate various forms of **un-traded technological interdependencies** or spill-over effects as it occurs in geographical agglomerations.
- **‘Community networks’** are based on the **sense of identity and common belonging**, on the existence of trust relationships and of specialised intermediate institutions (“social capital”) and may be defined as **places of collective learning** where as in “industrial districts” the development of a common production know-how occurs.
- **‘Strategy networks’** are based on **intended relationships and cooperative agreements** between firms and other organisations. They imply **forms of central coordination**, the creation of procedures for the exchange of information, the codification of individual implicit knowledge and the **joint investment in the creation of collective codified knowledge**. That is the case of those local clusters and regional innovation systems, which explicitly aim to become a “learning region”.

In particular, **clusters should evolve toward the form of ‘Strategy networks’**, which are based on intended relationships and cooperative agreements between firms and other organisations. They imply forms of central coordination, the creation of procedures for the exchange of information, the codification of individual tacit knowledge and the investment in the creation of collective codified knowledge.

Table 4
Policy areas
in the Territorial Knowledge Management approach
in selected regional innovation systems

| | Specific types of Regional Innovation System | | |
|---------------------------------------|---|--|---|
| Type of network | Strategy networks | Identity networks | Ecological networks |
| Regions, sectors and firms | Metropolitan areas High tech sectors Large enterprises | Industrial clusters Medium-tech sectors Innovative SMEs | Peripheral regions Low tech sectors Traditional SMEs |
| 1. Innovation stimulus | Product innovation in specialized markets and technology push | Customer needs and Supply chain integration | <i>Cost competition in the global market</i> |
| 2. Accessibility | <i>High international accessibility - low local accessibility</i> | <i>Low international accessibility - high local accessibility</i> | Low international accessibility - low local accessibility |
| 3. Receptivity | <i>High internal diversity</i> | High internal specialization | <i>Low quality of human capital</i> |
| 4. Identity | High organizational and cognitive proximity | High local embeddedness and local identity | <i>Fragmentation and external dependence</i> |
| 5. Creativity | <i>High investments in R&D</i> | <i>Networking and interactive learning</i> | Technology adoption |
| 6. Governance | National industrial policies and firms strategic alliances | <i>Multi-level governance</i> | Public finance and public regulations |

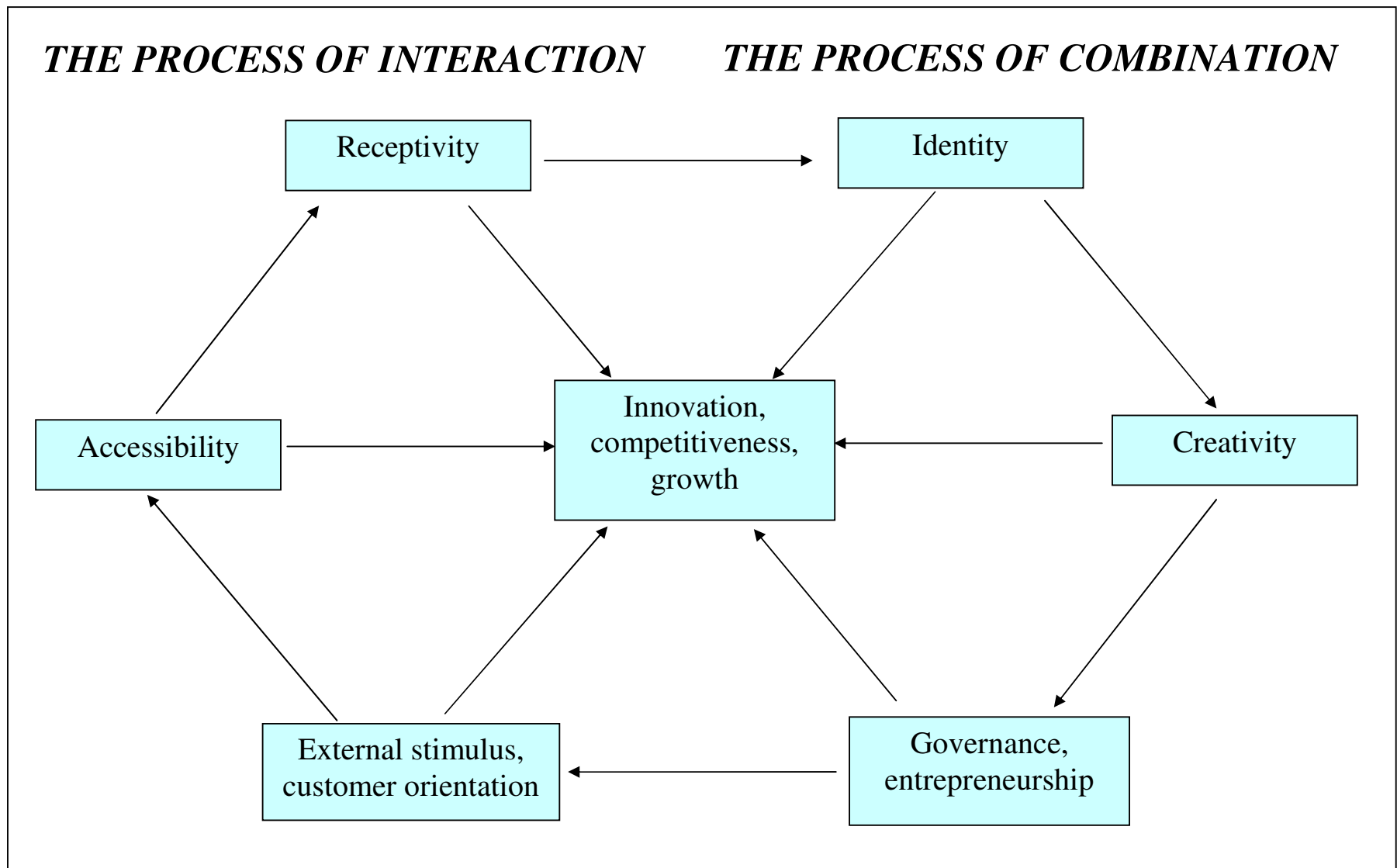


Figure 3 - Territorial Knowledge Management as a methodology for the governance of regional knowledge networks

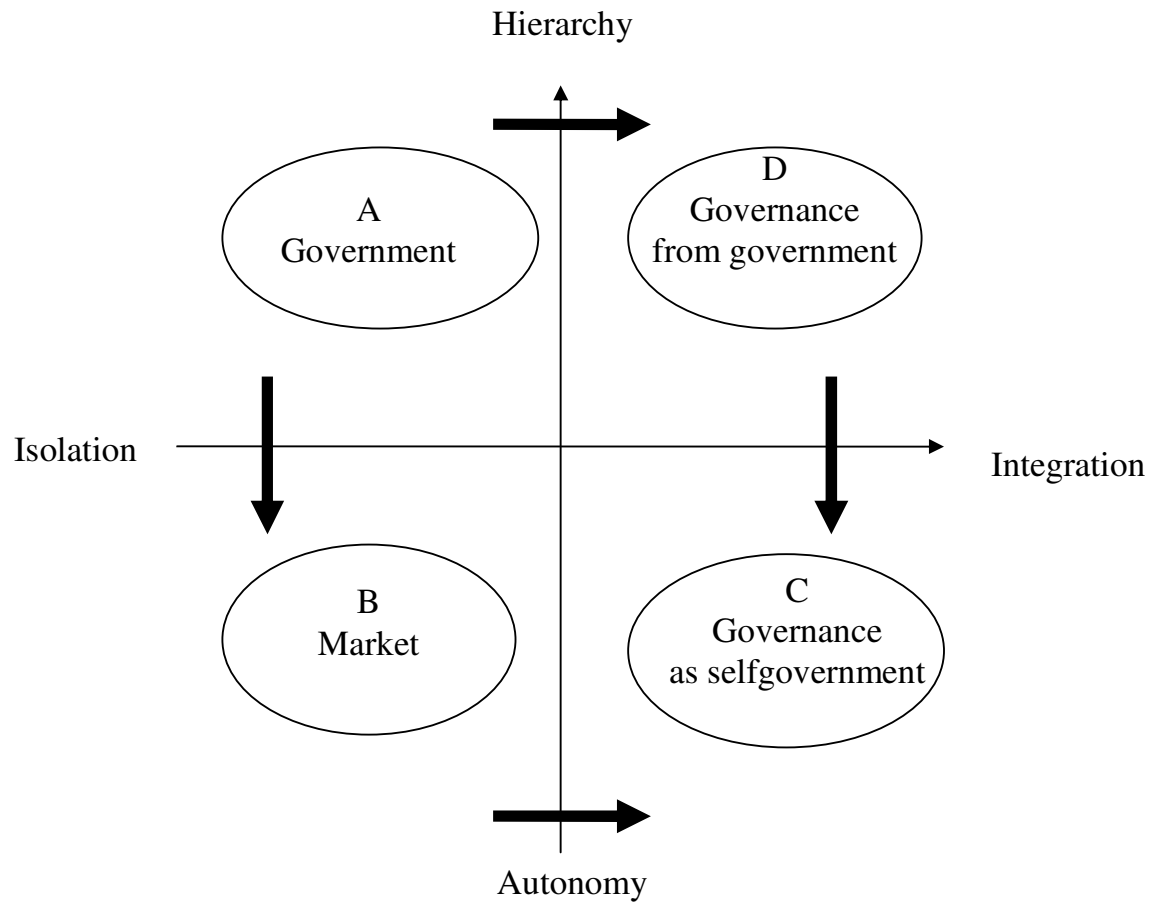


Figure 3: Four policy-making models

Source: Cappellin, R. (2004), The Matrix INT (Instruments and Needs of Technology) and the evaluation of innovation policies, in Wink,R.(ed.), *Academia-Business Links: European policy strategies and lessons learnt*, Palgrave – Mac Millan, pp. 168-194.

A policy of the knowledge economy based on the “governance” or “dynamic coordination” approach implies the use of **different policy instruments** with respect to those usually adopted in traditional innovation policies, such as:

- public R&D
- public subsidied to private R&D
- public demand of innovative products and services
- IPR in order to insure a monopoly power to innovators

New instruments of innovation policies are those which aim to steer the knowledge networks and to:

- create new **nodes** in the knowledge networks, such as the enhancement of innovative spin-offs from firms, the recognition of universities as a new actor in innovation networks, the promotion of diversity and attraction of new actors,
- create missing **links** by defining new procedures in the relationships between the local actors.
- promote **international links** in order to avoid regional closure and lock-in effects,
- invest in **human resources**, education and life long learning, in order to increase receptivity to new knowledge,
- promote alignment and **identity building** by defining joint long term projects and a joint strategy.
- accommodate the **switching costs or adjustment costs** implied by major changes in order to increase the flexibility of sectoral clusters and SMEs and accelerate the time of changes.
- design and adopt new regulations, which may defend weak and dispersed interests and determine the conditions in order to **aggregate scattered needs and demand** and to create new markets for innovative products and services.

The idea of the cluster policies and competence centres in various European countries is based on the following **characteristics of competence centres**:

- are part of a **national or regional network** created by a national or regional public program, which has defined a competitive mechanism for the selection of the various proposals of competence centres and an national or regional agency for the steering of the overall network of competence centres,
- have a **regional focus** but act on an **international scale**,
- concentrate on a specific **thematic production field**,
- are capable of **generating innovations** with a particularly high value-added potential,
- cover many links in the value chain and **connect multiple sectors of industry** and scientific disciplines,
- establish an outstanding communication and **co-operation platform** by promoting **public-private partnership** and existing networks between large and small firms and other regional actors, in close cooperation with universities and research, educational and vocational centres,
- aim to implement a **common strategy** of innovation and economic development for a specific **territorial cluster** or **regional innovation system**,
- represent **an innovative and operational mode of “governance”** or a “soft infrastructure”, that aims to develop synergies around **specific collective innovation projects** oriented toward one or more **well focused markets**,
- allow to reach a critical mass, in order to develop **international visibility** in an industrial and/or technological perspective and to increase the attractiveness of a cluster with respect to international competitors.

In particular, competence centres should:

- promote the development of existing or **emerging clusters**,
- promote a **production diversification of the regional economy** and new areas of business activity in new sectors of application, by investing in projects close to commercialization or in joint industrial research (not in pre-competitive research with a too high level of abstraction) to **avoid path-dependencies and lock-in effects**,
- promote the **circulation of tacit knowledge and process of interactive learning**,
- represent an **bridging institution and should promote contacts** between the **large international firms** on one hand and the **research institutions** (thus promoting a new organizational model for universities) and the **SMEs** (thus promoting a greater R&D effort and a mid term development strategy), on the other hand,
- **identify and aggregate new demand and explore new markets** for the regional productions
- build new formal and informal institutions, infrastructures, norms, rules and routines for the **“governance” of the knowledge and innovation networks** and promote the **participation of new partners** in innovation networks, such as KIBS and universities,
- raise **new funding** through public – **private partnership** and involvement of **modern financial intermediaries**, as **the problem is** not the lack of funding and risk capital, but rather **the lack of profitable investment projects**, as also the lack of **seed capital and ordinary credit** for smaller new projects and start-ups.

While the choice of the new specific production fields of specialization and the creation of specific “competence centres” in many European countries may be the result of previous local initiatives or may be left to the regional governments, which better know the production specializations of their region and the potentials of the various sectoral clusters, the national government may take various important initiatives, such as to:

- address the problems in the implementation phase of the competence centres,
- develop some systemic linkages between the various competence centres at the national and European level,
- promote international learning and benchmarking, share the tool box and compare the management models,
- allow an easier exchange of knowledge and their combination in the generation of new organizational and institutional solutions and the creation of a consensus on a new common model of action,
- identify success factors and evaluation criteria,
- design new public-private funding solutions,
- define concrete set of proposals and possibly strategic projects based on the cooperation of various competence centres,
- launch programmes for the creation of networks of competence centres in regions, which do not have them.

Statistical Appendix

Table 1
Structure of OECD¹ manufacturing trade² by technology intensity.
Share in total manufacturing trade.

OECD, STAN Indicators Database, March 2005.

www.oecd.org/sti/stan/indicators/

| | 1994 | 1995 | 2002 | 2003 |
|------------------------|------|------|------|------|
| High technology | 21,2 | 21,5 | 25,6 | 24,8 |
| Medium-high technology | 38,6 | 38,7 | 38,7 | 39,2 |
| Medium-low technology | 16,0 | 16,3 | 14,8 | 15,3 |
| Low technology | 24,2 | 23,4 | 20,9 | 20,7 |

1. Excludes Luxembourg and Slovak Republic.

2. Average value of total OECD exports and imports of goods.

Table 2.
The competitiveness of the European economy in medium-tech industries

| | | European Union (25) | | | Japan | | | United States | | | China | | |
|-----------------------------------|------|---------------------|---------|---------------|--------|--------|---------------|---------------|---------|----------------|---------------|--------|---------------|
| | | exp | imp | exp-imp | exp | imp | exp-imp | exp | imp | exp-imp | exp | imp | exp-imp |
| Manufactures | 2004 | 3053,70 | 2878,27 | 175,43 | 524,28 | 256,04 | 268,24 | 668,67 | 1133,89 | -465,22 | 542,37 | 428,27 | 114,10 |
| | 2005 | 3240,27 | 3042,17 | 198,11 | 546,42 | 276,35 | 270,07 | 732,47 | 1239,32 | -506,85 | 700,34 | 493,14 | 207,20 |
| Machinery and transport equipment | 2004 | 1556,13 | 1453,60 | 102,52 | 371,26 | 124,43 | 246,83 | 393,29 | 609,13 | -215,84 | 268,26 | 252,83 | 15,43 |
| | 2005 | 1636,11 | 1509,79 | 126,32 | 381,29 | 132,37 | 248,92 | 433,67 | 663,43 | -229,77 | 352,23 | 290,48 | 61,76 |

Source: WORLD TRADE ORGANISATION STATISTICS:
INTERNATIONAL TRADE STATISTICS 2006

http://www.wto.org/english/res_e/statis_e/its2006_e/its06_appendix_e.htm

1. Manufacturing exports of European Union are 4,4 time the exports of United States and 4,6 time the exports of China
2. The trade balance of European Union in manufacturing is positive while that of United States is highly negative
3. Exports in machinery and transport equipment of European Union are 3,7 time the exports of United States and 4,6 time the exports of China
4. The trade balance of European Union in machinery and transport equipment is highly positive and still 2 time that of China but lower than that of Japan
5. In order to maintain the competitiveness of the European Union, innovation policies should focus especially on medium tech sectors

Examples of national programmes on clusters policy/competence centres/ poles de compétitivité/centres of expertise are the following:

France: www.competitivite.gouv.fr/

Finland: www.oske.net/in_english/programme/objectives/ and www.tekes.fi/eng/

Austria: www.ffg.at and www.ffg.at/content.php?cid=341

“Centres of Competence” are different from research “Centres of Excellence”, which mostly belong to larger research institutions and focus on well defined fields of advanced pre-competitive research, often in tight cooperation of specific industries, with the aim to raise the quality of research and to improve its international visibility and reputation. However, Centres of Competence, which **concentrate on innovative industrial projects**, may clearly contribute to the enlargement of the technological and general information base, required for cultural and social development, while specifically focusing on the competitiveness of a national and regional industrial and innovation system.

“Centres of Competence” are different from the traditional “Technological Centres”, which have been created by local and regional institutions and aim to provide rather routine technological and business services to individual SMEs within territorial clusters, as Centres of Competence aim to **the design and management of large joint projects with several firms** and other partners for the development of new innovative productions for the **industrial diversification of a cluster**.

Competence centres and a focus on knowledge links indicate **the need for a new framework for innovation policies** at the regional, national and European level.

Competence centres allow to exploit the **factors of competitiveness of the European economy** with respect to the many and large emerging economies. These factors are related to:

- the **high diversification of industrial productions** within the various industrial clusters allowing the creation of new productions as combination of traditional specializations,
- the **emergence of new needs**, which often have a collective nature, by consumers and citizens and the creation of **new markets**,
- a high **qualified labour force**.

Competence centres are **a new instrument of innovation policy** and the experience of some countries where they have been created in the last few years should be extended to many other European **countries, which still lack an explicit national program** for the creation and management of **a national network of competence centres**.

Competence centres should not only focus on **financing pre-competitive and competitive R&D** and on **promoting technology transfers** to individual firms, but they should also aim to **promote knowledge creation, network building, knowledge exchange, interactive learning, the development of labour competencies and the creativity capabilities of the clusters in the design of new projects**. Competence centres should work as **knowledge intermediary** and not only act as an intermediary, which foster social and institutional proximity.

While high tech sectors are based on “analytical” or science based knowledge, **medium tech sectors** are based on “**synthetic**” or **engineering knowledge** and on “**symbolic**” or **creative knowledge** and they require **different types of innovation policies**. While in the case of “analytical” knowledge national financing may be adequate, in the case of “synthetic” knowledge and of “symbolic” knowledge **the need to promote regional relations is very important**. In particular, innovation in medium tech sectors is facilitated by **horizontal relations** within territorial clusters and these may be **accelerated by the competence centres**.

Competence centres should not only focus on **the needs of individual companies** or on the **strengthening of the vertical supply chains**. They should also **adopt a territorial perspective**, i.e. dealing with **horizontal relations** between the different sectors, and an **institutional perspective**, i.e. promoting new forms of **multilevel governance**.

Competence centres are crucial in order to **reduce the “switching costs”** to innovation and to **accelerate the speed** of the process of adoption of innovation, thus **avoiding the risk of a lock-in effect** in territorial clusters and **promoting an horizontal and vertical diversification of the traditional productions** in these clusters.

Knowledge **clusters are no longer organized along the boundaries of sectors**, as the knowledge and technology can be used in **different product segments**. The diversity of final products even raise incentives for cooperation, as direct rivalry between the partners can be excluded. Consequently, any support of knowledge clusters **should not be concentrated on single sectors but on broad platforms**.

A key problem in regional policy is the need to identify **regional fields of competence** and to target **relevant areas of new technology**. The following three fields of competence can be identified as candidate for cluster policies according to their stage of development: a) **developed fields of competence** well connected with the current specializations of the regional economy, b) **developing fields**, where strength in the supply by research institutions does not correspond to the actual demand by the regional firms, c) **emerging fields** in an early stage of research undertaken, which are in need of policy support for future development.

Competence centres aim to free **the innovation and entrepreneurial potential** of a cluster or region innovation system and to **activate new actors**, since innovation depends on the contribution of many partners and **small and medium size firms** may take innovative choices to be followed later by large firms. **Openness to new actors** within the various clusters is a decisive prerequisite for sustainability, in order to **avoid path-dependencies and lock-in effects** or the emergence of an elitist club made by few large and small firms isolated from the rest of the cluster.

Competence centres promote a **new role of universities in life long training programs** together with professional associations and also in **promoting creativity and entrepreneurship** by **joining firms in innovation projects** and in the creation of new firms.

Competence centres contribute to **develop a new vision** and a **long-term strategy** and should increase the **awareness of needed changes** in the clusters, thus **increasing the stimulus to innovate** by firms and other actors in the clusters.

Competence centres also represent **a stimulus to the international openness** and competitiveness of the regional clusters. As firms are increasingly integrated in international production networks, **also competence centres have to build international networks**. Competence centres may create that **institutional framework made by trust, reciprocal commitment and well designed governance**, which allow the SMEs of distant regions to collaborate in joint projects, where **exchange of tacit knowledge** can not be protected through intellectual property rights.

Gatekeepers are particularly important for lagging regions, as in these regions the necessary density of partners might not be given to form clusters, but single partners might use contacts to regional gatekeepers to find access to clusters in other regions.

Competence centres should not only focusing on **financing pre-competitive and competitive R&D** and promoting technology transfers to individual firms, but should also aim to **promote knowledge creation, network building, knowledge exchange, interactive learning, the development of labour competencies and of creativity capabilities in the design of new projects**.

The approach of learning networks underlines that **the time is the key dimension**. The competitiveness of firms and regional innovation systems is increasingly less determined by low production costs or even by high quality of the products or services and it requires **a faster speed of the process of change** with respect to the competing firms and regions.

Well structured production and innovation networks allow a greater flexibility, to accelerate the policy making process and to decrease the decision and implementation times, by reducing transaction and adjustment costs.

The speed of information flows and of decision making processes and a **faster adoption of innovation** is tightly related to the **stability of the organizational forms** and it depends on the existence of a well developed institutional system. A rather diversified **typology of institutions** play a leading role in defining a long term strategy of innovation of SMEs within the different regions. Institutions and other forms of “social capital” play the role of immaterial infrastructures which organize the knowledge flows between SMEs within the clusters. Institutional solutions to overcome lack of resources by SMEs are regionally specific and influenced by long-term historical and cultural heritage within the region.

Medium size firms have developed vertical flows of tacit knowledge in their respective supply chain, but they need to be supported in order to **develop horizontal linkages** between different technologies and sectors, by participating to regional “**competence centres**” focused on **new fields of production**, which may be related to traditional specializations in the various regions, with the participation of firms and research institutions having complementary competencies. **Productive diversification** is not only beneficial for small and medium firms but it can also be very positive for the large firm since it can rely on collaborating partners in more than a single sector, but always within the industry.

The challenge of an increasing international competition call for a **new industrial policy** supporting **large projects realized within national thematic networks** and building on the existing strengths and innovative capacities of the various regions.

National and regional **competence centres** are designed to stimulate cooperation in research and technological development **in strategic important production fields** between companies, academia, the public sector and other organisations involved in promoting innovation, overcoming the gap between **pre-competitive technological research and practical industrial application**.

The **Policy Forum** on competence centres in Europe organized by the European VI FP project: “IKINET - International Knowledge and Innovation Networks” , has allowed to discuss **the role of competence centres in innovation and industrial policies** at the European, national and regional level (www.ikinet.uniroma2.it/Policy_Forum.htm). In particular, it has aimed to investigate how competence centres can promote the international competitiveness of SME and these latter can become looked in international networks of innovation and knowledge.

The expression governance is used with respect to decision making systems, where the decisions are not taken according to the traditional hierarchical processes by a public authority (“government”), but rather through open forms of collaboration between a plurality of public and non public actors, which may differ between the various specific areas of policy and between the various levels of government. Governance is made by complex policy networks. The decision making processes may include forms of horizontal and vertical negotiation, where the exercise of a hierarchical control is only one of the components and most often not the major one¹.

The multiplication of players and layers of negotiation – international, national, and local – demands for a different model of government, called governance, based on organisational structures of interaction and partnership and this model is increasingly characterising national economies and even more local societies.

Governance cannot be considered a purely local process, but a multilevel process that develops through territorial and functional networks, transversal policy networks, the proliferation of technical bodies, distributive coalitions and organised economic groups at international, national, and local level.

It is now widely recognized that the interventionist top-down model (“government”) in the innovation policies is neither possible nor desirable, since innovation for its very nature can not be reduced to command and it has a pro-active character and it is open to new discoveries.

The governance model also differs from the free market model, which advocates more competition and flexibility, while the governance model focus on the need of a greater integration and a faster innovation, which are related to the existence of intermediary functions, a greater stability, a long term perspective and the supply of adequate public investments.

Recent evolution in technology and the changes in industrial organization seems to indicate the need to a greater autonomy of the various firms and actors. Moreover, the increasing interdependence of the actors and the firms as also the increasing complexity of the factors determining the innovation processes and the need to integrate complementary technologies seem to indicate the need for a greater integration of the individual firms and actors. Thus, the governance model is increasing in importance with respect to the opposite and traditional models of State and of Market.

Governance is the challenge of steering and positioning complex policy networks at international, national, and local level through **complex organizations**. These organizations may be made by:

- large “**networks of excellence**” between research institutions and research groups,
- international and **interregional agencies**,

¹ Cappellin, R. (1997), Federalism and the network paradigm : guidelines for a new approach in national regional policy, in M. Danson, ed., Regional Governance and Economic Development. London: Pion.

- large **multinational companies** and financial groups cross-participations between firms,
- **joint projects** between national and foreign firms for new productions and new technologies,
- **committees**, norms and technical standards between the firms of the same sector,
- vertical sectoral **clusters** of firms in the same supply chain,
- local networks, **communities** or industrial districts,
- forms of **public-private partnership**,
- poles de compétitivité and **centres of competence**.

The decision making processes include forms of horizontal and vertical negotiation. The different governance models range from coordinated transactions and constructed interactions to quasi-hierarchies (Antonelli 2005).

According to the approach of “TKM – Territorial Knowledge Management”, these different dimensions of the knowledge creation and innovation process are **linked by cause and effects relations**, as indicated in figure 2. The basic logic of their reciprocal relations is the following.

- The **focus on specific customer needs** determines a tension leading to **the search for a solution** and to change and it is facilitated by an higher accessibility and/or receptivity.
- **Accessibility interacts with receptivity.**
- The **building of a common identity** leads to cooperation and joint investments.
- **Creativity** emerges by the **commitment and combination of complementary competencies** and from decentralization of decision making.
- New ideas can be translated in economic innovations only through **an appropriate organization and governance.**

This approach is highly flexible and can be adapted to the various European clusters (Table 4).

3. The model of multilevel governance

The design and implementation of innovation policy requires to tackle the problem of the architecture of the institutional framework and to solve those policy issues, which occur in the relationships between the center and the periphery, the public and the private sector, the firms, the workers and the various external stakeholders, the world of production and that of financial intermediaries, the public technology transfer centers and the private consulting companies and last but not least the integration of an economic and technological perspective with a social and institutional perspective.

The debate in Europe on industrial and innovation policies allows to identify various alternative approaches in public policy-making:

- a) the centralist model of planning (“government”),
- b) the free market model,
- c) the public-private partnership model of “multi-level governance”.

The multiplication of players and layers of negotiation – international, national, and local – demands a different model of government, called “**multilevel governance**”. The model of multi-level governance of policy making is different both from the free market model of the rigid neo-liberal agenda and from the traditional top-down planning approach (figure 4). The “governance”model is based on the principle of negotiation and cooperation, while the government model is based on the principle of power or authority and the free market model is based on the principle of competition and conflict.

The ‘multilevel governance’ model allows a flexible combination of bottom-up initiatives and top-down coordination and financing. Thus, it is possible to distinguish within it two different types, which can be indicated as “governance model from government” (public-private strategic partnership) and “governance model as selfgovernment” (local networking and cooperation). The first type is characterized by a crucial role assigned

to national public authorities in promoting and steering the innovation networks made by different firms and actors. On the other hand, the latter type is characterized by a stronger autonomy of the different economic and social stakeholders.

In figure 3, these four models of policy-making are described according to their respective position within two major dimensions: 'hierarchy vs. autonomy' and 'isolation vs. integration'². The first dimension measures the power of the central authorities vs. the freedom of the various firms and individuals. The second dimension measures the level of explicit economic interdependence, the sharing of common values and the sense of belonging vs. the absolute isolation of each individual either in front of the law defined and enforced by the State or in front of the market price as in a perfect competitive market, as all individuals are equal in front of the law and all firms are equal in the model of perfect competition.

² Cappellin, R. (2004), The Matrix INT (Instruments and Needs of Technology) and the evaluation of innovation policies, in Wink, R. (ed.), Academia-Business Links: European policy strategies and lessons learnt, Palgrave – Mac Millan, pp. 168-194.

The linkages between SMEs in the process of interactive learning within a cluster are often informal, rather chaotic and time-consuming. Based on an original methodology called “**Territorial Knowledge Management**” (TKM), which provides an innovative and comprehensive and operative approach in promoting innovation in regional networks, the IKINET project developed methods to investigate and generate knowledge networks.

The TKM approach is based on the following stylized facts. **The external stimulus** stimulates knowledge creation and innovation, as firms aim to respond to the new emerging needs in their local markets and to solve problems of local users. Innovation requires **the search and the integration of complementary resources and capabilities**. Firms initially look for the support of local suppliers. **Interactive learning** is the key process in knowledge creation. **Institutions** play an important role in knowledge creation. Local history, common culture, values, norms, visions, trust are the component of the local **social capital**. These intermediate institutions **decrease the cognitive distance** between different actors. **Networks** are an appropriate organizational form, when the access to tacit knowledge is crucial. Knowledge develops according to **selected paths**, as the specific characteristics of the **local selection environment** may facilitate the identification of new emerging needs. The **diversity of metropolitan areas** or the **specialization of industrial clusters** may facilitate the identification of complementary capabilities or it may also create obstacles and lead to lock-in effects.

In particular, the Territorial Knowledge Management aims to consolidate the linkages between regional actors and to facilitate the flows of tacit and codified knowledge, by enhancing **six factors or dimensions** of the process of interactive learning and knowledge creation:

1. **Focus on customers satisfaction.** The adoption of an innovation is the result of the focus on a localized framework and of the clear definition of a specific problem, which calls for a solution and motivates to a search of different complementary competencies. Cognitive processes and innovation within firms are the result of repeated attempts and a gradual search activity, stimulated by the motivation to reduce the tension created by specific problems and the challenge that these latter may represent to the survival of the firm, rather by the explicit desire to seek a profit maximization solution, which is the result of a deductive reasoning. **Tacit knowledge** is crucial in this phase since the capability to apply the codified knowledge to the **solution of specific problems in different localized contexts** has clearly a tacit dimension.
2. **Manage accessibility and technological capital.** Since cognitive processes and innovation in the firms often develop in the framework of a specific “local” problem and they require the in depth knowledge of clients needs and of suppliers complementary capabilities, geographical proximity and appropriate technologies, such as ICT, may favor the development of the relations with various other actors and firms. The access to external complementary competencies and the access to a variety of building blocks of codified and of tacit knowledge requires the creation of those **hard and soft infrastructure** both in a local context and at the interregional level, which allow to organize the knowledge and innovation networks. The development of understanding capabilities requires the availability of tacit knowledge. In particular, tacit knowledge is crucial in this phase since **friendship relationships, leadership and reciprocal esteem and trust are tacit factors**, which represent the conditions for the socialization of tacit knowledge within the groups, firms and organization.

3. **Manage receptivity and human capital.** The openness of the various actors and nodes within the knowledge and innovation networks should be enhanced, in order to avoid lock in effects and that they become capable to acknowledge the need of complementary external knowledge and to assimilate it. **The capability to interact of the various actors to be involved in an innovation process** may be considered as a form of tacit knowledge and it is hindered by the cognitive distance determined by differences in the education level, cultural background, but also the different sectoral or technological specialization, the lack of broad diversified experiences and a too low capability of learning. The availability of tacit knowledge by the individual actors represents the base for the development of interactive learning processes. **Education enhance receptivity** and it is about the use codified knowledge in the process of **development of the tacit competencies of the various individuals**.
4. **Building a common identity and improve institutional/organizational proximity.** Actors to be involved in innovation should share common aims, mental models, as also trust and loyalty. To promote knowledge sharing and the willingness to collaborate requires a change in the corporate culture. The identification of common challenges to survival and development create a sense of belonging to the same community or group and are a prerequisite for collaboration in innovation. **Collaborative attitudes by the firms** in a sectoral cluster can be considered as a form of tacit knowledge and are tightly related to the creation of various intermediate institutions, such as industry associations or specialized services or just common agreed routines, which are part of the **“social capital” of the regional economy** considered. Interactive learning processes lead to the development not only of individual knowledge but also of **collective organizational and technological knowledge, which is clearly tacit** and characterizes specific groups of individuals, firms and organizations. **The socialization of tacit knowledge within the groups, firms and organization** is preliminary and instrumental to their codification and transformation into codified knowledge.
5. **Lever creativity and manage internal organizational capital.** According to cognitive theories, creativity is related to pattern making or the capability to establish original contacts or synapsis between different potentially complementary information, technologies, know-how, thus leading to new discovery and inventions. Creativity is crucial in order to diversify the structure of the local economy into new productions. Creativity can not be planned in advance, being the capability to discover original solutions. However, **it can be facilitated by favoring the diversity of the various actors** to be involved in the innovation process and the exploitation of their idiosyncratic characteristics. In particular, to increase creativity **firms should aim to leverage morale and to the empowerment and commitment of people**, in order to secure to potential inventors the freedom, security and willingness to invest in risky exploratory analysis and in a lengthy process of systematic search. **The process to combine in an original way existing knowledge is necessarily tacit**, as what has not yet been thought cannot yet be codified.

6. **Insure the governance and enhance entrepreneurship.** The implementation of innovative solutions requires the capability to cope with key problems of the organization and to manage the complex relationships between many different actors and to mobilize them. That requires entrepreneurship capabilities and to integrate knowledge with complementary material resources, in order to transform knowledge into action. The adoption of innovation requires the tight collaboration of various actors and **the facilitating role of intermediary organizations and institutions**, which may coordinate the joint effort. The governance of the innovation process requires an explicit effort in institution building and institutional learning, as the creation and maintenance of “social capital” or of “public goods” require appropriate investments by all partners belonging to a given innovation system. The existence of routines, institutions and governance activity has a positive effect on all the above indicated phases of the knowledge management process. Clearly, tacit factors are also relevant in this phase of the process of knowledge creation and of interactive learning, since **the organizational and managerial capability to govern or steer the action of other actors** is more an art than codified knowledge.

This new **cluster based or network oriented approach** implies a **shift from a linear approach**, which just promotes **transfers of information and modern technology** or provides customized expertise to individual firms, to a **systemic approach focused on promoting knowledge networks and cooperation** between various local and external actors and on the development of their internal capabilities.

According to this new approach (Table 2), focus should shift from the aim to promote the adoption of modern technology to that of enhancing **internal capabilities and knowledge**. The stimulus to change and innovation within firms is not only determined by the pressure of competition, the need to increase productivity and reduce costs, or the opportunity created by the supply of modern technologies and to adopt modern equipments, but rather by the identification of new markets, the aim to adapt to changes in the demand and the opportunity to **satisfy new users needs**. While in the linear process of innovation the formal process of R&D investment plays a key role, according to the systemic approach to innovation, solutions are gradually discovered through a **process of interactive learning** involving many different actors also outside the R&D laboratories. The desired outcomes are not just the increase of productivity indicators, often interpreted as disjoint result, but rather the speed of a **continuous process of innovation**, where each change is the evolution of previous changes.

Innovation and knowledge creation are local processes, as indicated by the FP6 project IKINET project (www.economia.uniroma2.it/dei/ikinet/). Innovation requires the **combination of different competencies** within a processes of collective learning, as firms are forced to cooperate in order to increase and diversify their knowledge base.

Innovation is not the result of the individual inventor or entrepreneur, but rather the result of a processes of collective learning and **flexible forms of cooperation** between many different private and public, regional and international actors, such as large firms, SMEs suppliers, knowledge intensive services, higher education and research institutions, financial intermediaries, public administration and many other partners such as professional association and media.

Technology spreads across industries and the new knowledge indicates an **high level of fungibility**. Moreover, the development of new productions requires the **innovative combination of the different types of technologies** characterising the different sectors. **Clusters are no longer organized along the boundaries of a sector**, as the knowledge and technology can be used in different product segments.

SMEs differently from large firms **should not be considered individually**, but represent a **regional complex system**, where the turnover, due to births and closures, the changes in the selection of partners are strong and there is an high interaction, due to the grouping of the various SMEs within larger industrial groups and to the existence of rather stable subcontracting arrangements between the various firms. **Clusters** do not correspond to the traditional local production systems or industrial districts and may have a rather different and evolving nature in the various regions. Clusters of SMEs often can not be defined within a limited local area and have a regional or even interregional reach, as the spread over contiguous regions separated by a rather long distance.

The IKINET project has clarified why **innovation and knowledge creation are local processes**. Knowledge circulates within networks through formal and informal institutions. Explicit or codified knowledge may be exchanged on technology markets. Instead, **tacit knowledge requires allocation mechanisms which are different from the markets**, since it has an asymmetric character, it implies high risks and it requires reciprocal trust, identity and shared values leading to collaborations. Only specific organizations and institutions and not traditional markets are capable to insure those connections which allow the exchange and the tight interaction of tacit knowledge and competencies.

The IKINET project has highlighted that the innovation process in medium tech sectors is **different from the “linear” approach** focusing on **R&D expenditure** and the rational process of optimization of **individual firms**.

On the contrary, innovation can be interpreted according to a **“systemic” approach**. This approach focuses on the process of knowledge creation, on **collective processes of interactive learning**, on the iterative **adaptation between the different partners** and on an implicit process of **automatic selection of the most competitive innovations**.

In particular, innovation processes **in SMEs and in medium technology sectors** has a **gradual character** and is driven by an **intensive interaction** between the suppliers and the customers. This process of **interactive learning** leads to the development of a **“tacit” knowledge or a complex set of capabilities**, which are localized or idiosyncratic and cannot easily be transferred.

In particular, the approach of regional endogenous development indicates that the process of economic development is the result of the tight interaction between the following eight key blocks of variables³:

- growth of regional product and employment,
- interregional and international networking and competitiveness,
- local networking between the various sectors and firms,
- quality of the physical environmental,
- birth, growth and closure of local firms,
- knowledge creation, learning processes, competencies and human capital,
- investments, product and process innovation, productivity increase,
- multi-level governance.

Figure 1 indicates that regional policies may enhance the process of local development by affecting the above indicated individual variables. That is usually undertaken by sectoral policies, while often the interdependence between the various variables is overlooked. Thus, in a system perspective, regional policy should also try to steer or govern the relationships between the various variables in order to steer a self-sustaining process of economic development.

In particular, in a knowledge economy perspective, it is important to facilitate the reciprocal interactions between the process of learning and knowledge creation and all the other variables, as indicated in table 2. Increased knowledge promotes greater international openness, through the participation to international innovation programs and it is promoted by it through international technology transfers. Increased knowledge promotes regional networking through the diffusion of technology spill-over and it is promoted by it through the creation of local innovation networks. Increased knowledge promotes the turnover of firms, as it stimulates the creation of science start-ups, while these latter increase the diversity of the industrial environment and stimulate the creation of new knowledge. Finally, increased knowledge promotes investments in structures and the adoption of innovation, as it provides the capabilities to design new projects and it is promoted by the investments in R&D and the demand of new competencies.

³ Cappellin, R. (2003), Networks and Technological Change in Regional Clusters in Bröcker, J., Dohse, D. and Soltwedel, R. eds., Innovation Clusters and Interregional Competition, Springer Verlag, Heidelberg.

2. A new model of innovation

Innovation is promoted by factors operating on the supply and on the demand side, as indicated in figure 1. Among the former are: the costs and the quality of labour, the use of new machinery embodying modern technology, the accessibility to qualified suppliers. Among the second are: the access to a specific market, the level of demand, the forms of competition as also the existence of specific barriers such as defined by IPR.

However, while these complementary factors define the viability of new process or product, innovation also requires the existence of subjective or immaterial factors, as innovation is the result of an original project and the internal capability of the firm and of the entrepreneur to elaborate an original long term project ("business Plan") and the subjective evaluation of the risk of the required investment, leading to secure internal or external financial resources to the project considered.

Thus, internal knowledge and internal or external financial resources are two additional necessary conditions for the adoption of an innovation and they indicate the subjective capability/weakness existing in the firms in order to exploit external opportunities or to face external threats.

In particular, knowledge creation is a crucial activity within the firms for the adoption of innovation, as it is required in order to search, evaluate and use technology bought from outside and especially for the design of the new product or process and the organization of the innovation project.