

Discussion paper
June 2004

Sustainable District Logistics: a Theoretical framework for understanding a new paradigm

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The INNESTO research project is supported by the European Commission under the Fifth Framework Programme and contributing to the implementation of the Key Action "Policy Aspects" within the Energy, Environment and Sustainable Development Programme (Contract N° EVG1-CT-2001-00054)



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Acknowledgements

This Discussion Paper regards the theoretical and operational framework on which the Sustainable District Logistics (SDL) approach was developed.

The European Charter opens the Paper by outlining the future development of the SDL approach as it was approved during the final INNESTO Conference of June 2004.

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The INNESTO research project was supported by the European Commission under the Fifth Framework Programme and contributing to the implementation of the Key Action "Policy Aspects" within the Energy, Environment and Sustainable Development Programme (Contract N° EVG1-CT-2001-00054).

The kind attention and support from Mr Pierre Valette, Mr Per Backe-Hansen and Ms Irene Gabriel (DG Research, European Commission) allowed the INNESTO partners to arrive at this publication.

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The European Charter of “*Sustainable District Logistics*”

Castello di Poppi, Arezzo, Italy

June 29th 2004

The participants of the Conference; “Spreading Sustainable District Logistics Throughout Europe”, held in Arezzo, on 28-29 June 2004 inaugurate a new approach to overcome the negative impacts of the current logistics process on a significant number of economic activities and geographical areas.

To this end, the Sustainable District Logistics approach promotes:

1. The sustainable accessibility to goods, services, people, places and information. This is a requirement to improve the quality of life based on equity between individuals, territories and generations considering both local and global dimensions and looking at the integration of different European contexts.
2. Participation, cooperation, networking, negotiation and shared visions. In fact, sustainable development requires the motivation of different stakeholders, citizens, public and private sectors while respecting all opinions and points of view.
3. A territorial governance based on a holistic vision considering the future generations. Territorial and business plans should valorise and integrate the diversity of social, economic and environmental features in order to cope with the negative aspects of a high mobility society.
4. A flexible and evolving toolbox. In fact, new methodologies are necessary to foster mutual learning and negotiation, through research, analysis, and market strategies (production and consumption) on a regional level and with benefits for local businesses and planners.

Sustainable District Logistics (SDL) is the integrated management of materials, energy and information flows in a cohesive territorial system to improve access to goods, services, people and places while maintaining and renewing the available resources (human-made, human and natural).

Preface

SUSTAINABLE DISTRICT LOGISTICS (SDL): TOWARDS A NEW PARADIGM

This Discussion Paper aims at providing the theoretical background that originated the *Sustainable District Logistics (SDL)* approach.

The Paper is intended to contribute to the ongoing debate promoted within EU research, documents and White Papers, in particular: *A sustainable Europe for a Better World: A European Union Strategy for Sustainable Development; European transport policy for 2010: time to decide; European Governance; Corporate Social Responsibility.*

The Paper introduces a constellation of ideas, concepts, values, perceptions, approaches and problems. Each of them

- is worthy of at least a book in order to compare different ways and models of thinking, expressed by the existing large amount of literature;
- is a complex system, with nested-systems, that lead to other complex systems;
- is the tip of an iceberg which requires in depth analysis and considerations;
- is fractal, whose irregular dimensions and shapes join up other fractals.

Issues appear simultaneously, causes become effects and vice versa, concepts co-evolve, being forced by unavoidable interrelationships between them. All these constitutes the dilemma and the challenge of the human activities and thinking.

Deterministic certainty of linear relationships between issues and problems leads to a reductionist attitude that would transform what is complex in a simple set of definitions, discovering basic rules and procedures, quantifying them through the elimination of what is not yet quantifiable and measurable, of what is not yet understandable by the available human cognitive maps.

On the contrary, the problematic nature of human thinking looks at uncertainty as the key-lever for knowledge development. Bachelard, Piaget, Popper, Kuhn, Morin, Prigogine, Nicolescu, Bateson, Deridda and many others have contributed to deconstruct the scientific rationality and to open the human mind to an ecologically interdependent system that connects cultures, disciplines and approaches.

For instance, Popper stated that the scientific knowledge is provisional, and science, instead of seeing its aim in the discovery of the “truth”, should be a continuous attempt to “falsify” or “refute” theories, concepts, approaches and methods. Kuhn successfully analysed the nature of scientific knowledge and defined the ongoing process of paradigm changes in shared values, assumptions, rules, points of views, and so on.

Morin E. (1999) underlined the needs of a “cognitive democracy”:

- understanding that knowing and reasoning are not aimed at meeting an absolute certain verity, but at conversing with uncertainty, recognising and utilising the dialogical relation between concepts and notions which seem to be contradictory or opposite
- being aware of the necessity of coping with complexity and uncertainty, avoiding the tendency towards reductionism which limits the knowledge to quantifiable, measurable and formalisable phenomena
- acknowledging that the comprehension of individual parts depends upon the comprehension of the whole, as well as the comprehension of the whole depends upon the comprehension of individual parts
- developing the capacity to contextualise and to globalise knowledge and actions
- understanding unity within and between diverse situations as well as diversity within what is unity and within a specific context

The dilemma in logistics is “to reduce complexity or to deal with it”?

The reductionist attitude leads to sectoral, technologically hyper specialised and one-company approaches. The non-deterministic approach requires a clear “focus” to avoid a purely theoretical quagmire.

This Discussion Paper considers both viewpoints: the sectoral logistics domain and its current hyper-specialised discipline; the global dimension of sustainable development and its impact on the inter-sectoral dimensions (economic, socio-cultural and ecological).

This Discussion Paper presents many issues, which converge into the *Sustainable District Logistics (SDL)* approach. As such, the approach must be considered open to multi-dimensional perspectives, to allow researchers and other stakeholders to further debate and to “falsify” or “refute” it.

This Discussion Paper may appear more affirmative and less problematic than the could be imagined for the issues here presented. This is a result of the attempt to provoke further debate on a paradigmatic shift from the current specialised disciplines on logistics to a more conceptually complex approach.

Following Kuhn’s original work, Ritzer G. (1996) offered the following definition of paradigm: “A paradigm is a fundamental image of the subject matter within a science. It serves to define what should be studied, what questions should be asked, how they should be asked, and what rules should be followed in interpreting the answers obtained. The paradigm is the broadest unit of consensus within a science and serves to differentiate one scientific community from another. It subsumes, defines, and interrelates the exemplars, theories, and methods and instruments that exist within it”.

The SDL approach is at the beginning of an ambitious and difficult path that requires open confrontation, debate and research. The path gears towards the paradigmatic change proposed by the Discussion Paper and reassumed in the following definitions:

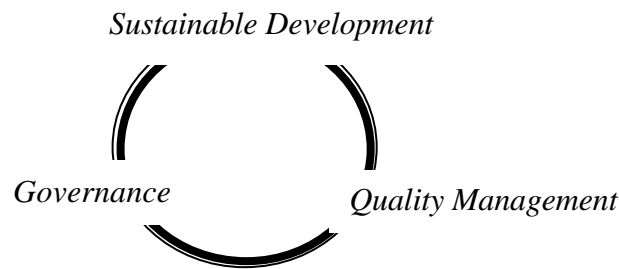
<i>From</i>	<i>To</i>
Logistics is the ”process of planning, implementing and controlling the efficient, cost-effective flow and storage of raw materials, in-process inventory from point-of-origin to point-of-consumption for the purpose of conforming to customer requirements”.	<i>Sustainable District Logistics (SDL)</i> is the integrated management of materials, energy and information flows in a cohesive territorial system to improve access to goods, services, people and places, maintaining and renewing the available resources (human-made, human and natural).
Council of Logistics Management (ECMT/OECD, 1997)	INNESTO project

The *Sustainable District Logistics (SDL)* approach looks at logistics from three overlapping dimensions:

- ❖ an integrated vision of **Sustainability**, which calls for a better governance and for quality management (Part one);
- ❖ the theories on economic, natural and knowledge systems, which contribute to define a **District** (Part two);
- ❖ the principles of strategic management, glocacity and accessibility, which re-examine the current definition of **Logistics** (Part three)

The amalgamation of basic conceptions concerning these three dimensions gives the rise to the **SDL approach** (Part four).

Part one: Sustainability



The opening part (1) of the Discussion Paper is on the key concepts of Sustainability and Sustainable Development.

The Introduction underlines the opportunities and the challenges that exist at European level and affirmed by the Article 3 of the Draft Treaty establishing a Constitution for Europe.

Following the intensive research that has characterised the sustainable development debate in the last 30 years, two complementary definitions have emerged: i) sustainability is a regulative idea to reconcile humanity and nature; ii) sustainable development is the "*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*" (Brundtland Commission (1987)).

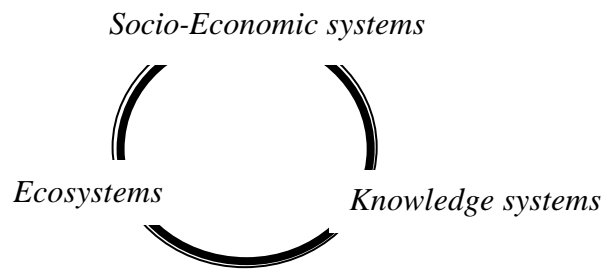
The Introduction considers the need for a multi-level governance of sustainable development processes, looking at quality management systems.

The current definitions of governance is summarised by Chapter 1, which utilises the concept of autopoiesis to understand the complexity that is embedded in local systems, going into the meanings of civil society and stakeholders, as well as of institutional, social and human capital. Corporate social and environmental responsibility is taken into account to foster the entrepreneurial culture towards new governance concepts. As a conclusion, the Chapter considers the necessity of empowerment and capacity building, which can open new paths of development through the support of adequate management frameworks devoted to increasing quality.

Quality management is the theme of Chapter 2, which draws some constitutive principles of TQM, TQEM and SQM. The coherent path that connects these three quality management frameworks is briefly pinpointed. The distinctive characteristics of the *SQM - Sustainable Quality Management*® system (developed in past EU research projects) are presented to look at the logistics dynamics with an integrated perspective of the territorial systems.

As a result, Part one provides the elements to begin a discussion on logistics with a broad view of the interrelationships between socio-economic, natural and knowledge systems.

Part two: District



The second part of the Document is dedicated to the analysis of economic, knowledge and environmental systems, as Districts. The Introduction of Part 2 underlines basic questions related to the governance and quality management of a territorial system: openness, intensity, solidarity and stability of interrelationships. The processes of globalisation, internationalisation and centralisation in logistics are considered along with the expected effects of the EU enlargement in the next years.

These issues introduce the concepts of District as an organised system of interrelationships between human, non-human species and the natural environment. In other words, district, like natural systems, co-evolve and are self-organised.

Chapter 3 begins with an overview of the economic debate on territorial development, referring especially to the research on system areas, industrial districts, milieux innovateurs and territorial productive systems. The core of all these system typologies is a combination of diversities (spatial, economic, productive, social and cultural) and networks in the entrepreneurial and social fabrics, formally and informally nurtured by fluid information exchange, interwoven co-operation, polarisation and attraction of external businesses, and so on. A question is underlined: can a district logistics exist? The vitality of the district is argued considering the actual capacity of small and medium sized enterprises to collaborate each others and to share integrated logistics systems that can be created with a bottom-up approach. As a conclusion, the Chapter points out a series of key factors that influence the reproductive capacity of the local systems.

The reproductive capacity is at the basis of the debate on natural systems, which is summarised by Chapter 4. This Chapter concentrates on the relationship between ecosystem theory in the biological sciences and the human organisation of economic and social systems. Introducing the concepts of "nested" systems, the Chapter pinpoints the continuity of interrelationships and exchange between components, as well as the constant and mutual influences between levels and dimensions (larger and smaller, higher and lower). What qualifies a system is the quality of its (internal and external) relationships, since they determine the capacity of self-organisation and co-evolution. This capacity concerns also a human-managed system, revealing dynamics that regard subsidiarity, networking and participation, while making it possible changes in the system boundaries as far as spatial and temporal dimensions are considered.

Close parallels are discovered between the internal / external relationships of a system and logistics. These relationships are the veins of a system and assure the flows of information, knowledge, matter, energy and so on. Logistics is the functioning of these exchanges. Therefore, the quality of a territorially determined system depends on the quality of its logistics, since it allows the components to relate each other. Vice versa the quality of logistics depends on the human capacity to organise the territorial structures (economic, socio-cultural and environmental).

As a conclusion, the Chapter points out a series of key factors that influence the human capacity to deal with the system complexity.

The human capacity is nourished by knowledge flows that converge into the decision making process.

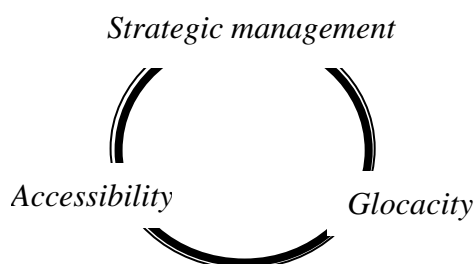
Chapter 5 pinpoints the role of tacit and codified knowledge, expressing the need of integration between disciplines in order to deal with the system complexity. Some key factors are taken into account to follow this perspective at a territorial level. Knowledge is, in fact, strongly embedded in the economic, socio-cultural and natural systems, but it appears also as a single system that nourishes the world of ideas, concepts, theories, cultures.

The Chapter briefly considers the historical dispute between the separation of “knowing and thinking” in specialised sectoral disciplines as and, vice versa, the attempts to unity and reconcile them.

As a conclusion, the “knowledge system” overlaps both the socio-economic and natural systems. Having these characteristics, the “knowledge system” concerns all the key factors of the social potential considered by the previous Chapters, making it possible to pursue a territorial governance based on the openness, the intensity, the solidarity and the stability of relationships within a system and between different systems.

The interrelationships within and between territorial systems constitute the specific field of action where logistics plays a relevant function.

Part three: Logistics



Part 3 examines Logistics and how it affects and is influenced by the district planning and development. Therefore, a basic question arises: what logistics for what development?

Taking into account the original meaning and the current definitions of logistics, the Introduction makes more explicit the above question: how logistics can be strategically planned and managed in order to favour the implementation of Sustainable Development through a better territorial governance?

Chapter 6 briefly introduces the idea of thinking about logistics as a system within the territorial systems, considering historical paths and fields of action (from military to business and development domains). The “one-company-oriented” logistics approach is still prevailing, but awareness is increasing on eco-efficiency and territorial perspectives, rubbing on the intensive network of interrelationships between suppliers, producers and consumers.

Looking at the quality cycle of logistics, the Chapter underlines the role played by a few number of transformation levers that allow businesses and organisations to improve their performances in a process of continuous change.

These levers can be utilised to move logistics towards Sustainable Development, starting from a first series of issues that the Chapter aggregates in the three development dimensions: economic, environmental and socio-cultural.

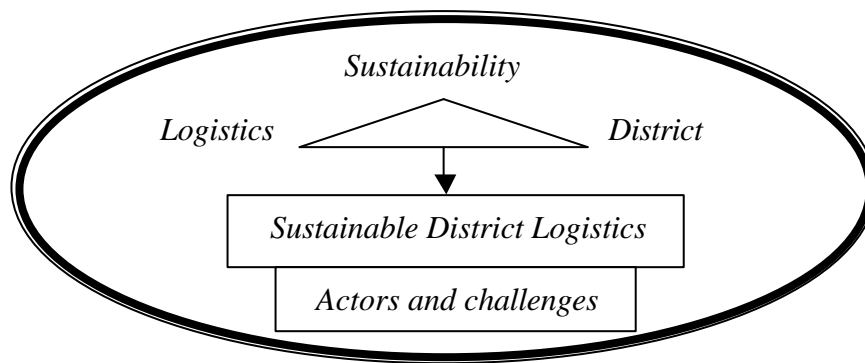
Other issues are considered in the following Chapters and regard the role played by logistics as a means that favours:

- the combination of global and local dimensions, present and future situations, virtual and factual realities;
- the access to goods, services, people and places.

Chapter 7 is concerned with the capacity to simultaneously incorporate the local and global dimensions in the decision-making processes. This capacity is called “glocacity” and owes its birth to logistics. Glocacity is activated when: larger dimensions and higher levels think locally and act globally; smaller dimensions and lower levels think globally and act locally. This decision flow connects people and organisations in different spatial and temporal dimensions. Glocacity changes the way in which a system is organised and managed: networked and participative organisations are based on the acknowledgement of diversity and on subsidiarity. The Chapter considers how glocacity can influence positively the governance dynamics, both in corporate organisational behaviour and in the overall society, even though the current approach to logistics shows difficulties and opposite directions. In fact concentration and globalisation processes are taken into consideration looking at district logistics and at the necessity of vertical integrators and facilitators to favour a close collaboration between logistics operators and the economic tissue of the local contexts. As a conclusion, the Chapter pinpoints the main issues that can orient logistics towards glocacity.

Chapter 8 introduces the concept of accessibility as the capacity to access to goods, services, people and places. Adopting this concept, the Chapter underlines that logistics can facilitate or hamper the equity of access, a right that regards businesses, social communities and people in different spatial (local and interlocal) and temporal dimensions (generations). Accessibility guarantees the right, enlarge the opportunity and improve the capacity to see, reach, produce, buy, use, consume, and so on. This concept of accessibility integrates and recapitulates the logistics issues regarding the strategic management of the resources' flows, which deals simultaneously with local and global contexts (glocacity), providing a clear orientation towards Sustainable Development. According to the latest development in the field, logistics is seen as a co-evolving concept, without a simple and reductive definition. It is a broad field of development strategies and initiatives, which involve a large number of disciplines and functions. Moreover the increasing role of information technology can have a positive impact in this perspective.

Part four: The SDL approach



The final part of the Discussion Paper elaborates Sustainable District Logistics (SDL) approach that was the basis of the INNESTO project. The Introduction underlines a basic questions needed to be raised: How to move the current logistics management towards the integration between different interests, decision-making processes, identities, cultures, knowledge, skills and experiences?

This integration is necessary to reduce the intensity of material flows and maximise the sustainable use of renewable resources by:

- favouring local networks and new styles of production and consumption
- promoting participation-oriented local development
- enhancing the reuse and recycling of materials
- extending the usable life of products
- substituting the use of material goods by services
- substituting physical movement (transport) by other types of access to goods and services (e.g. information technology)
- organising transport in an optimal way by exploiting all possibilities of bundling and co-operation adopting a territorial perspective

Chapter 9 collocates these objectives in a holistic management perspective. The complex tissue of interrelationships between the logistics stakeholders is the reason for the SDL approach that fosters a "new social and territorial deal" according to the co-evolution and self-organisation dynamics of a multi-level-governance. The Chapter, in fact, suggests that the boundaries of a "Sustainable District Logistics (SDL)" have to be defined in a flexible and adaptable way, based on the openness, intensity, solidarity and stability of relationships between the district constitutive components and other networked logistics organisations (systems). A series of concepts (governance; civil society; public sector; social, economic and environmental glue) are utilised to analyse the stakeholder typologies of logistics and territorial systems.

Chapter 10 describes more in depth the perceptions, the interests and the roles of the SDL stakeholders in order to better understand the main challenges faced by the SDL approach. A main question, in fact, arises from the previous Chapter: who could be the promoter of this territorially integrated approach to logistics? Answers are provided by Chapter 10 through the analysis of obstacles and difficulties that need to be overcome. The development of appropriate instruments is suggested in terms of a SDL operational tool-box that allows the stakeholders to widen their perceptions, to better co-operate with each others, to integrate different interests, decision-making processes, identities, cultures, knowledge, skills and experiences.

Part one SUSTAINABILITY

THE CHALLENGE OF SUSTAINABLE DEVELOPMENT

From the Rio Conference in 1992 onwards, the call for Sustainable Development has led to many disputes about its interpretation. The growing consensus, which has emerged from these discussions, is that Sustainability is a general idea, a “regulative idea” in the Kantian sense, as are, for example, beauty, freedom or health (Homann K., 1996). It cannot be assessed or achieved by simple rules; it needs interpretation in a specific context.

Sustainable Development is not only a new concept, it is a new paradigm, and it requires viewing many things from a new perspective. As a paradigm shift involves the difficult questioning of assumptions and perspectives previously taken for granted (Kuhn T. S., 1967), a confrontation with the views of other cultures can be as fruitful as confrontation with other disciplines. Europe has a unique opportunity in this sense – several highly developed cultures have developed different approaches towards the same issues; they have a common basis for understanding and they now also have common institutions.

Europe, with its diversity of traditions and cultures, with its long history of political and intellectual struggle towards combining cultural, economic, social and individual development in a rich and varied but spatially restricted environment, has the unique opportunity to play a leading role in the transition towards more sustainable development. European policies are aimed at meeting this challenge by mobilising and recombining different local resources and making them accessible as part of a collective learning process. “An EU of 25 will create new relationships with its neighbours and the wider world” based on the motto “More unity and more diversity” (EC, DG for Press and Communication, 2003).

The European Union has, in fact since the Amsterdam Treaty of 1997, required that all policies and programmes funded by the EU be conceived and implemented in accordance with the principles of Sustainable Development. The regulations for the new generation of the European Structural Funds (1999), the EU Strategy for Sustainable Development decided at the Gothenburg Council (2001) and the objectives stated by the Article 3 of the Draft Treaty establishing a Constitution for Europe have confirmed this commitment towards a sustainable development, based on:

- a balanced economic growth in a social market economy aimed at full employment and social progress, and with a high level of protection and improvement of the quality of the environment
- the fight against social exclusion and discrimination in order to promote social justice and protection, equality between women and men, solidarity between generations and protection of children's rights
- peace, security, solidarity and mutual respect among peoples, free and fair trade, eradication of poverty and protection of human rights and in particular children's rights, as well as a strict observance and development of international law, including respect for the principles of the United Nations Charter

The concept of sustainable development

The concept of Sustainable Development was invented because of the obvious shortcomings of conventional development approaches. It presents two basic challenges:

- Whereas the extraordinary development of technology, industry and large organisations of the modern age were strongly based on an increasingly sophisticated differentiation and specialisation, the concept of sustainable development stresses the necessity of an *integrated consideration of different dimensions of development*. Considering simultaneously different dimensions in order to avoid counter-productive effects is not an easy task for highly differentiated administrations. More difficult still is to systematically look for synergies and win-win solutions. Different actors, different organisations, different disciplines will need to cooperate more fully.
- Sustainable development (SD) requires *openness towards the future* – for “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987). We need not only to conserve potentials and resources but also to encourage innovation in the right direction and to improve the ability to learn. Learning may include the shifting of perspectives and priorities. Therefore, the concept of SD and corresponding assessments must also allow for changing objectives and priorities over time. Sustainable development is an open process. “Sustainability” can never be achieved definitively. Yardsticks change as your knowledge increases.

Two additional challenges emerge in formulating Sustainable Development policies at the European Union level:

- Across Europe the cultural, the political, the economic and the environmental contexts of development vary considerably. Nevertheless, European policies need a common framework that is able to deal with this *diversity of contexts*. Assessments will need to take into account differences between contexts and at the same time allow for comparisons. For transferring experiences, a description and an understanding of these differences is necessary.

- European policies often concern five or six political or administrative levels, from the European level to the local level. Transparency and participation are high priority principles of the EU. A coherent sustainable development policy across the Union requires *multi-level governance*: appropriate systems for ensuring co-ordination and an integrated view of the responsibilities and activities of all levels are needed (Hey C. and Schleicher-Tappeser R., 1998).

European Governance

The White Paper on European Governance by the EU Commission proposes that the principles of *openness, participation, accountability, effectiveness and coherence* should guide the necessary reforms (CEC, 2001).

From its beginnings the European Union faced the difficult task of formulating policies which take into account very different traditions, conditions, and cultures. Founded in the era of undisputed industrialism, the European Community initially relied on standardisation, alignment, and centralised steering. But this approach encountered increasing and sometimes insurmountable difficulties, especially in the sphere of agricultural and environmental policies.

As a consequence, in many fields the old “command-and-control” approach has been replaced by more flexible policies (see e.g. Prittwitz V., 2000). With the growing influence of European policies and increasing European integration in the most diverse areas of private, public and economic life, the necessity of respecting and actively taking into account regional specificities is growing. With the upcoming EU enlargement towards the East, the challenge of diversity has definitely reached a dimension where centralistic steering becomes illusionary. Under these circumstances *subsidiarity* becomes a key concept – and consequently the disputes about its interpretation have become intense.

There is an increasing fear that in the increasingly complex and global strands of negotiations, politics is degenerating into a mere marketplace, democratic control is being lost, and powerful specific interests succeed in pushing themselves to the fore. In this situation the concept of territory in combination with the concept of subsidiarity could be essential for providing guidance to all actors.

Political institutions at all levels essentially represent the political will of the citizens of a particular territory. In this they are particular, and differ from other interest groups, such as companies or NGOs. The spatial unit has always been the most important category for the integration of different dimensions of development and as such it regains its importance today, especially in the context of the discussion on Sustainable Development. In representing the citizens of a territory, political institutions have a particular democratic legitimacy and also a particular responsibility with regard to all aspects of life and development.

The principle of subsidiarity is increasingly recognised as being essential for structuring the increasingly complex relationships between different political and administrative levels – it can be helpful in defining the roles of the individual levels within the framework of common shared responsibilities.

With five to seven levels of territorial representation in Europe, the system of multi-level governance has become very complex and often lacks the transparency required for democratic legitimacy.

However, the repeated attempts to assign the full responsibility for specific subjects, policy fields or tasks to specific levels are not appropriate to the complexity of our societies and there is a tendency to fall back to centralistic approaches.

Another approach is to acknowledge explicitly the shared responsibility of the different levels and to structure the responsibility using the principle of subsidiarity, which states that the intervention of higher levels is useful only where lower levels are not capable of resolving a problem.

The idea of a rather comprehensive and exclusive competence in an area is replaced by the taking of responsibility for contributing to the attainment of common objectives. The specific objectives and means of each level need to be defined and revised in regular negotiations. Therefore, the approach of sharing responsibility in the spirit of subsidiarity can only function if the objectives, the means, the difficulties and the progress in attaining them are transparent to all actors concerned – in a democratic system this must also include the public.

Sustainable Development and Quality Management

Sustainability is a general idea, which can be operationalised by increasing the quality of governance and can be implemented through the quality management of transformation processes in specific situations. Such a management approach needs general guidelines, procedures for setting specific goals and useful instruments.

Many attempts have been made to reduce the whole issue of Sustainable Development to a limited number of easily comprehensible indicators that can be measured and monitored using conventional means. These approaches have been very useful for gaining a quick overview. However, limiting the assessment to the measurement of a standardised set of indicators has not led to a satisfactory response to the abovementioned challenges. Such a reductionist approach easily leads to the reproduction of a sectoral view– it is not able to deal with views and priorities, which change over time, and often it is not felt to be adequate to the specific local situation. In practice, the wide variety of initiatives that have attempted to progress in the direction of sustainable development (such as local agendas, state programmes, companies etc.) have often devoted considerable efforts to developing very specific and detailed assessment systems with varying levels of success.

This wide variety of approaches has for a long time given rise to polemics that argued that the concept of Sustainable Development was without any precise meaning and therefore useless. However, despite the difficulties in giving precise definitions and assessment rules, the concept has not lost its attractiveness and political effectiveness. A review of the main EU research projects concerning sustainable regional development in 1999 showed that a considerable consensus concerning the main challenges of sustainable development had grown in only a couple of years (Schleicher-Tappeser R. and Strati F., 1999).

Today, we can build on a rather large consensus, as can practitioners, that SD is a useful concept that involves an open learning process, and that it makes no sense to give a detailed universal measurement rule for “sustainability”.

Understanding Sustainable Development as a collective learning process is the key to developing adequate management systems.

Collective learning changes the perspective concerning what could and should be done (the objectives) and how it could and should be done (means and methods):

1. What should be done:

- by analysing a situation
- by identifying alternative developments and actions
- by specifying and revising objectives

2. How to do better:

- by monitoring progress towards set objectives and refocusing actions
- by reminding that the different dimensions of development need consideration
- by comparing different approaches
- by exchanging experiences between different contexts.

In the business world, the necessity of dealing with complexity and continuous change has led to several concepts that may be most useful in this context: “learning organisations”, “change management”, “quality management”, are all concepts that have abandoned the old “command and control” approach and try to make use of systematic self-reflexive learning processes.

Our democratic systems indeed rely more or less systematically on these kinds of feedback mechanisms – many administrations however, still operate on the basis of a rather conventional top-down logic and have difficulties in conceiving of assessments and evaluations as occasions for learning new methods for conceiving new strategies.

The aforementioned concept of *Quality Management* seems to be particularly appropriate as a starting point of reference for performing sustainable development processes (Strati F. and Schleicher-Tappeser R., 1999).

Also intuitively, it is recognisable that quality is always relative; it can never be reached absolutely.

Quality Management means that permanent attention to quality is important at every stage of “production”, everybody at all levels shares the collective responsibility.

The emphasis of a quality management system lies on the procedures. Objectives and criteria are not fixed forever; they are re-examined on a regular basis. The transparency of objectives, continuous monitoring and regular evaluation are constitutive elements of such a learning system.

The same holds true for Sustainable Development (SD): the concept of SD and the best management systems amount to more than the sum of regulations and standards.

Basic questions arise to which the quality of governance and management try to give an answer.

- How does one look simultaneously at different dimensions of development?
- How does one integrate different disciplines?
- How does one measure a balanced development?
- How does one account for changing views?
- How does one guide and encourage innovation?
- How does one account for different contexts and priorities in different European regions and cultures?
- How does one ensure transparency and shared responsibility across a hierarchy of political levels?
- How does one deal with such a wide range of issues and the complexities of their interrelationships over space and time in a dialogue between experts, politicians and the public?

CHAPTER 1: GOVERNANCE

Governance is the way in which governments, citizens and their organisations relate with each other to manage their common affairs in order to cope with and solve the problems of their territories.

The concept of *autopoiesis* is useful to understand the complexity that is embedded in the territorial governance. Maturana H. (1980a) invented the term *autopoiesis*, merging the Greek word *poiesis* (creation or production) and *auto* (self), in order to express "what takes place in the dynamics of the autonomy proper to living systems" in terms of *self-producing, self-organising and co-evolving capacity*.

According to Maturana (1980b), an <i>autopoietic system</i> is defined as:	Looking at the governance complexity, a territorial context is a wide system that:
<i>A dynamic system that is defined as a composite unity</i>	contains different systems (governments, citizens, families, associations, groups of interests, which are confronting each other
<i>is a network of productions of components that</i>	ensures the creation and life of new components, both as individuals and their communities (networks)
<i>(a) regenerate the network of productions that produced them, and</i>	together with its networked components, is continuously changing in time and space
<i>(b) realize this network as a unity in the space in which they exist by constituting and specifying its boundaries</i>	<i>self-recognises and self-defines</i> its own boundaries
<i>as surfaces of cleavage from the background through their preferential interactions within the network</i>	is <i>self-referential</i> and, at the same time, open to other systems by means of mutually determined developmental actions that correspond to different cycles of life (human, non-human, etc.) and spatial dimensions (larger or smaller according to the scope of activity of the components)

Local actors and communities can be *empowered* to autonomously organise themselves and to evolve together. The empowerment depends on the capacity building to cultivate mutual relationships, which are at the same time open, closed, intense, solid and stable.

Many scientists and philosophers contributed to the understanding of the concepts of autopoiesis, from Pascal and Kant and more recently, von Neuman J. (1966), Bateson G. (1972, 1979), Le Moigne J. L. (1977), Maturana H. and Varela F. J. (1980), Morin E. (1980) among others. These processes are also the basis of social interactions dynamics.

According to Mahatma Gandhi (Fisher L., 1982), "No society can possibly be built on a denial of individual freedom", while reason and openness are at the basis of the mutual social relationship. Following Hindu philosophy and tradition, he thought that self-government could be not obtained without self-control for the individual. In his opinion, personal morals and (individual and collective) ethics were the roots of change. He wrote, "swaraj is a sacred word, meaning self-rule and self-restraint, not freedom from all restraint which 'independence' often means"; thus he stressed the need for individual commitment, action and personal change (Ranchor P., 1994; Gandhi M. K., 1982).

Some centuries ago, Alexis De Tocqueville (1838) observed that citizens respect laws, which they help to create and administer. He argued against "the partisans of centralisation" who "are wont to maintain that the Government directs the affairs of each locality better than the citizens could do it for themselves; this may be true when the central power is enlightened, and when the local districts are ignorant; when it is as alert as they are slow; when it is accustomed to act, and they to obey"... "But I deny that such is the case when the people are as enlightened, awake to their interests, and accustomed to reflect on them" "I am persuaded, on the contrary, that in this case the collective strength of the citizens will always conduce more efficaciously to the public welfare than the authority of the Government."

Nowadays all these characteristics merge in the terms of *governance* and self-governance (Osborne D. and Gaebler T., 1992; Commonwealth Foundation, 1999; CEC, 2001). They are of a paramount importance in the processes towards sustainable development, for instance in the Local Agenda 21 initiatives (Warburton D., 1998; Knowles E., 1999; Satterthwaite D., 1999; Malini M. and Jørgesen A. M., 1997; Erdmenger C., Burzacchini A., Levett R., 2000; Erdmenger C., 1998).

According to the definition given by "The Governance Working Group" of the International Institute of Administrative Sciences in 1996, "governance is a broader concept than government and it refers to the process that involves formal institutions and those of the so-called civil society. Institutions are the expression of public authorities (governments), civil society is the social fabric constituted by a multiplicity of units territorially created by the citizens".

Civil society (Seligman A., 1992; Fukuyama F., 1999; CSOPP, 2000) is always understood as dynamics strictly related to citizenship, rights and duties, subsidiarity and participation in the decision-making. Civil society consists of "the groups and organisations, both formal and informal, which act independently of the state and market to promote diverse interests in society" (World Bank, 2002).

Civil society embraces the notions of social movements and implies conflicts and agreements, diversity and negotiation, the merging of constitutions, legislations, executive and judiciary powers, legitimacy, representativeness, transparency, accountability and efficiency.

Putting the civil society at the centre of the policy mainstreaming, the United Nation (CSOPP, 2000), underlines the following basic elements of governance:

Governance	
<i>Political Authority</i>	<i>Public Management</i>
<ul style="list-style-type: none"> • Political Legitimacy • Democratic participation • Empowerment • Inclusiveness in shaping public affairs 	<ul style="list-style-type: none"> • Transparent public administration and policy management • Accountable public service • Effective implementation of public policies

The European Union has reiterated these elements in five principles for Good Governance (CEC, 2001): openness; participation; accountability; effectiveness; coherence.

As a result, it is clear that Democracy is the *sine qua non* of “good governance”: Democracy and Governance go hand in hand: "no civil society, no democracy" (Gellner E., 1994). Democracy and Governance foster and require quality of interrelationships between governments, social movements, mutual support associations, informal and formal networks, pro and anti interest groups, profit and not profit sectors, and so on.

The structured non-governmental organisations of citizens act as social bridges; the citizens themselves act as the social glue. Social bridges and glue are the components of the Social Capital (Lang R. E. and Hornurg S. P., 1998, Fukuyama F., 1995, 1999; Putnam R. D., 1993, 2000; Ladd E. C., 1999; Dionne E. J., 1998), as it is currently understood in terms of trust, collaboration and mutual interactions between individuals, generally manifested in nested networks (from family to trade unions, trade associations, political, religious, socio-cultural, environmentalist and so on organisations).

Alexis de Tocqueville (1838) used the expression "art of association" anticipating the concept of social capital and looking at a democratic society. This "art" is nowadays identified in the capacity to weave fair interrelationships between individuals and groups.

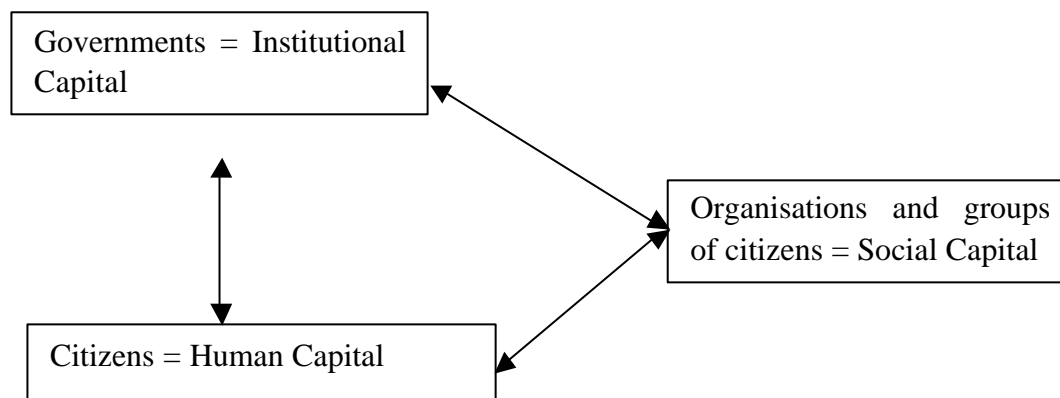
The quality of the social capital involves the values and the behaviours of the civil society and, all together, rely upon the potential and the capacity of the human beings. Their Human Capital (OECD, 2001) is, therefore, the "energy" of the socio-cultural and economic system in a locally determined context and within a global (world) perspective.

Summing up, according to the recent literature on sustainable development (e.g. Smith D., Sippert N. and Emmert J., 2002), governance is a process based on the interwoven relationships between Institutional, Human and Social Capital.

Institutional Capital is constituted by decision-making processes, organisational capacity, support, services and resources, provided by the institutions that operate at whatever level of a social community.

Human Capital consists of individually possessed knowledge, skills and competencies acquired through learning, experiences, attitudes and values widely shared within a specific local context and transmitted from generation to generation with respect to the creation of social, cultural, economic and environmental well-being. (OECD, 2001).

Social Capital is produced through human capital; is a “relational capital” rather than being the property of any one individual; it is a public good that is shared by the community that creates and utilise it; it involves the values and the behaviours of the civil society and relies upon the potential and the capacity of the human beings; it consists of mutual trust and benefit, community participation, co-ordination and co-operation, developed through formal and informal networks, social organizations, norms, and so on. (OECD, 2001).



Human beings (or, better, the human capital) make governance. Good governance is needed for implementing sustainable development.

“We have to combine the basic notion of sustainability rightly championed by Brundtland, Solow and others, with a broader view of human beings” writes Amartya Sen, adding that “What role, then, should citizenship play in environmental policy? First, it must involve the ability to think, value and act, and this requires that we think of human beings as agents, rather than merely as patients (...) Second, among the opportunities that we have reason to value is the freedom to participate (...) Third, if environmental objectives are pursued by means of procedures that intrude into people’s private lives, the consequent loss of freedom must count as an immediate loss (...) Fourth, the conventional focus on overall living standards is too aggregative to pay adequate attention to the importance of specific freedoms (...) The relevance of citizenship and of social participation is not just instrumental. They are integral parts of what we have reason to preserve” (Sen A., 2004).

Therefore, governance is inclusive to the extent that it ensures legitimacy of different points of view and perspectives of the people, taking them into account in the decision-making process.

Components of the system and, consequently issues and interests (e.g. economic, socio-cultural and environmental) can be underrepresented in or excluded from the decisions concerning a specific system (spatial dimension) and in a specific period of time (in the past, currently or in the future).

Within the SDL approach, a case study begins with the analysis of the potential stakeholders in the logistics process, what are their roles, importance and influence on the local logistics system.

In the INNESTO project Casentino study, researchers identified 13 stakeholders at the project beginning in the analysis of the local context and businesses (e.g. logistics flows and performances) as well as in the creation of innovative hypothesis to improve the condition of the valley for the future.

The stakeholders represented public authorities and administrations, development agencies, business and trade associations, transport companies, trade unions and environmental associations.

A second stakeholder analysis was performed to enlarge the stakeholder representation in the elaboration of a new development vision for the local territory in relation to the sustainable accessibility to goods, services, people and places. 18 persons were selected to participate in a final Local Scenario Workshop (LSW), coming mainly from associations of consumers, households, students, parents, commuters, the third sector and environmental sectors, as well as from organisations and bodies involved in civil rights, social and health, equal opportunities etc. Attention was focused on women participation in the LSW, ensuring an equal number of women and men (50%).

Recently, with the diffusion of the sustainable development concepts, also *corporate governance* opened its view to a broader range of stakeholders looking at interests and needs that were ignored or refused before, such as those of the civil society and of the so-called "stakeholders without voice", namely the natural environment, the non-human species and the future generations, unable to speak for themselves (Wheeler D., Sillanpää, 1997).

This new approach to corporate governance builds upon the a wide debate and literature which initiated several decades ago (e.g. Friedman M., 1962; Schumacher E. F., 1973) and underlined the necessity for the entrepreneurial culture to move from profit-oriented actions to a stakeholders approach that considers the well-being of people and the eco-systems in which they live.

This new approach calls for an active engagement of all citizens and is described in European Union publications (CEC, 2001b and 2002) as:

- “a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis”
- the business behaviour “over and above legal requirements, voluntarily adopted because businesses deem it to be in their long-term interest”
- “intrinsically linked to the concept of sustainable development (businesses need to integrate the economic, social and environmental impact in their operations)”
- “not an optional "add-on" to business core activities - but about the way in which businesses are managed”.

Governance (both corporate and general) is influenced by strategic choices: Who are the stakeholders excluded from the decision-making table? Why? Which methods and procedures can facilitate an effective participation?

Positive answers, in the sense of inclusion and participation choices, contribute to the empowerment of the local actors and communities, building their capacity to conceive and implement development strategies and plans. "It is beginning to be recognised that community is neither the 'end' nor the 'means' of a process of development or participation, it is creating something new which is based partly in people's memories, real or imagined, and partly in future visions of society" (Warburton D., 1998).

The involved stakeholders, according to their capacity to imagine and see the future pictures of the local contexts, depicting the related constitutive features, can open different paths of development. This capacity requires the support of a management framework devoted to increasing quality.

CHAPTER 2: QUALITY MANAGEMENT

Today there are many approaches to quality from TQM, TQEM, SQM.

A coherent path can be discovered in the development of concepts, criteria and procedures that characterise each of the above-mentioned quality management frameworks. It is a path correlated to paradigmatic shifts of a world wide relevance and regarding the role of the enterprise, the society and the natural environment.

Total Quality Management (TQM) modified the entrepreneurial culture, conceiving a company as a living organism, open to society and managed through innovative methods aimed at the improvement of the human capital.

Total Quality Environmental Management (TQEM) incorporated the environmental dimension into the corporate strategies, enlarging the meaning of a company as a socially managed organism and offering a wide perspective where business and territorial quality are more and more integrated towards sustainable development.

Sustainable Quality Management (SQM) goes further embedding corporate planning and programming cultures within a holistic vision of local and regional Sustainable Development.

From TQM to TQEM

Total Quality Management (TQM) framework had a very long path of incubation, which combined Eastern (e.g. Japan) and Western (e.g. the USA) cultures.

If the first concepts appeared clearly in the 1950's, the following decades gave a robust configuration of criteria, guidelines and procedures.

Especially during the 1970's and 1980's, TQM acquired a world wide influence, as a comprehensive approach which considers that:

- an organisation continuously improves its performance over the long term, being customer-focused and meeting the needs of all stakeholders;
- the system is an undivided "whole", an organisational complex based on interdependent components (e.g. suppliers, inputs, processes, resources, people, outputs, customers, etc.);

- a climate of trust and co-operation among the stakeholders should be developed;
- the effects of changes on the entire system, not just the individual elements needs to be taken into account;
- teamwork, commitment and innovation should be favoured, to give a shared ownership of all the improvement processes.

One example is the "Baldrige model" (George S., Weimerskirch A, 1994) which "focuses on the customer; aligns internal processes with customer satisfaction; puts everybody in the company to work on a shared vision and goals; facilitates a long-term approach to continuous improvement; demands management by fact; promotes prevention rather than reaction; seeks ways to be faster and more flexible throughout the organisation; looks outside the company for opportunities to form partnerships with customers, suppliers, and other companies, to benchmark, and to fulfil the company's responsibilities as a corporate citizen; values results."

Benchmarking is important to nourish TQM. In fact, according to Beckford J. (1998), "Benchmarking will enable innovations (either of process and product) to spread more rapidly through an industry and across industries where appropriate - for example, in supply or distribution logistics where many problems are similar regardless of the industry. Benchmarking involves a number of simple steps. The first establishes what, from the customer's perspective, makes the difference between one supplier of a product or service and another. (...) The second step is setting standards according to the best practice found. (...) The third step is to determine by what means the benchmark organisation achieves those standards (...). The final step is utilising the capabilities of the personnel to meet and, if possible, exceed the standards observed".

The concept of TQM has evolved over the last three decades, acquiring a fundamental meaning that has been summed up in the following three terms (Galvano A., 1990; Beckford J., 1998; Kaku, R., 1997):

- *Kaizen* as a process of continuous, slow, day-by-day change;
- *Kairyo* as fast, unpredictable modifications and improvement;
- *Kyosei*, as an emphasis on social and environmental responsibilities for the present and future generations, as well as equity within world-wide and between local economies.

The latter term, in particular, links quality management with environmental management, in the concept of total quality environmental management (TQEM) TQEM was officially born in 1990, when the GEMI (Global Management Initiative) grouped more than twenty big companies of the USA to voluntarily adopt this new entrepreneurial paradigm.

TQEM "is a system of dealing with quality at every stage of the production process, both internally and externally ... The TQEM system requires that every single part of the organisation is integrated and must be able to work together. This is exactly the ethos which is needed for an environmental system to be successful ... For firms with a total quality management system in place or considering one, the next steps towards an integrated and effective environmental management system are not hard to make" (Welford R., 1995).

TQEM pursues a holistic approach to understand the links between an organisation and its natural environment and to foster, especially by adopting life-cycle analysis, ecological performance and clean manufacturing processes which reduce pollution at the source rather than end-of-pipe.

ISO 9000 series was created for TQM and ISO 14000 series for TQEM, as well as EMAS and ECOLABEL.

Their ways to improve quality underline how corporate strategic visions are necessary in order to promote the principles of sustainable development as a set of core values guiding the firm's decision-making processes at all levels (Welford R., 1995; Elkington J., 1997; Clarke T. & Clegg S., 1998) and fields of activity (e.g. marketing, training, auditing, life cycle of products and processes, etc.).

That way the scope of quality management is enlarged involving all sectors, all typologies of companies and business (small, medium and large sized) and the territory.

In fact the ISO 14000 series and EMAS II can be applied at a territorial dimension through the participation of local stakeholders (actors), e.g. employees and employers, businesses and organisations of different interests (economic, environmental, social and cultural), local authorities and public administrations.

This wide applicability is possible since the standard setting process is orientated to a continual improvement, based on voluntary adhesion and agreements supported by norms, regulations and laws.

This flexibility allows stakeholders and local contexts to define appropriate courses of action to improve performance in different ecological, social and economic situations.

Quality, in relation to sustainable development must also consider social factors such working conditions, human rights and participation (SA 8000), in relation to all kinds of organisations, (businesses, non-business and voluntary organizations, public administrations, manufacturing, services, etc.).

The quality management approach therefore starts on a meta-level and does not prescribe fixed standards. It deals with the methods and procedures with which quality targets that have been set can be attained or exceeded. The commitment is to ensure optimal and transparent management in the fulfilment of very complex objectives.

Sustainable Quality Management

The term Sustainable Quality Management appeared for the first time in the 1990's in theoretical considerations and in a programme of UNIDO (United Nations Industrial Development Organisation) aimed at analysing the entrepreneurial tendencies in several countries. The basic need of this initiative was to address TQM towards sustainable development.

However, it was on the basis of a EU research project that the '*SQM – Sustainable Quality Management* ®' system was created in 1999. The EU research was entitled "INSURED" ("Instruments for Sustainable Regional Development") and funded by the ENVIRONMENT programme (Schleicher-Tappeser R. et al., 1997; Schleicher-Tappeser R. et al., 1998). Since then, the SQM system has been further developed in a series of research and pilot application projects in different European Countries.



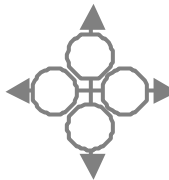
Three groups of aspects are contained in the *SQM analysis framework* to answer three simple questions:

- Which direction do we choose for our future?
→ The principles of sustainable development: **ORIENTATION**
- Which are the societal forces and the capacities for co-operation?
→ The local key factors for a sustainable development: **SOCIAL POTENTIAL**
- Which levers could be used for reorienting development?
→ The transformation levers: **ACTION DYNAMICS**

The ten components of the *ORIENTATION towards Sustainable Development* have been developed comparing a very wide range of systems and definitions of sustainable development.

It is possible to establish a full correspondence with the less systematic 21 principles of the Rio Declaration.

The components of the *ORIENTATION towards Sustainable Development* are also based on three questions:

SQM analysis framework		
The ten elements of ORIENTATION towards Sustainable Development		
What do we want to sustain?	<p>The Development Dimensions</p> <p>Environmental dimension</p> <p>Economic dimension</p> <p>Socio-cultural dimension</p>	
Which conflicts of interest are driving the debate?	<p>The Equity Dimensions</p> <p>Social and gender equity (inter-personal)</p> <p>Equity between regions (spatial)</p> <p>Equity between generations (temporal)</p>	
Which basic approaches can help us?	<p>The Systemic Principles</p> <p>Diversity</p> <p>Subsidiarity</p> <p>Networking / Partnership</p> <p>Participation</p>	

The first three elements are the common three basic dimensions of Sustainable Development with the third one encompassing what some other systems call “society” rather than merely the usual “social” aspects.

These are looked at in more detail in the second group, which has proved to be very useful for discussing the “future generations” issue in relation to other equity conflicts that have driven policies historically.

The most innovative part is the “Systemic Principles”: they are a systematic synthesis of various underlying principles often mentioned in this context but usually not seen as core elements of the concept of Sustainable Development.

To include these kinds of more basic orientations in practice requires some additional initial explanations, but it has proven to be extremely helpful in discussing essential relationships and in elaborating strategies.

The second major group of aspects in the SQM analysis framework concerns the *SOCIAL POTENTIAL*.

Sixteen key factors for local sustainable development have been identified in order to describe the co-operation and communication structure in a given community.

In fact, these elements allow for the identification of the obstacles and the particular potentials for promoting sustainable development in a given local or regional context.

For the comparison of experiences in different contexts and cultures and for evaluating their transferability, a description of the contexts in these terms has been shown to be essential.

SOCIAL POTENTIAL	
P1	Perception of a variety of development approaches
P2	Creativity and innovation in an entrepreneurial culture which emphasises responsibility towards the community
P3	Capacity to cope with complexity and ambiguity and to anticipate change
P4	Openness to enrich the own culture and enhance multicultural cohesion
P5	Discovery and re-encoding of territorial specificities & local knowledge
P6	Ability of each to reach their optimum level of attainment and fulfilment
P7	Fractal distribution of competence using the counterflow principle
P8	Autonomy of strategic decision making within a facilitating infrastructure
P9	Primary reliance on own resources without compromising the ones of the others
P10	Shared value system taking into account environmental, socio-cultural and economic interdependencies
P11	Social cohesion
P12	Opportunities and room for equitable interaction
P13	Capacity of creating shared visions
P14	Integration of social & technical skills into the innovation process
P15	Access to information and to the arena of dialogue and debate
P16	Multiplicity of interactions, enhanced by local animators

Finally, for analysing and designing actions, policies and programmes, the third group of the SQM analysis framework proposes the six basic “transformation levers” that describe the ACTION DYNAMICS.

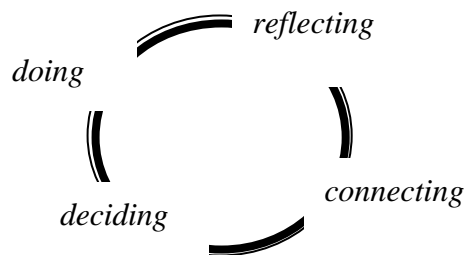
DYNAMICS: TRANSFORMATION LEVERS	
D1	Enhancing problem understanding
D2	Open collective learning
D3	Negotiation and co-decision
D4	Creation of a shared vision
D5	Client orientation
D6	Result orientation

“SQM – Sustainable Quality Management ®” is a versatile system for the assessment and management of sustainable development processes.

Having this broad view, SQM corresponds to a systematic problem solving approach similar to the iterative cycle of "Plan, Do, Check, Action", the PDCA cycle conceived by Deming within the principles of Total Quality Management (Beckford J., 1998).

This cycle is nourished by the "wheel of learning" (Handy C., 1989; Senge P. et al., 1994) based on four interlinked stages, which are the "lubricants of Change":

- reflecting (thinking, feeling, evaluating problems, dilemmas, challenges, theories);
- connecting (creating idea and possibilities for action, dis-embedding and re-embedding things and concepts, rearranging them in new forms);
- deciding (settling on a method for action from alternatives and opportunities generated in the connecting stage);
- doing (performing a task with as much of an experimental frame of mind as possible).



The “reflecting stage” of SQM consists of the sustainable development *concepts*, which are continuously updated, integrated to those of governance and quality management, adapting them to several fields of policies, strategies and programmes, especially at European level.

The “connecting stage” is constituted by the *SQM analysis framework* with 32 aspects that can be applied to different contexts. The framework can be regarded as a kind of “language” in which different points of view, priorities and contexts can be expressed.

The “deciding stage” is represented by the *SQM methods* which are designed to support learning processes and to facilitate the involvement of a large variety of actors. The methods concern the appreciation technique itself, the facilitation of workshops, inquiries by questionnaires, the integration of given indicator systems, the development of strategies and programmes, teaching, and the exchange of experiences.

Finally the “doing stage” is present in the *SQM online tools* which combine the above stages and provide efficient support for different users over the Internet.

SQM – Sustainable Quality Management ®		
A modular system for the management of sustainable development processes		
<p>Concepts</p> <ul style="list-style-type: none"> • Sustainable Development as regulative idea and dynamic process ... • Quality Management of development processes, evaluation ... • Subsidiarity as a central concept of governance ... 		
<p>Framework</p> <p>the SQM analysis framework</p> <ul style="list-style-type: none"> • ORIENTATION: 10 Components of Sustainability • SOCIAL POTENTIAL: 16 Regional Key Factors • ACTION DYNAMICS: 6 Basic Transformation Levers 	<p>Methods</p> <ul style="list-style-type: none"> • diagnosis of situations • strategy and programme development • monitoring and evaluation of programmes and projects • SQM-appraisal combining qualitative and quantitative analysis • participative facilitation • synthesis and visualisation • training 	<p>Tools</p> <p>Internet-based online-tools</p> <ul style="list-style-type: none"> • <i>SQM.guide</i>: public guide to funding programmes • <i>SQM.progman</i>: tool for managing funding programmes • <i>SQM.project</i>: versatile expert tool for SQM-related projects • <i>SQM.experience</i>: experience exchange

The Local Context Analysis of the Casentino Valley (INNESTO project) led to the central working hypothesis: the elaboration of a “Sustainable accessibility plan” as an integrated plan to increase accessibility of the Valley inhabitants to goods, services, people and places, without compromising the territorial integrity (social, environmental, economic).

Nearly 30 local projects were analysed considering their impacts both on territorial systems and logistics. Nearly 200 indicators were quantified and estimates were produced when appropriate data were not available. They relate to all the 32 aspects that constitute the SDL approach: Orientation (10), Social Potential (16) and Dynamics (6).

The central working hypothesis is correlated by six hypotheses where the levers of Dynamics act on the key factors of Social Potential to determine paths orientated towards SDL.

- To create a permanent structure for the study of sustainable logistics where local professionals interact with local and regional bodies to create a Plan for Sustainable Accessibility in Casentino. This structure will have the responsibility to coordinate the following hypotheses.
- To create a roundtable on logistics issues, with the involvement of a large variety of stakeholders for planning logistics fluxes, integrating accessibility issues into Local Agenda 21.
- To organise a long term system for monitoring and evaluating to assist logistics stakeholders (governments, businesses, civil society and citizens) to improve their activities in terms of economic, social and environmental diversification and to facilitate the participation of logistics stakeholders in integrated decision making (e.g. co-ordinated planning).
- To create a group of local facilitators for “win-win” solutions, participation of local stakeholders, elaboration of locally-adapted methodology
- To create of a “centre of resources”, integrated with Local Agenda 21 structures, in which knowledge, know-how and skills in sustainable logistics are developed year by year also through specific courses, seminars and workshops.
- To include quality management issues and sustainable development principles in all training courses and e-learning tools for producers (employers and employees) and consumers (generic public, job-seekers and unemployed, families, pupils) in order to increase awareness of sustainable logistics as a means for favouring social cohesion and development in depressed areas over the next 15 years.

Part two DISTRICT

THE PROBLEMATIC RELATIONSHIP BETWEEN LOGISTICS AND SYSTEMS

Logistics is a fundamental aspect of the quality process that regards both individual companies and aggregations of industries at different spatial levels and dimensions, from industrial districts, territorial productive systems and so on. Logistics is the catalyst of their combination, relationships and life. This specific role derives from the nature of a system.

Many definitions have been given to system during the human history, but the currently more comprehensive and innovative definition is that (Morin E., 1977): a system can be conceived as the globally organised unity of interrelationships between elements, actions or individuals.

This definition changes the way of thinking and seeing the system: from its components to its interrelationships. The quality of a systems depends upon the quality of its internal and external links and is determined by its dynamics as a recursive combination of parts that are at the same time parts of a shared system and individual systems. The system co-evolves and self-organises itself at the extent that the relationships allow a common life. As Pascal said: the part is in the whole and the whole is in the part.

Parts are nested in the system as a successive whole: a whole that is also part of a more encompassing whole, as Wilber K. (1995) defined this process following the work of Koestler A. (1967), who firstly introduced the idea of *holon*.

The human rational and linear way of thinking is faced to other types of vital orders: e.g. the hierarchical organisations (top-down functional delivery of decisions) versus the holonic organisations (*holarchies*). The term holarchy is, in fact, used as an antonym of hierarchy and to avoid the organisational value and behaviour based on a vertical "top - down" line of command and control. Holarchy allow large and complex systems to be self-governed and to co-evolve in efficient ways being resilient and adaptable. Each-system (or holon) is both a nest for and is nested within another system (Kiuchi T. and Shireman B., 2002).

Businesses can be examples of nesting or overlapping systems (or holons). In a holonic company, there is an intensive network among the members (each of them as a whole), the company (the member as a part and the business as a whole), other companies (each of them as a whole), and the larger social community (the business as a part, the community as a whole).

There are seven characteristics that make a system a holonic network (McHugh P., Merli G. and Wheeler W. A., 1995). A holonic network is not organised hierarchically; each holon has the characteristics of the entire network; the network is in dynamic equilibrium; it is self-regulating; access to exchange of information is open throughout the network; access to and exchange of information across the network boundaries is open; the network is evolutionary and interacts with its environment; is a knowledge network based on self-learning processes.

The network (as a whole) can be understood as a complex loop between different webs (each of them as a part) that continuously evolve. This network does not imply one-way causation, but multiple and multidirectional trajectories. A change in any part affects other parts; together the parts determine the dynamics of the network; changes within the network determine the dynamics of each web. And so on, given that each part of the network, creates its own web with other parts in other networks...

The complexity of networks is clearly evident in the logistics domain where companies form collaborative mechanisms with suppliers, buyers, other producers (competitors and allies) and consumers. The dynamics of internationalisation and globalisation are increasing in logistics together with trading between the different regions of the Planet. Considering recent literature and research, Lemoine W. and Dagnaes L. (2002) underline that “Mergers of companies, joint ventures, collaborative loose agreements and short or long-term alliances between firms characterised the business world of today”. According to the above-mentioned experts, a series of factors drive towards internationalisation and globalisation, e.g.:

- businesses are moving from an industrial economy to the network based and digital economy (the advance of information and communication technology) utilising, for instance, electronic commerce;
- economic world has shifted from being a cluster of national economies to being more linked in an interdependent network of marketplaces that overcome the limits of geographical boundaries;
- multinational corporations influence the global economy, from financial to production and consumption phases, both directly or indirectly (through networks and associations);
- a series of small and medium sized enterprises are actually under control and domination of large corporations (e.g. subcontracting, market areas, financial and technological dependency)
- a series of small and medium sized enterprises create their own networking relationships with large and / or other small and medium sized enterprises to cope with market niches and financial ventures;
- the organisation of transport and logistics activities is one of the most advanced sector in the above-mentioned trends, becoming more global and networked, concentrated and outsourced through mergers, strategic alliances, joint ventures, acquisitions and partnerships.

Considering the European situation in the last 5 – 10 years, supply chain trends show (Ernst&Young, 2003) the following trends:

- centralisation of structures that lead to cost saving;
- shorter product life cycles determined by the need of launching new products and using new technologies in order to gain market segments;
- outsourcing of warehousing and transport operations to logistics service providers, since many companies recognised those activities as not part of their core business;
- outsourcing to multiple logistics service providers determining acquisition of several other companies and consolidation to improve supply chain network at a European scale;
- specific operations (e.g. product assembly) taking place as close as possible to country or customer needs and features in order to qualify labelling, to have a favourable market appeal, to demonstrate a close attention to the client centrality (e.g. some smaller manufacturing activities have to be planned and executed in a decentralised manner before final delivery takes place).

According to Lemoine and Dagnaes (2002) more research is needed to answer the following questions:

- “how firms with different cultural backgrounds could establish a successfully collaborative arrangement?”
- “what were – and are – the sources of power and conflict between the firms?”
- “how do all the firms within the network re-engineered their management models and operation standards?”
- “can the network manage a truly global business strategy?”

With 25 countries, the EU population now moves from 370 million people to nearly 450 (+20%) and has increased 25% in a territorial area. Distances are longer but markets are more connected. In the next years, the EU enlargement will affect logistics networks considerably, in particular (Angerer A., Cortsen D., Straube F. and Tufinkgi P., 2003; Ernst&Young, 2003):

- the localisation of the most influent distribution centres from the Netherlands (nowadays nearly 60% of them are concentrated in this country) to three regional areas that will play a more important role than before - Baltic sea, Mediterranean sea and cross-boarder areas;
- Belgium, Germany and the Netherlands (see for instance the “Betuwelijn” rail project) should become ideal paces to locate distribution centres, followed by Bulgaria, Czech Republic, Denmark, France Hungary, Luxembourg, Poland and the United Kingdom;
- Austria loosing role and investment attractiveness;
- Latvia and Finland as a starting point for export to the Russian market and for relationships with Asia Pacific;
- extra infrastructure investments in road, rail and inland waterway networks;
- a rise in multi-modal transport infrastructures;
- the increase in road traffic congestions and costs.

The North Brabant case study within the INNESTO project analysed the current situation and the future perspectives of the North Brabant Province logistics systems in an international contexts, focusing on the decrease in the role played by the provincial territory. The expected changes regard the main goods flows that, except for road transport, do not enter the Province (e.g. the “Betuwelijn” rail project that passes just North of the Province).

A series of innovative actions were identified (through the Local Context Analysis and the District Logistics Analysis) and debated with the involvement of key local stakeholders (in the Local Scenario Workshop). These actions (e.g. moving freight transport from road to waterways and rail, utilising a neglected railway corridor, coordinating transport flows of a large number of transport companies and optimising the utilisation of load capacity per trip) form a main working hypothesis: to develop a virtual network (called “Virtual Transport Company” – VTC) capable of increasing transport efficiency and creating an added value based also on the decrease of environmental and social costs.

As Power T. and Jerjian G. (2001) affirm, "no business is an island. You cannot manage a business, let alone a networked business, on its own. You must manage the ecosystem, in which your business inhabits.... Businesses can no longer work in a singular, linear way. Once you have learned a new language, it is impossible to unlearn it. The new language is ... about working in a holistic and organic way".

Human beings must understand and follow the natural rules and dynamics of ecosystems if they are to evolve as social, cultural and economic systems through dense exchanges supported by logistics.

As a result, the current debates on ecosystems, territorial socio-economic systems and knowledge systems influence the quality of governance and management in the following leading questions:

- How to favour *openness* to all the internal components of a territorial system, as well as to the external collaboration with other systems (spatial dimensions)?
- How to ensure *intensity* of interrelationships, that includes the willingness of collaboration from the part of the public (government), private (business) and social (voluntary) sectors in the wide range of economic, social, cultural and environmental issues (development dimensions)?
- How to promote *solidarity* within and between different systems, which regards the networks of trust as the foundation basis of these systems (e.g. the intra-groups solidarity can become closeness to inter-groups solidarity, reducing the opportunities and the capacity to co-operate with the "others")?
- How to insure *stability* of procedures that allow people and groups to share a mutual trust and respect, looking at the present and future generations (time dimensions)?

CHAPTER 3: DISTRICTS IN THE ECONOMIC THEORIES

The relationship between the globalisation of the economy and local economic development is at the centre of the ongoing debate on the importance of the territorial characteristics of small enterprise spatial systems in the global competition (Amin A. and Thrift N. 1994).

While the competitiveness of a particular system can be measured using a global scale (e.g. capacity to innovate and business efficiency), the importance of the local relations and the socio-economic relationship within different realities is difficult to evaluate. The market cannot define a single model for business management and social regulations, but simply allows for an analysis of business efficiency. Development, on the other hand must include socio-economic elements that have, by definition, a local nature.

The processes of economic cooperation - competition are based on the integration of different elements, rather than the homologation of similar elements.

According to Porter M. (1991), the diversity of productive models, situations and cultures has been recognised as the basis of new competitive advantages.

Business and business products become instruments with which a specific reality can be compared with the global economy, as described by Cavalieri A. and Grassi M. (1997).

A central role is played by the interdependence of the single actors that make up the local economic system, within the global economic process.

Socio-economic research demonstrates that present economic development requires an institutional structure that is oriented towards the local level. As such, institutional characteristics (diversity and number of institutions, the distribution of responsibilities and power, institutional relationships, and so on) can act as a driving force or a hindering element in local economic development.

Theories on endogenous development

The principal elements with which the territorial characteristics modify the local economic competitiveness are related to (Bramanti A. and Maggioni M. A., 1996):

- the economy of agglomeration;

- lower transaction costs of internal and external exchanges through the process of identification and cooperation between social actors;
- local governance methods directed at specific territorial realities;
- activation of potential resources through the social mobilisation related to the sense of belonging;
- innovation supported by a cumulative not-formalised knowledge acquisition, creation of activities that are directed at improving quality of life for the local population.

These elements constitute the basis of an approach to endogenous development that considers the spatial diversity of socio-economic features as a strong point of reference.

In this approach, particular attention is focused on the interaction between economic actors, the society and the institutions and the identification, mobilisation and combination of potential resources.

The numerous works that highlight the role of the local territory as a fundamental element in the economic system also support the theory of endogenous development. In particular the definition of Marshallian industrial districts (Becattini G., 1991), the neo-Proudhonian theory of flexible specialisation (Piore M. J. and Sabel C. F., 1984), the theory of milieu innovateurs (Aydalot P., 1986), the Coase -Williamson approach to transaction costs and the technological poles approach (Storper M. and Scott A. J., 1992).

While the spatial differentiation of productive systems has been studied for a number of years, creating a large literature base, there is no exhaustive taxonomy of local systems (Becattini G., 1989, Brusco S., 1989; Pyke F. Becattini G., Sengenberger W., 1990; Garofoli G. and Mazzoni R., 1994).

The debate has centred around the diffuse phenomena of agglomeration of small businesses. These phenomena have been described in a number of ways. These descriptions have a large range, but can be grouped into three categories: *System areas*; *Industrial districts*; *Milieux innovateurs*.

System areas have been defined as an area of specialised production where a closely tied interdependence between small businesses is formed around a dominant sector (Garofoli G., 1981, 1983).

Within this productive area, an interwoven relationship is formed that includes businesses, unions and local government. The face to face relationship between operators creates an informal information system that facilitates the diffusion of professional, technological and business knowledge. This definition is the historical approach to business agglomerations, which highlights the systematic nature of production and organisation, and the role of territory and socio-environment in the economy.

Marshallian industrial districts have been defined as a social territorial entity characterised by the active co-presence, in a territorially circumscribed, naturally and historically determined area, of a persons' community and industrial enterprises population that tend to mutually interpenetrate (Becattini G., 1979, 1987).

These create an agglomeration of small businesses specialised in products, product parts and micro-processes that result in

- A network of interpersonal relationships and a common culture of workers, businessmen and politicians
- An industrial atmosphere that facilitates the transmission of knowledge and information as well as the diffusion of innovation.

The district, with its specific socio-productive organisation is characterised by a powerful generator of internal-external economies. The individual specialisation generates non-competitive relationships and allows smaller businesses to access to higher technologies. The businesses reach an optimal dimension based on the economic of scale and specialisation.

In fact the “industrial atmosphere” favours the development of a creative approach that increase the mutual trust between local operators.

Social culture conforms to the needs of the dominant industry while the market is a mix of competition and cooperation (Dei Ottati G., 1987, 1995) and made transparent by the practising of face to face relationships which reduce transaction costs and give rise to a specific diffused innovation capability (Bellandi M., 1989).

In this way, information becomes a social product and the connective tissue which holds together the district. Informal relationships make the exchange of experiences more advantageous and increase the relation of the business activity to the territory.

The accumulation of local non-formalised knowledge is therefore related to the social nature of the relations created (Becattini G. and Rullani E., 1993). The regulation mechanism of the social interests is then tied to the cooperation and competition that characterises the district and the relation between the interested businesses.

The local political institutions, formed with the patrimony of the collective identity and diffuse political culture, contribute to activate the processes of the so-called “social construction of the market” and the mechanism of local regulation of social conflicts (Bagnasco A., 1988; Trigilia C., 1986).

This translates into a continuous flux of internal-external economies, outside the single enterprise but internal to the local production system, leading to differential advantages in the sense of reduced costs for the businesses located in the district.

One of the principal peculiarities of this theoretical construction is related to the idea that the roots of the business earnings are located in the indistinct humus of the socio-cultural and institutional situation.

These elements characterised a district based analysis of the 1970s in which the identity of the strategic endogenous resources (in particular, the human capital) was seen as basic to competitiveness.

The 1980s research was directed towards the analysis of the rapid process of globalisation on the relationships between businesses within a particular industrial district and international competition. “Openness” became a key aspect of the analysis of the external relations of businesses.

In the 1990s, studies were dedicated to the evolution of the small enterprise spatial systems and the need to consider the bi-dimensionality of local/global and external openness / internal identity. This brought the idea of the diversity of local industrial organisation, historical and dynamic evolution.

The term milieux innovateurs was derived from the phenomena of territorial development from innovative processes and from the synergy that occurs in specialised territorial areas, which are characterised by agglomeration of small businesses.

The *milieu* concept was based on the importance of the socio-cultural environment, which determines the capacity to generate innovation.

This translates into a network of territorial relations that favour a dynamic process of collective learning.

The milieu is therefore considered a specific operator that acts to reduce uncertainty by acting in a collective and social manner in the collection, evaluation and response to complex messages.

The closeness between actors creates a local synergy related to:

- Local resources of human and material capital, which may be immobile to the external territory while highly mobile within the local milieu, thereby determining a continuous process of local learning which can be reinforced by a polarisation and attraction of external businesses (e.g. Silicon Valley)
- A network of informal contracts between actors that create a “Marshallian industrial atmosphere” based on face to face contacts, information exchange and client-supplier cooperation.
- The presence of synergistic effects derived from common cultural roots.

The milieu innovateur becomes the relational space that guides the innovation agents, allowing them to coordinate with other innovative agents.

The correct balance between internal synergy and external energies creates a positive self reinforcing feedback and guarantees the reproductive capacity of the system.

The theoretical elaboration, supported by a number of empirical analysis, is articulated in various phases.

Initially the attention was focused on the relation between the businesses and the socio-economic context, followed by the study of how the innovation process can reinforce or restructure the territorial texture and finally on the networks with productive systems not necessarily territorialised.

The most recent developments are directed towards the dynamics of development of the milieux innovateurs, of their territorial trajectory and of the emergence of their coordination and governance.

Territorial productive systems and dynamic competition

In the post fordist context, the territorial system of small businesses began to show some difficulties in both the productive as well as the social sectors. The traditional external economic driving forces were losing efficiency with respect to the international processes related to the economy and technological innovation (Bianchi G., 1994; Garofoli G. and Mazzoni R., 1994).

A major part of the discussion on local development in the 1990s was directed towards the problems related to evolution, thereby moving the attention from the efficiency of the individual businesses or business groups to the overall efficiency of the territorial productive system (Camagni R., 1989; Brabamanti A. and Odifreddi D., 1994).

One part of the literature underlined how the crisis in the districts determined the passage from a model of regulation based on informal and spontaneous elements to a model based on the construction of a formal and institutional network between social actors (Florida A, Parri L., Quaglia F., 1994; Streeck W. and Schmitter P. C., 1985).

This transformation affects both the market as well as the reciprocity:

- The market is affected by the growing importance of control strategies together with the new entrepreneurial functions (R&D, training, marketing, information technologies, etc.) that the local businesses do not seem able to furnish individually, in relation to the changing conditions of the external competition.
- The reciprocity is affected by the changes in the traditional community mechanisms and the weakening of the collective identity, causing political exchanges to have a more formal and institutional character. This leads to a new form of inter-organisational exchange, with the construction of a more formal network of relationships and the reduction of the competition-cooperation dichotomy through alliances, consortia, contractual and business agreements, joint ventures, commonly used centres of services, etc.

Another area of study, based on the analysis of the organisational-functional paradigm, underlined the emergence of hierarchical elements in the territorial system of small businesses and elements of cooperation in the large businesses (Bianchi G. and Compagnino A., 1997) that seemed to induce a convergence of the two spatial models of production towards a single model defined in terms of a business network (Hakanson H., 1991; Camagni R., 1991; Belussi F. 1992).

This gave way to the embedded business (Grabher G., 1993) in a local system of untraded interdependences (Storper M., 1994).

The large businesses assumed several of the characteristics of the organisational model of industrial districts (operative flexibility, diffuse incremental innovation) and began to organise on a network base.

The traditional subordination of relationships between large businesses and their supplying small industries began to have a cooperative relationship. The restrictions brought on by the “time to market” and quality goals of the larger industry led to their investment into the organisation and technological qualification of the subcontractors. In the most advanced cases, the large businesses entered into collaboration networks and productive exchange based on the individual capacity and autonomy of innovation in the specific areas.

The most advanced of these territorial systems of small businesses also evolved towards a network construction where a business leader was inserted and where relationships went beyond territorial limits of a singular local system. Market trade forces, while being used to maintain efficiency, were regulated by relationships both hierarchically organised (leading companies) and more interactive (joint venture, partnership) (Cavaliere A. and Grassi M., 1997; Grassi M., 2001).

Competition between different business dimensions became less defined.

The dimension problem was no longer connected to the volume of production and competitive costs, but to create an organisational and cultural level that allows the business to operate in the new context of competition and cooperation (networks) not in a subordinate way. For smaller businesses, it became a problem of the relational culture and the possibility to have adequate resources to sustain such a process.

The emphasis on territorial systems of small businesses was reduced while the denomination of local productive systems (Garofoli G. and Maggioni R., 1994) and localised development models (Bramanti A. and Maggioni R., 1997) are expanded.

The business network approach (networks of businesses or networked companies) offers a reference point to understand the evolution of the *territorial productive system* to indicate the multiplicity of spatial organisational forms which can play a positive role in relation to synergy and proximity (Bramanti A. and Maggioni R., 1997) (marshallian districts, technological poles, system areas, small enterprise territorial systems, milieux innovateurs, etc.).

The spatial dimension becomes a fundamental component of the productive process in the socio-economic systems. A complex growth process is born out of the interaction of a number of localised economic behaviours of the singular actors in a “territory” understood as:

- a site for technological innovation,
- a site for the coordination of industrial activities,
- unity in the political decision making that is related to the structure of the relationship between actors (Storper M. and Harrison B., 1991),
- nexus of untraded interdependencies through which the actors can coordinate themselves and improve their technological and organisational knowledge.

This system becomes then a relational space able to activate or retard stimulus, diffusive modalities and change dynamics, in all their variations.

Other studies also contribute to this analysis, and that related to the evolution of complex business systems and the nature of businesses as specific knowledge (Rullani E., 1985; Becattini G. and Rullani E., 1993; Anastasia B. and Corò G., 1996; Grandinetti R. and Rullani E., 1996).

These studies emphasise that the knowledge contained in the local system is no longer sufficient to understand the dynamics outside the local district.

The increase in the division of cognitive work on the global scale make is necessary to acquire knowledge from the global network and integrate it with knowledge obtained in the local context.

Technological innovation and the globalisation process call for the district to transform itself, while using the territorial characteristics as a support element for local businesses.

As such, there is a need for a continuous renovation and enrichment based on an external flow of knowledge. The territory then becomes the protagonist of change as a versatile integrator able to adapt the local knowledge and facilitating the sharing of general knowledge through the interaction between actors.

The Danish case study within the INNESTO project analysed the District Logistics related to a furniture manufacture region in the Viborg County. In this context, and with a growing competition with furniture producers in other European countries, a potential gate to develop and implement environmental strategies was identified as a network among SME's and their transport operators. This is based on the observation that logistics is often an issue organised in an inter-firm network, rather than within a single firm.

District Logistics

The vitality of the different system typologies (e.g. districts, system areas, milieux innovateur) faces the growing processes of globalisation, internationalisation, concentration and re-location of activities in territorial contexts with low labour and production costs, taxation, environmental and social rules.

A question arises from these tendencies: can a “district logistics” exist? (it can be also questions as whether it is possible for a “company logistics” to exist ?)

The answer depends upon the context, as a large variety of local conditions exist within and between local districts.

The *Sustainable District Logistics (SDL)* approach was utilised within the INNESTO project with different purposes and in a flexible manner according to the specific characteristics and issues of five selected local areas.

Five main working hypotheses emerged through the involvement of the concerned local stakeholders:

- A sustainable accessibility plan for the Casentino Valley (the case study in Italy).
- Virtual networks to increase transport efficiency in the region of Brabant (the case study in the Netherlands).
- Cross-border inter-modal cooperation between public and private actors in the region of Trier (the case study in Germany).
- Global and local logistics among small and medium sized enterprises in the Viborg County (the case study in Denmark).
- Renewable energy and logistics in the region of Vega de Guadalquivir (the case study in Spain).

Moreover, as in all development dynamics, globalisation cannot exist without localisation as well as vice versa.

Given that systems are nested in each other and that the global dimension cannot be separated from the local dimension and vice versa, the question can be formulated in another way: what kind of development we would like to create, considering the impacts of infrastructures, logistics and transport services on the quality of life of the concerned communities?

Looking at the economic fabric of a given local context, the above-question can be articulated by asking:

- if small and medium sized enterprises are capable to share services that improve business efficiency while reducing logistics costs;
- if local authorities and community systems are capable of organising infrastructures, logistics and transport services that reduce environmental and social costs addressing, for instance, the transport modal split towards environmentally-friendly means.

A recent study, concerning the well-known textile district of Prato – Italy (Caloffi A., Capineri C., Lattarulo P., 2004), provides interesting results revealing:

- an increased networking capacity of one district with other districts and firms;
- more formalised connections based on quality management and certifications;

- more attention on production planning, markets of high quality products and technological innovation;
- an increasing presence of logistics operators and managers that act as “vertical integrators” outside a single firm and without a strong influence exerted by a district’s main enterprise;
- strengthening of networks towards “group logistics” and “district logistics platform”, which create logistics scale economies and foster innovation and technologies in small-business systems.

The research underlined that:

- it is difficult to arrive at a shared and united logistics system in a short time
- but, by linking together scale economies and flexibility, the small-enterprise systems will be able to improve the logistics system in order to become more competitive in a long term perspective.

Of course, this example cannot be taken as the overall trend around the world, but it demonstrate that in order to cope with the disruptive impacts of a logistics dominated by big companies and operators, room can exist for developing alternative paths. These are paths that can be created only by looking at the multidimensional aspects of logistics as a means and not an ends of local development.

Common features

As a general consideration, the core of the above-mentioned system typologies is a combination of diversities and networks:

- diversities in the spatial dimensions of socio-economic development, productive models, situations and cultures
- networks in the entrepreneurial and social fabrics, formally structured and nurtured by informal and face-to-face contacts between the actors, by mouth-to-mouth communication, by fluid information exchange, by interwoven client-supplier co-operation, by polarisation and attraction of external businesses, and so on.

Their complex characteristics can be aggregated in key factors that influence the reproductive capacity of the local systems. They act as:

- areas where a network of interpersonal relationships, a common culture, the sense of belonging, the mutual trust between local operators nourish a collective identity without immobilising the structure and behaviour of social cohesion (e.g. social animation, inclusion, employment initiatives);

- cognitive circuits that combine global and local dimensions and reduce the difficulties connected to globalisation through the recovery of the local dimension as the primary basis to rely on the endogenous potential resources; the close interdependence between the local actors creates an internal synergy that is reinforced by their openness to the external energies of the global economic processes (e.g. through common territorial marketing plans, locally based investments, exchange of good practices with other local contexts)
- collective and social structures that allow local actors to improve their capacity to cope with complexity, reducing uncertainty in evaluating and managing local / global interdependencies (e.g. through common medium and long term projects)
- areas where common cultural roots, the indistinct humus of the social and institutional situations are at the basis of the local mobilisation that activates the potential resources to improve the quality of life for the local population; a continuous flux of economies, outside the single business but internal to the local production system, leads the entrepreneurial creativity and innovation; this flux depends on the typology of the local economic fabric (number of businesses and their life expectancy, sizes, sectors) and on their openness to different levels of knowledge (through common projects and plans);
- connective tissues where the access to information and dialogue is a social product to hold together the local actors, communities and institutions (e.g. procedures, campaigns and projects for awareness raising);
- areas where the interaction between economic actors, the society and the institutions is based both on informal relationships and regulation mechanisms of the social interests through a fractal distribution of responsibilities and competence (e.g. diversity of institutional characteristics in number of structures, distribution of responsibilities and power, relationships);
- areas where the local political institutions are expression of a collective identity, manifesting the different economic and social interests through a facilitating structure for autonomy and collaboration into the decision-making (e.g. participation at public budget allocation and shared responsibilities in public spending)

CHAPTER 4: ECOSYSTEMS

Ecosystem, a term to describe the relation between the biotic and abiotic components of the natural systems arose in the last century from the need to organise different spatial and temporal scales in an integrated manner.

The concept of ecosystems as complex systems, in which evolution and trends can not be explained by the reductionist view of the sum of the individual parts has particular importance in the relation of man's actions within the environment.

The nonlinear nature of natural systems was brought to the forefront of scientific thought in the second half of the last century when it was seen that the environment was not predictable or describable in its response to environmental stress.

In particular, there was a failure of the post industrial economic paradigms in relation to natural ecosystem functions and the maintenance of a natural resource base, which is the foundation for economic systems. It therefore became a priority to define ecosystems, and to identify the autonomous self-integrative dynamic processes of nature.

The term "ecosystem" was first defined (Tansley A., 1935) for the organising unit of biotic and abiotic elements that can be considered a functional system.

This system progresses towards an equilibrium, which is never completely attained, but to which an approximation is made whenever the factors at work are constant and stable for a long enough period of time.

As in the case of all levels of biological systems, ecosystems are open systems, which exchange energy and matter with the surroundings. An open system is one that has one or more inflows and outflows of either matter or energy. One example is the biosphere, where solar energy and cosmic matter flow in and infrared radiation flows out.

Ecosystems are nested systems, in that they are located within other systems and contain systems that are entirely or partially contained within their boundaries.

A nested system contains an arrangement of graded series of components. In such systems, levels are arranged from largest to smallest, but the order could be reversed if one wished to start with the lowest level of resolution.

Generally, the term ecosystem was traditionally considered the level that contains the biotic community and the abiotic environment in which this community has developed.

The community, in turn is considered the collection of individual populations that share the same resource or spatial base.

Groups of ecosystems that share common geographical area, and therefore some material or energy fluxes are considered landscapes, which are then part of larger regional units called biomes or biographical regions.

The biosphere is considered all the earth's ecological systems functioning together on a global scale. All of the levels of the ecosystem involve life and biological processes that are in constant exchange with each other, making any clear definition of system boundaries rather difficult.

In a nested system, each level influences the processes and functioning of the adjacent levels. Processes at lower levels are constrained by those at higher levels. On the other hand processes at lower levels can influence the functioning of processes at a higher level, although less directly.

In general, the slower, long term interactions that characterise higher levels tend to move towards the direction of an eventual "steady" state, demonstrating a higher stability that is considered a system constraint.

An important consequence of this systems approach is that, as components are combined to delineate larger functional parts, new properties emerge that were not evident at the lower level.

This new property, which results from the functional interaction of the components, is considered an "emergent" property. An emergent property cannot be predicted from the study of the individual components decoupled from the whole (Salt G. W., 1979).

In this manner, the ecosystem is more than the sum of its parts and can not be described only by a detailed study of its units, but requires a holistic approach to determine its functioning. Emergent properties within a nested system are characteristics of evolving complex systems.

Complex systems, due to their non-linear nature, do not yield to easy prediction. It is for this reason that the classical scientific approach of Bacon, Descartes, Newton, Darwin and Comte fails to predict the effects of changes on complex systems.

It is, in fact, the incapacity of classical science to predict change that has caused its demise in the study of natural systems.

Classical approaches to change prediction are limited to efficient causality and transitional events in the context of equilibria (Depew D. J., 1986).

Ecological studies are demonstrating more and more nonequilibrium situations, in which system evolution takes a necessarily irreversible path.

The evolution of a complex system then becomes a matter of important debate, in particular in the light of the development of instruments for management and prediction. The Bacon, Cartesian, Newton, Darwin and Comte worldview of treating all system elements as independent has been eclipsed by an alternative more organic view of causation.

However, the literal application of Aristotelian idea of growth and development according to prior plan is not less controversial.

This latter organicist approach has an important flaw, that a coherent organism (ecosystem) must be identified at some level as a "whole", (see the Gaia theory of Lovelock J. E., 1977).

This approach simply transfers the assumption of independence that is applied to elements of reductionist system to an arbitrary boundary within which the embedded systems are restricted. In other words, the highest level of the system will manage the lower levels to meet its (therefore predictable) purposes.

Ecosystems and the ecological systems in general are evolving systems whose form and functions change in relation to the temporal and spatial variations in the continuous exchange of energy and matter with their environment (Koestler A., 1967).

As energy and matter (and therefore information) pass across levels of the system, the system has to remain open ended (Ulanowicz R. E., 1986).

Causation flows both ways, not only in a top down sense as would result in a organicistic approach.

Self-organisation can be described phenomenologically (Prigogine I. and Stengers I., 1984). In such a manner, ecosystems can be defined as self organising and self regulating systems, imbedded within other systems and which exchange energy and material in both a horizontal and vertical fashion.

This multiscale paradigm does pose a series of new problems, in particular in relation to spatial and temporal boundary definitions.

By avoiding the organicist approach, there remains an infinite number of possible scalar arrangements to choose from.

As the systems are open, system boundaries can be drawn in any number of ways, based on any possible group of criteria.

Therefore the concept of boundary represents only a formal category and makes the definition of scale and perspective a relatively arbitrary decision.

As nature is self organising on many different levels, there are an infinite number of information required to explain its functioning (Norton B. G., 1991).

Obviously, jurisdictional and even natural boundaries will therefore only represent a partially acceptable limit to a system that is in continuous exchange and self organisation.

As any chosen system lies within another scalar level, management and definition directed specifically at that system will fall short of managing the fluxes that are vital to the growth and development of that system.

This is further complicated when one takes a temporal perspective of an ecosystem. Here as well, different scales make difficult any attempt to define the temporal boundaries to the system.

Biological systems are dynamic, changing according to multiple timeframes which must include geological, climatic and ecological cycles.

It is not possible to limit an analysis of an ecosystem to a single time cycle without making the error of not considering smaller biological cycles and the longer trend of the ecosystem within its surroundings.

Ecosystems are therefore self organising complex systems, in that their behaviour can not be determined by a study of their individual parts.

Furthermore the study or management of such systems must consider their nested arrangement in which all processes are related to all other processes, processes are not related equally but unfold in systems within systems which differ on temporal and spatial scales on which they are organised (Norton B. G., 1994).

Furthermore, ecosystems remain sensitive to changes in both the fluxes that are exchanged both vertically and horizontally as well as changes in their surrounding environment.

Numerous examples exist of how human activities have modified indirectly the biotic and abiotic parameters of ecosystems, even to the level of the biosphere itself, i.e. global warming, ozone depletion, and so on.

The rapid acceleration of technological growth within the industrial and post industrial society risks to damage the functioning and evolution of ecological systems on all scalar levels, in varying degrees and with unpredictable results.

Risk and vulnerability are in fact no more limited to individual activity but they potentially spread outside the individual sphere of control, i.e. threatening the survival of humanity or jeopardising large numbers of the population, natural environment, etc. (Giddens A., 1990).

Risk and vulnerability increase because everything is connected: the part is a whole and the whole is a part of another whole, as well as human beings are in a dependent alliance with the other components of nature (Pascal).

These characteristics affirm the necessity and the challenge to use a holistic approach to understand ecosystems as the globally organised unity of interrelationships between human, non-human species and the natural environment.

Ecosystems co-evolve: from the past to the present and to future times.

Human beings should be aware of this connection between actions, elements, space and time dimensions, looking both at the present and the future generations. In other words, also the human beings are nested in ecosystems.

The natural dynamics of complex systems

Nested systems express a dialogical continuity of interrelationships and exchange between the components (e.g. closeness and openness; inflows and outflows dynamics), which characterises the constant and mutual influences between levels and dimensions (larger and smaller, higher and lower).

These natural dynamics can be aggregated into the principles of subsidiarity, networking and participation, which concern all the components of a human-managed system.

Due to the complex life dynamics; also the system boundaries change in the spatial and temporal dimensions. As a result, what qualifies a system is its capacity of self-organisation and co-evolution.

This quality is strongly related to the internal / external relationships of a system and its capacity to utilise them. These relationships are the veins of a system and assure the flows of information, knowledge, matter, energy and so on.

From this point of view, logistics is the functioning of these exchanges.

Therefore, the quality of a territorially determined system depends on the quality of its logistics, since it allows the components to relate to each other.

Vice versa the quality of logistics depends on the human capacity to organise the territorial structures (economic, socio-cultural and environmental).

In the Dutch case study of the INNESTO project, two main hypotheses of innovative actions emerged from the Local Context Area of the Northern Brabant province:

- The development of a (ICT-based) virtual network between independent transport companies, including intermodal node service providers
- The renewal of education and employment policies to impede the abandonment of Province by young people.

The two hypotheses are connected each other.

In fact the expected results of the first hypothesis are:

- reduction of number of trips, which will result in reduction of traffic noise, emission of pollutants, congestion, traffic casualties and demands for additional (road) infra-structure;
- reduction of (transport) costs because of higher utilization of the loading capacity of the transport unit;
- further utilization of the central geographical position of the North Brabant area;
- further strengthening of the competitive position in (sustainable, multimodal and intermodal) transport solutions with respect to the new members of the EU (Latvia, Estonia, Lithuania, Poland, etc.).

The expected results of the second hypothesis are:

- attraction of more businesses providing new opportunities for young people;
- attraction of high-educated young people by stimulating the settlement of companies with “cutting edge technology” also in the transport sector;
- the extended use of public transport by young people;
- new sources of employment for young people in social services for ageing persons and families, as well to people at risk of social exclusion (e.g. immigrants, disabled, ethnic minority groups, etc.);
- reduction of the growing individualization and social isolation that affect the inhabitants of Northern Brabant;
- a long-term plan for sustainable development of the agriculture sector in order to face the problem of succession between ageing and new generations.

Some key factors influence the human capacity to deal with the system complexity:

- the openness of the interrelationships between the components, present and future; this factor determines the outflows dynamics and is based on the capacity to enrich the local knowledge and culture in order to create a cohesive multicultural environment (e.g. exchange programmes with other local systems, integration of external components into the own system through project of labour and social insertion)

- the closeness of the interrelationships between the components, present and future; this factor determines the inflows dynamics and is based on the discovery and re-encoding of the local specificities and knowledge in order to support the primary reliance on the endogenous resources (e.g. projects on local diversity recovery, on economic and social diversification, number of endogenous companies)
- the ability to reach optimal levels of attainment and fulfilment of the life within the territorial system and for its individual components; this factor, which is influenced by the dialogical capacity of being simultaneously open and closed, determines the synergy of a system as more than the mere sum of its components; in order to create this incremental result there is need for an integrated knowledge improvement, looking at the systems as a whole of different “wholes” (e.g. training and university courses, dissemination programmes of holistic approaches)
- the existence of opportunity and room for fair interactions between the components of the system; this factor enhances the system synergy through interactions aimed at guarantying the rights to be parts of the “big whole”; it is the “system citizenship” determined by appropriate system structures and services (e.g. for equal opportunities, for human and not-only-human civil rights)
- the integration of top-down and bottom-up approaches in decision-making, which depends on the elasticity (the resilience) of the fractal distribution of responsibilities and competences (e.g. diversity of institutional characteristics in number of structures, distribution of responsibilities and power, relationships); the word fractal was coined by Mandelbrot in 1975 (Gleick J., 1998) from the Latin *fractus* which describes broken and irregular forms; they are everywhere and, recognised in the business, political and administrative spheres, allow the human beings to determine the scope of the system interrelationships (level and dimension of the decisions) and the system synergy, which is supported by informal attitudes (behaviour) and formal rules (procedures) of decision-making
- the existence of facilitating structures for autonomy and collaboration into the decision-making (e.g. the shared participation and responsibilities in public budget and spending); this factor, which is closely connected to the previous one, allows the components to nourish a collective identity of the system (the part as expression of the whole, the whole as expression of the parts)

CHAPTER 5: KNOWLEDGE SYSTEMS

Knowledge and thinking are interlinked by the human system of life and converge into the decision making process.

For instance, analysing the furniture industry of Salling, Hansen et al. (2002) discovered how complex development processes influence the capability to co-ordinate and organise the material flow (logistics) in an efficient way. "This efficiency is dependent on the knowledge (...), which the local transport firms accumulate over time via long standing relationships to specific furniture firms (...) a kind of untraded interdependencies (...). Thereby the knowledge from each involved firm is being transformed to a common competence, which generates a collective efficiency in the organisation of input and output flows (...). This common competence is (...) not easy to describe explicitly, since its character is often embedded in the ongoing social interactions between individuals and organisations."

The District Logistics Analysis carried out within the Danish INNESTO project did not only confirm the existence of a localised specialisation in furniture production, but also identified a highly localised specialisation within furniture transportation in Salling and the surrounding County of Viborg.

This specialisation in furniture transportation is reflected in the way in that furniture-producing firms located in Salling and the surrounding county of Viborg use locally based freight haulage firms. However, furniture producers in other parts of Denmark also do, to a large extent, use freight haulage and forwarding firms located in Salling and Viborg County.

These results from the questionnaire and interviews indicated that a number of transportation firms in Salling and the County of Viborg seem to have benefited from the geographical clustering of furniture production in terms of developing a nation-wide reputation of being skilled and competent in handling and organising transportation and logistics of furniture.

In relation to the furniture producing firms localised in Viborg County, the use of primarily local transport firms indicates a highly localised governance structure of the *intraregional distribution* and *interregional output* of the total transport chain of the furniture industry in Salling as a whole.

This localised capability seems to be embedded in the inter-organisational relations between the local furniture producers and transport firms that have evolved since the growth of the furniture production from the mid-1970s onwards.

According to Polanyi M. (1958; 1967), most of what we know is tacit knowledge individually managed and blended in a socially conveyed process.

The tacit knowledge has a subsidiarity role that assists the capacity to learn through formally explicit processes.

In other words, knowledge is an informal ability of the mind to integrate several dimensions of thinking, which cannot be replaced by formal operations, but only improved or blocked by them.

Knowledge is incorporated in the systems (as well as are the flows information, energy, materials, etc.) and it is based on the integration between a huge variety of interrelationships, such as those regarding: individuals, organisations and society; past, present and future times; local, interlocal and global spaces; technical and social skills; specialist and generalist disciplines.

Knowledge is an open collective process determined by and determining several dimensions of a system, being they spatially, temporally, socially, economically and environmentally determined.

Several times science has tried to separate the sphere of “knowing and thinking” in specialised areas, and several times the human beings have had the necessity to turn specialists into generalists. Some examples demonstrate how these dynamics arrived at our time.

In the XIII century, the philosopher Raimondo Lullo tried to elaborate fundamental concepts to acquire a universal knowledge through logic combination of thinking.

Four centuries later, Leibniz (1666) attempted to create a methodology to give a universal quality to acquired truths (*ars demonstrandi*) and to discover new truths (*ars inveniendi*) through the combination and permutation of several definitions.

The Leibniz's *ars combinatoria* is based on two conditions:

- the decomposition of complex ideas in simple ideas;
- the composition of a universally recognised scientific language that adopts symbols able to correlate each other as the ways of thinking (the alphabet of the human thinking).

This combination follows rules similar to those of mathematics and the artificially determined symbols reflect the structure of the real world.

Decomposition of notions and their composition through a symbolic system allow the human mind to understand the flow of events according to a systemic way of thinking.

At that time, Pascal B. (1670) introduced a series of reflections on holistic thinking and on the relationships between humanity and nature:

- "Since everything, then, is cause and effect, dependent and supporting, mediate and immediate, and all is held together by a natural though imperceptible chain which binds together things most distant and most different, I hold it equally impossible to know the parts without knowing the whole and to know the whole without knowing the parts in detail."

- "If man made himself the first object of study, he would see how incapable he is of going further. How can a part know the whole? But he may perhaps aspire to know at least the parts to which he bears some proportion. But the parts of the world are all so related and linked to one another that I believe it impossible to know one without the other and without the whole."
- "Man, for instance, is related to all he knows. He needs a place wherein to abide, time through which to live, motion in order to live, elements to compose him, warmth and food to nourish him, air to breathe. He sees light; he feels bodies; in short, he is in a dependent alliance with everything. To know man, then, it is necessary to know how it happens that he needs air to live, and, to know the air, we must know how it is thus related to the life of man, etc. Flame cannot exist without air; therefore, to understand the one, we must understand the other."

The challenge to combine sciences and to determine an inter-disciplines unity is still alive and growing in importance. It can be discovered, for instance, under the term of "consilience" introduced by Whewell W. in his 1840 "The Philosophy of the Inductive Sciences".

Consilience means the creation of a common groundwork of explanation, a jumping together of knowledge across disciplines, the linking of facts and fact-based theory.

Consilience, as the unity of knowledge, was underlined more recently (Wilson E. O., 1999) in order to re-combine what the human beings divided into four disciplinary domains: Biology, Ethics, Social Science and Environmental Policy.

Other writers go further, underlining that knowledge operates simultaneously at several levels and dimensions.

Knowledge is strongly embedded in the economic, socio-cultural and natural systems, but it appears also as a single system that nourishes the world of ideas, concepts, theories, cultures.

The term of "noosphere", introduced by Teilhard de Chardin and developed by Popper, Morin and other scientists, refers to this "knowledge system" endowed with a dependant autonomy, having its own life, the power to influence the human mind, but, at the same time, relying on all the other systems and being created and cultivated by the human mind.

Knowledge nourishes the human capital, which is a precious resource for the economic, social and environmental development.

The flows of knowledge is the pillar for capacity building, allows individuals and communities to improve governance, to innovate and to foster creativity.

For these reasons, Morin E. (1999) forged the concept of "cognitive democracy" as a process which opens the decision making, ensuring the continuous acquisition, combination and dissemination of knowledge at all the levels of the human societies.

At a territorial system, local development agencies and agents facilitate interactions between the stakeholders through this knowledge flow that allows capacity building.

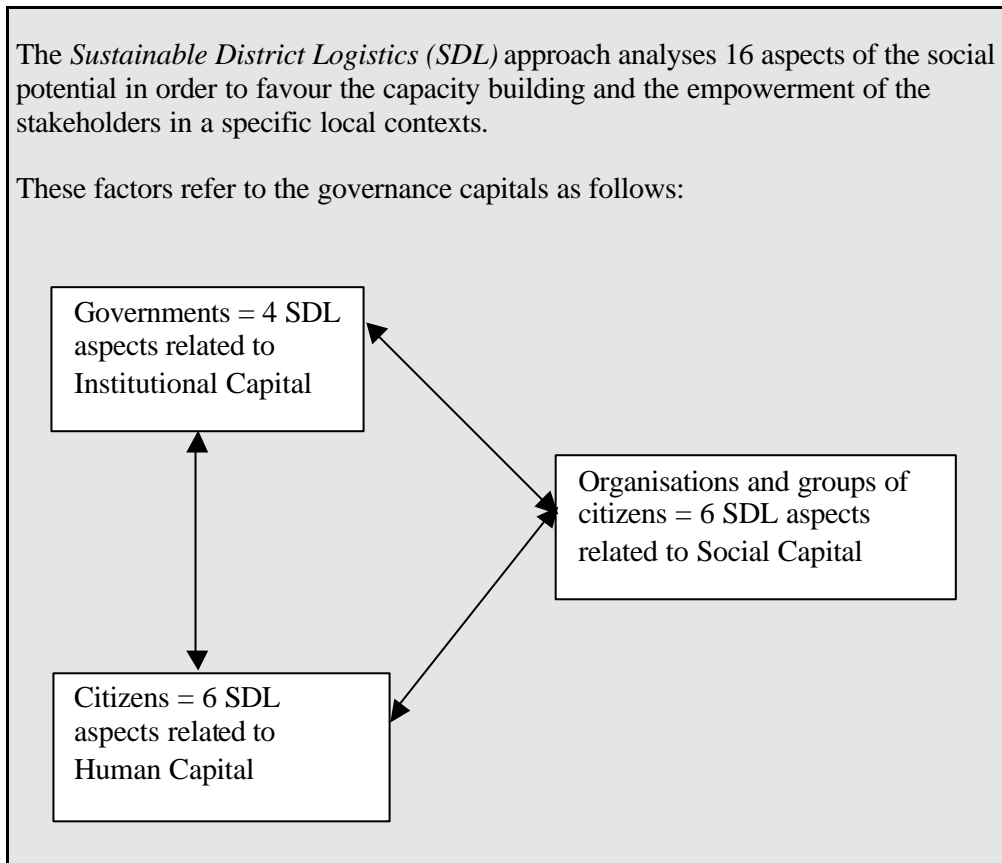
However the flows of knowledge and participative decision-making depend on the following key factors relating to the willingness of the stakeholders to:

- open their views and ways of thinking, looking at new issues, debates and conceptions (perception of a variety of development approaches)
- collaborate with each other, determining a system of shared values that take into account the economic, social, cultural and environmental interdependencies of a territorial system
- create shared visions of local development, which are translated into actual courses of action.

Some other key factors specifically characterises the knowledge systems and they overlap both the socio-economic and natural systems:

- the integration of “tacit” (embedded in the local context) and codified (formalised) knowledge; an informal information system facilitates the diffusion of professional, technological and business knowledge, embedded into individual specialisation that generates non competitive relationships and allows for the access to higher technologies to smaller businesses; this integration of skills for innovative processes is supported by a cumulative, not-formalised and formalised, knowledge acquisition (e.g. training courses, connection with universities, inter-companies collaboration, stages and professional mobility);
- the discovery and re-encoding of the local specificities and knowledge (e.g. projects on local diversity recovery, on economic and social diversification, number of endogenous companies)
- the discovery, understanding and respect of other different cultures and knowledge; this factor contributes to enrich the local knowledge and culture, as well as to create a cohesive multicultural environment (e.g. exchange programmes with other local systems, integration of external components into the own system through project of labour and social insertion)

As a conclusion, knowledge concerns all the key factors of the social potential that can be activated for improving territorial governance in terms of Institutional, Social and Human Capitals (see Chapter 1).



The quality of governance	<i>Social Potential key factors</i>	<i>The main capitals of governance</i>
<i>Openness</i>	Perception of a variety of development approaches	Human Capital
	Entrepreneurial creativity and innovation	Human Capital
	Integration of social and technical skills for innovative processes	Human Capital
	Enrichment of the local knowledge to create a cohesive multicultural environment	Social Capital
	Discovery and re-encoding of the local specificities and knowledge	Social Capital

The quality of governance	<i>Social Potential key factors</i>	<i>The main capitals of governance</i>
<i>Intensity</i>	Capacity to cope with complexity	Human Capital
	Optimal levels of attainment and fulfilment of the life	Human Capital
	Shared value system	Social Capital
<i>Solidarity</i>	Primary reliance on the endogenous potential resources	Human Capital
	Social cohesion	Social Capital
	Capacity of creating shared visions of local development	Social Capital
<i>Stability</i>	Existence of facilitators and animators of multiple interactions	Social Capital
	Fractal distribution of responsibilities and competence	Institutional Capital
	Facilitating structure for autonomy and collaboration into the decision-making	Institutional Capital
	Access to information and dialogue	Institutional Capital
	Opportunity and room for fair interactions	Institutional Capital

Part three LOGISTICS

THE DILEMMA OF LOGISTICS WITHIN SUSTAINABLE DEVELOPMENT

The Greek word from which logistics derives is “léghein” that means to tie together, to connect, to assemble.

From this root, logos, logic and logistics evolved following their specific paths but remaining related as expressions of reasoning, discourse, calculation and, consequently, strategy and tactics adopted by humans to comply with their objectives of life, temporally and spatially determined.

This original meaning of logistics evolved along with the specialisation of human activities and it almost intrinsically accompanies the predominant current connotation of logistics as the science of planning and implementing the acquisition and use of the resources necessary to sustain the operation of a system.

The International Society of Logistics Engineers (SOLE) further defines (Kobayashi S., 1998) logistics as the art and science of management, engineering, and technical activities concerned with requirements, design, and supplying and maintaining resources to support objectives, plans and operations.

According to Quayle and Jones (2001), logistics regards the holistic supply chain management intended as "the management of all activities in order to satisfy the ultimate consumer" and, therefore, is intimately tied to Total Quality Management (TQM), covering "almost all business activities, including marketing, manufacturing, purchasing, logistics and, more generally, such activities as finance and personnel"

As such a TQM approach adopted by a business is directly related to logistics quality by:

- putting the customer first;
- selecting quality suppliers;
- setting appropriate standards;
- setting a quality costing framework;
- providing a regular monitoring of quality and performance;
- developing supply chain partnership.

It is also evident that the shift from TQM to TQEM introduces new attention on the impacts of logistics on the environmental and social dimensions.

However from the SQM point of view, a basic question should be considered:

- How logistics can be strategically planned and managed in order to favour the implementation of Sustainable Development through a better territorial governance?

CHAPTER 6: LOGISTICS AND STRATEGIC MANAGEMENT

Logistics requires an integrated approach, also when it is considered from the military point of view. Admiral Eccles H. E. (1959) affirmed that the word "logistics" is an abstraction like strategy, tactics, economics, or politics.

Likewise, in ancient civilisations, the necessity of sustaining, organising and rationalising the war engine represented the driving factors for improving the supply chain (Dardani B. and Gattorno S., 1996).

The French meaning of logistics (*logistique*) during the XVIII and the XIX century is that of the science of reasoning and calculating, applied to military techniques and plans of supplying and moving troops.

Jomini A. H. (1838), who served Napoleon and then the Russia Tsar, defined logistics as the theory of organisation looking at the practical application of the art of moving armies and then to the supplying, quartering, and movement of troops. Jomini referred to the XV century French verb "*logier*" (to lodge, to quarter) nowadays "*loger*".

Eminent war strategists (e.g. Sun Tsu in the fourth century BC and Karl Von Clausewitz in the XIX century AC) recognised the importance of logistics within the general administration of the basic resources of the State (cash reserves, treasury and credit) especially when the army is engaged in protracted campaigns.

The successful action of war requires spending capacity, tax collection, military factories, food productions, means of transport, warehouses, arsenals, barracks, army camps and so on.

Logistics approaches have been studied from ancient times, from Alexander the Great as well as in the Assyrian golden era, and in particular during the Roman empires domination of the known world.

In modern times, logistics is essential to an efficient and strategic management of the transfer and storage of materials, components and products starting from the suppliers, passing through the producers, arriving at the consumers (Christofer M., 1986).

Quayle M. and Jones B. (2001) underline that "Just as marketing grew in the 1960s to encompass sales, retailing, advertising, customer relations, product design, market research and in so doing encouraged an overview which then revolutionised the approach to server the customer, so logistics has evolved to encourage a similar integration of materials-related functions. Moreover (...) the logistics approach recognises the importance of those functions both individually and collectively and the need to manage them in totality".

Logistics activities regard the time-related positioning of resources and include procurement, manufacture, distribution, storage, transport, recycling and waste storage, information technology, etc.

Logistics assumes the features of an integrated cycle that includes design, management and utilisation of several resources: physical, human, financial and information. These resources regard the lifetime of a product, system, or service, embedding *time, mass, place and form*.

Logistics supports the production and the flow of goods and services throughout their life cycle.

This key dynamic aspect is reflected in the specific terminology currently used in the logistics jargon, such as:

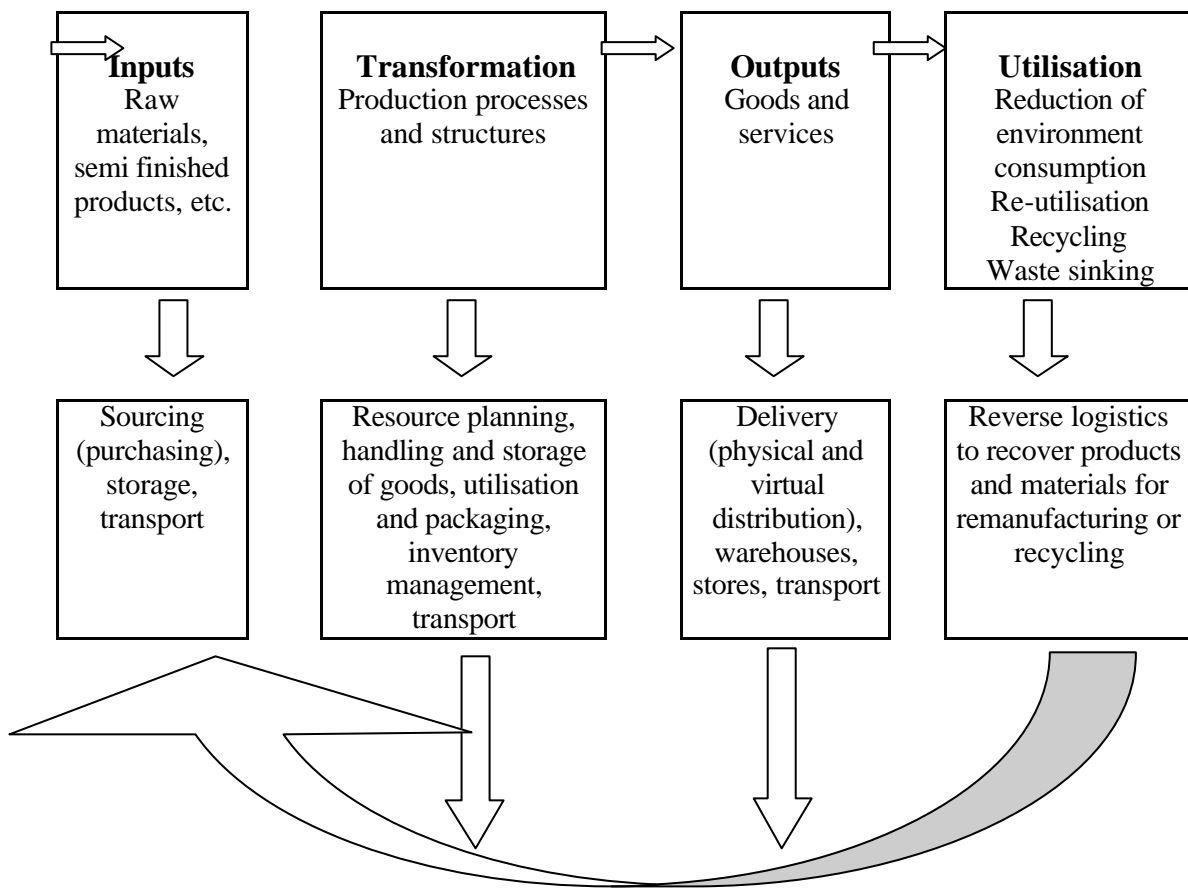
- "from-cradle-to-grave", to indicate logistics planning, design and support throughout the entire system life cycle in order to streamline the business processes;
- "lust-to-dust", to include the initial planning phase, before the acquisition process of raw materials, equipment, personnel and considering production, delivery and recycling.

By integrating the principles and definitions of the different approaches to logistics and management, a further reflection on the direction of sustainable logistics can be made, as shown in the following table.

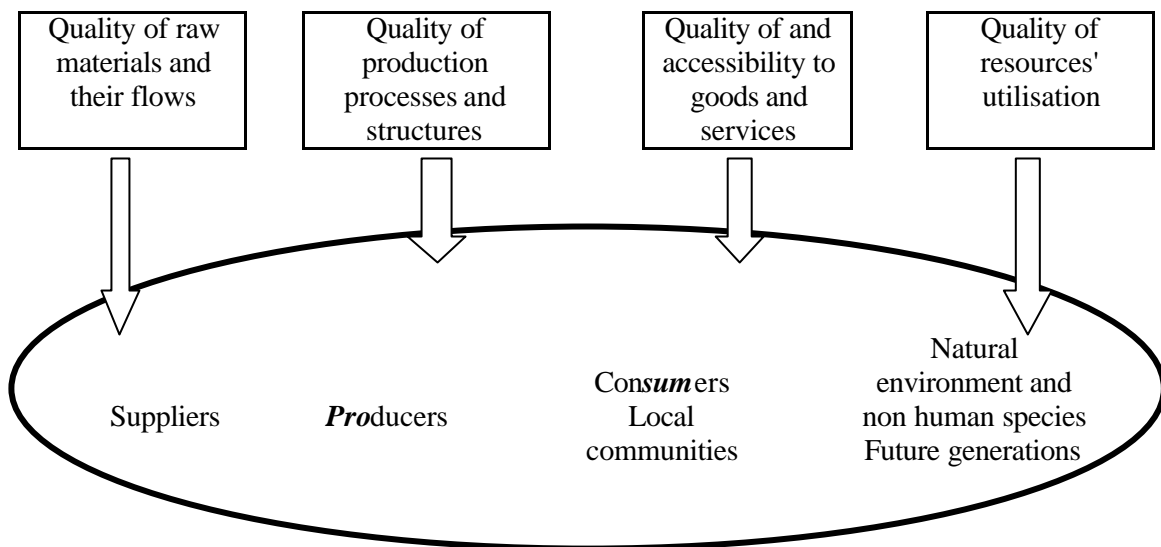
<i>The 9 levers of logistics mix</i>	<i>The SOLE "8 R", logistics aims</i>	<i>The "7 Dimensions" of eco-efficiency (doing more with less)</i>
<p><i>Planning and Marketing strategy</i> (the major influences of design and marketing on materials requirements and distribution requirements)</p> <p><i>Purchasing</i> (source research and selection, negotiation, building supplier partnership programmes)</p> <p><i>Production Planning</i> (plant capacity, location and layout, scheduling, manufacturing resource planning, control and support of work in progress)</p> <p><i>Storage and Materials Handling</i> (the handling and storage of goods, utilisation and packaging)</p> <p><i>Inventory Management</i> (control over inventories, sustaining minimum practical stock levels, minimising holding costs, wastage and obsolescence)</p> <p><i>Warehouses and Stores</i> (location, capacity, mix and operation)</p> <p><i>Transport</i> (inbound, intra site, outbound; mode decisions, scheduling, routing and operation)</p> <p><i>Customer Service</i> (demand forecasting, service levels, order processing, parts / service support, and aftermarket operations)</p> <p><i>Technical Support</i> (the provision and management of the systems needed to support these activities)</p>	<p>Right material</p> <p>Right quantity</p> <p>Right quality</p> <p>Right place</p> <p>Right time</p> <p>Right method</p> <p>Right cost</p> <p>Right impression</p>	<p>Reduce the material intensity of goods and services</p> <p>Reduce the energy intensity of goods and services)</p> <p>Reduce toxic dispersion</p> <p>Enhance material recyclability</p> <p>Maximise sustainable use of renewable resources</p> <p>Extend product durability</p> <p>Increase the service intensity of goods and services</p>
<p>Quayle M. & Jones B., 2001</p>	<p>Kobayashi S., 1998</p>	<p>DeSimone L. D. and Popoff F., 1997</p>

The quality cycle of logistics can be presented in a recursive way, as summarised in the following charts.

Logistics within the Quality cycle



Eco-prosumerism in logistics



The "prosumer theory" (Toffler A., 1980) reunites producers and consumers (producer + consumer = prosumer) in the cycle of wealth creation as a circular process where, for instance, wastes are recycled as inputs for the next cycle of production, material products (from industry) and services are increasingly integrated.

The quality cycle of logistics opens trajectories and processes that allow businesses and territorial communities to continuously introduce changes in their styles of production, consumption and life.

In the Dutch case study of the INNESTO project, the analysis of the District Logistics related to the Northern Brabant province demonstrated a complex evolution of the costs, impacts and capacity of the logistics operators, in the regional and global context.

To improve the capacity of the operators, researchers identified specific courses of action that closely correlate the District Logistics Analysis findings with the two main innovative hypotheses stemmed from the Local Context Analysis:

- to stimulate transportation over water by mean of road-water transport chains;
- to stimulate establishment of companies near waterways or near 'Hubs';
- to increase or further development of load and unload facilities in 'Hubs'
- to create a "Virtual Transport Company", which co-ordinates the transport flows of a large number of transport companies (including non-transport services providers) and thus optimize the utilization of transport capacity per trip;
- to further improve the efficiency of the local logistic structure by exploiting the central geographical position of the Brabant area through multimodal transport solutions, a further extension of the facilities of existing 'Hubs', the improvement of, and the increase in, the capacity of existing water and road infrastructure, non road infra-structural initiatives like "The IJzeren Rijn" (a neglected railway corridor thru the Brabant area);
- to develop better social cohesion and inclusion plans together with employment measures to create better and interesting jobs;
- to improve the inter-local equity between territories through a structural interregional cooperation in multimodal transport solutions (for example: tuning railway bloc times) aimed at investing in or attracting of intermodal service providers.

The Trier region was chosen within the INNESTO project for its position as a hub of cross border (Germany and Luxembourg) and inter-modal logistics. In this case study, the transport operators, local government and steel manufacturers were asked to participate in an analysis of the production and logistics trends for the future of the region. Alternative future scenarios were examined and paths to reach these futures were elaborated. Local stakeholders involved in the debate decided to start to co-operate systematically in order to move towards a new dimension characterised by reduction in truck traffic and a better connection between inland navigation and railways.

In other words, the attention on quality fosters transformation dynamics such as: (Senge P. E. et al., 1994; Smith N. I, 1994; Pasmore W. A., 1994; Garrat B., 1994; Beckford J., 1998,):

- a clear client orientation in order to offer goods and services that meet the customer needs and requirements;
- a constant assessment of the ongoing results, both in terms of client-satisfaction, stakeholders appreciation, performance costs and revenues;
- a fluid negotiation between the stakeholders (e.g. owners, shareholders, employees, suppliers, consumers, local communities and authorities) in order to arrive at strategic decisions that have the wider possible consensus;
- the involvement of the stakeholders in order to define transparent business purposes (through the creation of a shared vision) and to follow them with coherent organisational behaviours (missions)
- the creation of an internal working environment based on open and collective learning (learning organisation)
- the nourishment of the "learning climate" through problem understanding and the awareness raising from the close interrelationships between the organisation, the surrounding environments, the spatial and the temporal dimensions.

These dynamics are recognised by SQM (Sustainable Quality Management) as six basic levers for strategic changes.

The six transformation levers can stimulate the social potential of a local context (analysed in Part II of this Discussion Paper) to enter the path of Sustainable Development and to follow basic orientations that include the integration between the quality of the economic, socio-cultural and environmental dimensions.

Within the INNESTO project, the Viborg Local Context Analysis arrived at formulating the following hypothesis of action: the development of innovative networks in the relationships among local furniture and transport firms as the basis for implementing regional policies aiming at promoting more sustainable district logistics.

This hypothesis was constructed utilising the local characteristics of a selected range of the SQM / SDL aspects.

Two Transformation Levers (Dynamics) were identified:

- the “Open collective learning” lever, constituted by close B2B relationships that enhance rapid knowledge and experience exchange;
- the “Negotiation and co-decision” lever, constituted by diffused logistics competencies and decisions that involve transport firms in organising supply chains within the local furniture industry.

The two Levers were useful to move towards a basic SDL Orientation aspect: the economy. In fact, innovative actions were focused on stimulating the regional economy and compensating for the peripheral location of SME’s through an efficient and environmentally friendly transport system with the relative organisation of freight transport and logistics.

To follow this Orientation aspect (Economy), two key factors of the local Social Potential were diagnosed as the most appropriate facilitators:

- “Perception of a variety of development approaches”, represented for instance by current initiatives to perform the Local Agenda 21, to strengthen innovation and marketing processes of the local and national furniture industry; to manage an interactive web-site on green indicators, to campaigns for traffic safety, etc.;
- “Capacity to cope with complexity”, mainly based on the current intensive activity developed by policy networks (e.g. the Transport Political Network and the North Sea Commission on transport corridors).

Logistics should be re-thought in this context, innovating and changing consolidated perspectives.

The historical perspective of logistics was summarised by Rushton A, Oxely J. and Croucher P. (2001) arriving at new concepts and considering issues of social (e.g. security and safety), environmental (e.g. pollution, energy consumption, packaging), technological (e-procurement, e-trading, home shopping and delivery) nature.

As a general conclusion, the above-mentioned writers affirm that: "the role and importance of logistics has, once again, been recognised as a key enabler for business improvement".

In fact, the common understanding of logistics is oriented towards one-company-approach

- organised in a concentrated and centralised manner according to a top-down management
- vertically organised according to a value chain, whose economic efficiency is measured in terms of time and cost cutting (namely those relating to inventory carrying, administration, warehousing and transport)
- based on technical solutions and managed by technological and organisational improvement, with a strategic role played by transportation

This conventional way of thinking on logistics is confirmed also by the current available data that explore more the supply chains than its impact from a territorial point of view.

Considered in an aggregate way (the business dimension and the economy as a whole) and at a European dimension:

- logistics alone contributes between 10 - 14% to gross domestic product (GDP) of the member nations (*Financial Times*, December 1998, quoted by Rushton A, Oxely J. and Croucher P. 2001)
- logistics costs are influenced mainly by transport (41%), while inventory carrying arrives at 23%, warehousing at 21% and administration activities at 15% (*A. T. Kearney survey*, quoted by Rushton A, Oxely J. and Croucher P. 2001)
- logistics costs (inventory carrying, administration, warehousing and transportation) reach 14% of revenues as an average, but they can be reduced to 9% by logistics excellence (A. T. Kearney, quoted by EC, 1997).

Less information is provided on the other logistics costs that relate to its impacts on social and environmental systems:

- aggregate external costs, which relate only to land transport (over 90% due to road), are estimated to be 5% of GDP including pollution, noise, accident and congestion, but excluding global warming (CEC, 1995).

In recent years important developments have been achieved concerning the conceptualisation, management and measurement of the territorial material and energy flows.

For instance, the Wuppertal Institute and the whole debate about factor 4 (i.e. 75% reductions in resource consumption for any unit of production) or factor 10 improvements (i.e. 90% reductions) have had a widespread influence in the discussion across Europe.

However, the practical use of these approaches has been mostly limited to single companies. Exceptions are the endeavours to create eco-efficient districts (e.g. Öko-Profit developed in Austria and other attempts within specific programmes, such as SEER - Socio-Economic Environmental Research).

These recent developments in "one-company-oriented" logistics and territorial management of material flows still remain separated.

As a result, several business-derived costs are still ignored and often externalised, leading to negative impacts of logistics on land use, the environment and the social communities.

Conversely, there is a considerable amount of avoidable economic costs that remains invisible in a company-oriented perspective.

Basically the economic issues regard:

- the logistics costs in the business organisations (e.g. for planning, inventory carrying, administration, warehousing, transportation, fuel and energy, marketing and customer services)
- the logistics relevance in the economy, taking into account its structure (e.g. the percentage of GDP represented by the logistics activities, the productive specialisation of the territorial areas, the average employment dimension per company, the interdependencies in terms of export - import flows)
- the structure of distribution and trade to which logistics is embedded (e.g. number of retailer and wholesale operators per sq. km)
- the intensity and the structure of transportation that influence and are effected by logistics strategies (e.g. tonne-km or tonne per GDP, modal split, lorry vehicle-km per GDP, load factor, modal split, the investments and capital stock per mode, estimate of time costs due to congestion)

The issues of environmental relevance, in which logistics is embedded, regard:

- the land use (e.g. concentration of industrial, urban, green, protected, rural and derelict areas; population density; km of rail - road - waterway)
- the resources use (e.g. waste production; the percentage of differentiated waste treatments; the energy consumption and intensity; the quantity of energy produced by renewable sources; the investment for the environmental recovery and protection)
- the environmental impact (e.g. concentration of greenhouse gases, exposure to noise per inhabitant and time, biodiversity loss in terms of species reduction)

The main socio-cultural issues, which affect and are affected by the territorial logistics system, regard:

- the population structure understood as the general "end-consumer" of logistics activities (e.g. the density per age, the rate of population change, the dependency rate, the average rates of activity and unemployment, the employment percentage distribution per main sectors, the average income per inhabitant)
- the investment in human capital (e.g. the average education level, the investment in training and education per inhabitant, the drop-out rate)
- the population health (e.g. percentage of disabled people, number of accidents due to transport modes, estimate of the social costs for road accidents, estimate of time loss per inhabitant due to traffic congestion)

CHAPTER 7: LOGISTICS AND GLOCACITY

Glocacity is the capacity to simultaneously incorporate the local and global dimensions in the decision-making processes and owes its birth to logistics.

The OECD (1996) affirmed that the "capability to act locally with a global perspective, and to be effective globally with both global and local perspectives" is a driving factor in the integrated advanced logistics for freight transport. "The roots of this concept are in product planning and design, where many companies are striving to develop global products. A global product can be a single standard product; or it can be a generic product with specific local variations for several local markets."

Glocacity requires:

- the understanding of what is (or can be) common between different territorial areas and what is closely linked to the local diversities
- the integration of top-down and bottom-up approaches into decision-making processes and procedures; this integration is a component of the subsidiarity principle
- new organisational patterns, less hierarchical and more flat, being open to horizontal networks and favouring collaboration and participation from the internal and external tissues of relationships (intra and inter openness)

Diversity

Glocacity starts from the conviction that each customer and each local situation are different. "In each situation, there are unique local characteristics, customs, business practices, and ways of getting things done effectively" (OECD, 1996). Such characteristics will vary in every local situation. Therefore, logistics tools must be directed towards a balance between the desired uniformity of global practices, and the local diversity.

Subsidiarity

Subsidiarity saw its origin from military language. Subsidiarity comes from the Latin concept of *subsidium*, which indicated the reserves (the supporting troops). The support (*subsidium*) to the front lines is temporary. If reserves substitute definitely the front lines, it means that the risk to lose the battle is high and then the security of a country is endangered.

Logistics assures that the actions and the movements of the *subsidium* are really useful to support the *praesidium* (the front line troops), in the advanced position of the army in a battle scenario. Successful war management requires an efficient logistics. For instance, Napoleon Bonaparte was defeated in Russia because of a protracted campaign that did not allow his imperial army to be supported sufficiently to meet the needs of a moving army in a hostile territory. This event was recognised as the result of a lacking in efficient logistics.

In the military logistics, the usual practice became to externalise specialised services to non-military professionals. The Roman legions, the medieval crusades, the Scandinavian armies (e.g. the Swedish King Gustavo Adolph), the Napoleon and Wellington armies employed specialised civilian professionals to manage parts of the logistics chain. Externalisation was due to the necessity to lower the war costs and maintain efficiency through partnership between the State and experienced people and organisations. Armies are owned by the State and are therefore public functions, while logistics activities (or part of them) were often managed by non military sectors. This practice can be considered as one of the first institutional cases of “horizontal” subsidiarity, a term that indicates the outsourcing of services to non-State actors, while “vertical” subsidiarity refers to the devolution of policy making to lower levels.

Today logistics is characterised by outsourcing. "With increasing fervour and conviction, corporations have sought to reduce costs by contracting out services and activities traditionally provided in-house. (...) That way you not only save money through greater efficiency but also gain effectiveness by focusing more clearly on those things you can do better in-house" (Quayle M. & Jones B., 2001).

Nowadays the meaning of subsidiarity influences the governance dynamics, both in corporate organisational behaviour and in the overall society. Subsidiarity is understood as an institutional and social process orientated to some basic principles:

- the capacity of individuals and/or smaller social groups to take care of themselves should not be hampered;
- higher or bigger organisations can intervene only when and where the lower or smaller scales do not have this capability;
- the subsidiary role of higher or bigger organisations must be temporary in nature; their basic commitment must be to allow individuals and/or minority groups to develop self-management, self-administration and self-governance, by means of empowerment and capacity-building;

- all levels of society should improve the relationships between the private and public sides, giving to individuals and their communities the responsibility to organise and manage public functions by themselves;
- organisational systems should provide and assure flexibility and adaptability, in both vertical and horizontal directions, in order to give cohesion between their members; this means adopting a style of “multi-level governance”, where vertical relationships between higher and lower levels, larger and smaller dimensions, are conceived and managed in a horizontal way, respecting authoritative roles according to a value added scale.

Within the INNESTO project, six main hypotheses emerged the Local Context Analysis of the Vega del Guadalquivir Valley:

- a programme of territorial development based on the SDL approach;
- a programme for integrated waste management supported by the development of a environmental industry;
- coordination of the instruments of regional planning;
- implementation of new governance mechanisms on a supra-local level;
- participation of institutional and economic agencies and civil society in the overall programme;
- technological development, improvement of human resources, increase in local employment, improvement of the social well being and quality of life.

The six hypotheses converge in a central working hypothesis: a program for the integrated management of the waste and the utilisation of renewable energy.

Logistics plays a central role to meet the need of new forms of territorial governance according to the principles of subsidiarity.

To this end, some instruments have been identified in specific forums to co-ordinate the local scale policies through the participation of the concerned municipalities, as well as in specific forums to involve the representatives of farmers, businesses, citizens.

Networked and participative organisations

Looking at the organisational dynamics, new forms have appeared with such names as the shamrock, federal, holonic, virtual and *hetartical* organisations (OECD, 1996). The latter is usually referred to logistics open extended enterprises with extensive use of teams and participation of partners outside the formal boundaries of the firm. They use EDI (electronic data interchange) and other technologies to manage the "pipeline" of material flows (e.g. PLMS, pipeline management system).

Hetartical organisation has multiple independent units, each responsible for developing and maintaining its own relationships with customers, suppliers, partners, etc.

Partners can be within the same parent organisation and in other corporate organisations.

Interpersonal relationships are the driving forces that co-ordinate several activities in appropriate teams, which share common business interests. Teams are the means of strategic alliances or association, while no single authority has the power to direct all units. Negotiation, persuasion and agreements between the companies and the units involved create an integrated network between many centres in different countries and with different roles.

Limits to the glocacity perspectives

Businesses of entrepreneurial excellence take into account the global and local dimensions of their activities integrating logistics into marketing. They continuously monitor and adapt the logistics chains to the requirements of their customers. Several large single companies (e.g. Daimler Benz, DHL) have demonstrated that considerable efficiency gains can be realised adopting a territorial approach in reorganising the streams of goods, by means of advanced logistics concepts. However, Small and Medium Enterprises (SMEs) typically maintain high logistics costs because they do not have the size and the capacity to organise their logistics optimally. In some cases they have found large logistics providers to help them.

Even though logistics and glocacity could go hand in hand, the current approach to logistics in the European market shows the following dilemmas:

- many companies are expanding, acquiring and merging with other firms to achieve economies of scale and long-term pay-off; others are repositioning themselves, breaking chains of integration and divesting themselves of non-core businesses and activities;
- the large companies, which integrate logistics and marketing, local and global dimensions through their own networks, jeopardise the autonomy of small and medium logistics and transport operators (SMEs); the latter risk to be totally absorbed by the former;

- local integrated economic fabrics (e.g. the industrial districts) are often at risk of being subordinated to vertically dominated large logistics systems that are not able to offer services that meet the interests of small firms;
- these processes combine to dismantle local networks of production and consumption with long-term consequences on the environment and local social and economic potentials;
- these processes exclude local authorities and communities from strategic decisions that have an impact on their quality of life, styles of consumption and production, while the existing intermediary bodies (development & business agencies) play a minor role in the "one-company-approach" that dominates big logistics systems.

In a short definition, glocacity is activated when: larger dimensions and higher levels think locally and act globally; smaller dimensions and lower levels should think globally and act locally. This decision flow connects people and organisations.

In order to cope with concentration and globalisation processes in district logistics, a collaborative integration between main logistics operators and the economic tissue of the local contexts (specifically small and medium sized enterprises) can open new perspectives of glocacity.

In fact, this capacity to combine local and global dimensions could be built favouring the integration of a bottom-up approach, constituted by the district businesses (included locally based transport and logistics operators) and the wider logistics chains (big operators).

A professional profile of “vertical integrator and facilitator” is necessary maybe in close collaboration with the role played and the competence of the “mobility managers” who operate at a local level within public authorities and the private sector.

Within the INNESTO project, the District Logistics Analysis carried out in the Viborg County (Denmark) illustrated that the furniture industry is a useful example of an industrial cluster of SME's, where the logistical competence is embedded in a network among a number of firms – specially transport firms. Only parts of the logistical competence (in terms of decision-making on logistical organisation) is locally embedded, while other parts (specially ingoing flows) of the logistical decision-making are located outside the territory. This fact demonstrates how the close relationship between the logistics flows and the organisation of the inter-firm network can act to combine local and wider dimensions in an original way.

Some issues have to be considered in order to understand the orientation of logistics towards glocacity and they regard:

- the maintenance and further development of diversity (e.g. enterprises created in different economic sectors, new professional skills and traditional arts and crafts enhanced by training initiatives, local products protected by specific brands, fauna and flora species recovered and disseminated, initiatives directed to preserve local habits and cultures)
- the enforcement of the subsidiarity principles in business and society organisations as well in the logistics chain (e.g. the degree of maximum decentralisation of the decision-making and functions in the business fabrics and in the public administrations; the financial autonomy of local authorities; public, private and social joint management of innovative local initiatives; the transportation distance, volume and time of the major flows of goods, wastes and recycled resources; the main geographical markets of sourcing and delivery)
- the existence of territorially diffused networks and partnerships (e.g. business and trade associations and their members; local consortia and local development agencies managed by joint public, private and social partnerships; jointly managed projects that combine logistics, transport, the environment into spatial planning; networked local fairs, markets and home delivery activities; local businesses involved in certification marks of controlled origin)
- the degree of participation in business, public administrations and in the society (e.g. the prevalent organisation typologies in terms of concentration and centralisation or diffusion and decentralisation of industries and services; the prevalent work organisational behaviours in terms of hierarchical or democratically negotiated styles; information and awareness raising campaigns devoted to the general public)

CHAPTER 8: LOGISTICS AND ACCESSIBILITY

A central theme arose during the Mexico City World Conference on transport (1994) being: “what quality for what transport for what kind of development” (OECD, 1996a). During the debate it was recognised that "transportation is mostly not an end in itself but a means to an end, and that there may be other ways of achieving a particular end rather than motorised mobility.

Meetings can be replaced by video-conferences, postal and courier services can be replaced by faxes and electronic mail, travel to work, shopping, and social visits can be reduced and even avoided by more compact land development".

For instance, recent studies show (see: www.transportconnect.net) that Information and Communication Technology (ICT) is introducing relevant changes in the access to goods and services.

ICT is changing structurally freight transportation industry and logistics of businesses (e.g. where freight moves, the sizes of typical shipment and the time which goods must be delivered). These developments affect activities from the level of individual household to the consumers market.

The growing importance and availability of information technology has had and will continue to have a significant role on logistics, from all aspects, supply, demand, inventory and warehousing.

For instance, the early use of the fax to replace the physical movement of paper to the development of Internet and computer networks has streamlined and optimised the possibility to control material and information flows.

This revolution in information management is continuing and presents an important opportunity to increase efficiency and reduce overall costs (economic, environmental, social) of logistics activities

The Mexico City Conference highlighted that "sustainable transportation/mobility might alternatively be rephrased as sustainable access, which can be defined as access that meets the needs of the present without compromising the ability of future generations to meet their own needs".

This approach is echoed also in the 1997 Vancouver Conference (OECD, 1997), which elaborated upon the UNCED 1992 definition of sustainable transportation as “the expression of sustainable mobility within the transportation sector”.

The conclusions of the Vancouver Conference contain the following more transparent definition, “Sustainable mobility (transportation) is achieved when the needs for access to people, services, and goods are met without producing permanent harm to the global environment, damage to local environments, and social inequity...”

Several key requirements for future research were cited in the final document, the need for “the setting and enforcing of a target that represent required changes in environmental and other indicators” and “identification and removal of barriers to securing progress towards sustainable transportation, including societal attitudes and trends, government and corporate practises, and the prospect of economic diversity”.

The set of draft principles that evolved during the Vancouver Conference was aimed at developing transportation systems that maintain or improve human and ecosystem well-being. These guiding principles describe the transition strategies that need to be built.

1. *Access*, people are entitled to reasonable access to other people, places, goods and services, as well as responsible information that empowers them towards sustainable transportation.
2. *Equity*, nation states and the transportation community must strive to ensure social, interregional and intergenerational equity, meeting the basic transportation-related needs of all people including women, the poor, the rural, and the disabled. Developed economies must work in partnership with developing economies in fostering practises of sustainable transportation.
3. *Individual and community responsibility*, all individuals and communities have a responsibility to act as stewards of the natural environment, undertaking to make sustainable choices with regard to personal movement and consumption.
4. *Health and safety*, transportation systems should be designed and operated in a way that protects the health (physical, mental and social well being) and safety of all people, and enhances the quality of life in communities.
5. *Education and public participation*, people and communities need to be fully engaged in the decision-making process about sustainable transportation, and empowered to participate. To achieve this, it is important that they be given adequate resources and support, including information, about the issues involved, as well as the benefits and costs of the potential alternatives.
6. *Integrated planning*, transportation decision makers have the responsibility to pursue more integrated approaches to planning.
7. *Land and resource use*, communities should be designed to encourage sustainable transportation and enhance access, as a contribution to providing comfortable and congenial environments for living. Transportation systems must make efficient use of land and other natural resources while ensuring the preservation of vital habitats and other requirements for maintaining diversity.
8. *Pollution prevention*, transportation needs must be met without generating emissions that threaten public health, global climate, biological diversity or the integrity of essential ecological processes.

9. *Economic well being*, taxation and economic policies should work for and not against, sustainable transportation, which should be seen as contributing to improvements in economic and community well being. Market mechanisms should support fuller cost accounting, reflecting the true social, economic and environmental costs, both present and future, in order to ensure users pay an equitable share of costs.

More recently, the European Union Strategy for Sustainable Development (CEC, 2001a) set three main objectives to improve the transport system and land-use management:

- Decouple transport growth significantly from growth in Gross Domestic Product in order to reduce congestion and other negative side-effects of transport.
- Bring about a shift in transport use from road to rail, water and public passenger transport so that the share of road transport in 2010 is no greater than in 1998
- Promote more balanced regional development by reducing disparities in economic activity and maintaining the viability of rural and urban communities, as recommended by the European Spatial Development Perspective.

To reach the above-mentioned objectives, the EU Commission will:

- propose in 2002 a framework for transport charges to ensure that by 2005, prices for different modes of transport, including air, reflect their costs to society;
- implement in 2003 a framework ensuring, through the use of intelligent transport systems, the interoperability of payment systems for road transport; promote further technological progress enabling the introduction of road pricing;
- give priority to infrastructure investment for public transport and for railways, inland waterways, short sea shipping and intermodal operations. The Commission will propose a revision of the guidelines for the Transeuropean transport networks, and will promote, in the mid-term review of the Structural Fund programmes, a marked reduction in the share of finance given to road transport;
- improve transport systems by addressing missing transport links, developing open markets and co-operation at EU level (e.g. railway liberalisation, air traffic systems);
- make European Single Sky to be operational by 2004;
- promote teleworking by accelerating investments in next generation communications infrastructure and services;
- start the implementation of the European Spatial Planning Observatory Network (ESPON) in order to define a set of territorial indicators to analyse the regional impacts of Community policies;
- assess the coherence of the zoning of different Community policies, taking account of their objectives (e.g. NATURA 2000, less-favoured agricultural areas, areas eligible under the Structural Funds or for State Aids);
- diversify income sources in rural areas, including by increasing the proportion of Common Agricultural Policy funds directed to rural development;
- encourage local initiatives to tackle the problems faced by urban areas; produce recommendations for integrated development strategies in urban and environmentally-sensitive areas.

The White Paper on the European transport policy (EC, 2001) reaffirmed the necessity of "greater efforts in order to break the link gradually between transport growth and economic growth and make for a modal shift".

A comprehensive strategy was elaborated in order to develop medium and long term environmental objectives for a sustainable transport system, looking beyond a sectoral approach and incorporating transport policy in other policy fields, e.g. economy, urban and land-use planning, social and education policy, modernisation of public services, budget and fiscal policy (to internalise social and environmental costs), competition and research.

Logistics can follow this tendency:

- assuring the maintenance, the reuse and the recycling of the available resources;
- providing a streamlined organisation of the materials flow (time, quantity, space, information, etc.), able to reduce unnecessary material flows;
- utilising efficiently the related equipment and means (transport, warehouses, storage, inventory, administration, etc.);
- improving the access to goods and services through the substitution of physical movement by information technology and by local networks of production and consumption.

Logistics can facilitate or hamper the equity of access, a right that regards businesses, social communities and people in different spatial (local and inter-local) and temporal dimensions (generations).

Accessibility guarantees the right, enlarges the opportunity and improves the capacity to see, reach, produce, buy, use, consume, and so on.

Therefore, the capacity to access regards equity issues:

- within the local context, especially for people at risk of social exclusion (e.g. disabled people, elderly people, poor inhabitants, rural population, immigrants, ethnic minorities, women);
- between different local contexts (e.g. unbalanced development, substitution and displacement effects of logistics circuits and investments devoted to a territorial area with respect to other local contexts);
- in the long term (e.g. between present and future generations, young, adult and elderly people).

The Casentino Valley was one of the case studies of the INNESTO project. Within the Valley, different logistics realities exist, a heavy industry, an aging population distributed in small towns and the countryside, a national park, an antiquated train system and an under-dimensioned road system. A shared vision was developed by local stakeholders on the equity (social, inter-local and inter-temporal) characteristics of a sustainable accessibility plan. A close correlation was found between the main hypotheses emerged from the Local Context Analysis (LCA), the findings of the District Logistics Analysis (DLA) and the results of the Local Scenario Workshop (LSW).

The LCA hypothesis is:

- To include quality management issues and sustainable development principles in all training courses and e-learning tools for producers (enterprises and employed) and consumers (generic public, job-seekers and unemployed, families, pupils) in order to increase awareness of sustainable logistics as a means for favouring social cohesion and development in depressed areas over the next 15 years.

The DLA findings are:

- To improve entrepreneurial knowledge and strategy through the dissemination of the principles of social and environmental quality

The LSW results are:

- To offer equal opportunities to each local community, different territorial areas and diverse generations

A series of financial, organisational measures and instruments merges the above-orientations towards equity:

- new methods of services delivery (e.g. e-government network supporting e-commerce, e-logistics, home-shopping, e-banking, e-administration)
- an integrated e-logistics and a safety-orientated inter-modal transport system based on the full utilisation of co-ordination potentials
- programmes and projects related to integration between different knowledge and cultures in order to enhance awareness, to build the capacity of long-term strategic thinking, to anticipate change taking into account future impacts on logistics dynamics
- programmes and projects for fair interactions, logistic s plans in favour of fair trade with different immigrant communities and countries, through the dissemination of good practices among the stakeholders opening a specifically dedicated web-site in the e-government network with information on strategies and actions (e.g. the European World Shops, Fair Trade Organisation, ethical banks)
- programmes and projects for positive actions in favour of women in the labour market, education and decision-making with a close attention to logistics impacts
- vocational training programmes and employment creation devoted especially to women and young people
- a co-ordinated action plan on SA 8000 certification elaborated by the Mountain Community, the Province, trade associations, trade unions and relevant NGOs.
- institutional co-ordination between local authorities, involving the local communities in the decision making processes, supported by integrated programming, monitoring and evaluation systems, especially on strategic (long-term) impacts of processes, products and consumption utilising international sources of information and knowledge (e.g. the Dow Jones Sustainability Indices).

Under the local, interlocal and intertemporal issues of equitable access, all the other logistics issues have to be considered, as the following table recapitulates them:

<i>The economic dimension of logistics</i>	Logistics costs in the business organisations
	Logistics relevance in the economy, taking into account its structure
	Distribution and trade structures
	Intensity and structure of transportation
<i>The environmental dimension of logistics</i>	Land use
	Resources use
	Environmental impact
<i>The socio-cultural dimension of logistics</i>	Population structure (the general consumer and producer of logistics activities)
	Investments in human capital
	Population health
<i>The logistics glocacity</i>	Maintenance and further development of diversity
	Enforcement of the subsidiarity principles in business and society organisations as well in the logistics chain
	Existence of territorially diffused networks and partnerships
	Degree of participation in business, public administrations and in the society

Part four THE SDL APPROACH

THE DILEMMA OF MULTI-DIMENSION GOVERNANCE AND MANAGEMENT IN LOGISTICS

Perret F.L., Liebling T., Bierlaire M. and Chevroulet T. (2002) Ecole polytechnique fédérale de Lausanne) affirm, looking at the role of logistics in sustainable development dynamics, that logistics has all the properties to:

- "become the science of transdisciplinarity"
- "build a common language between hard and soft sciences and will open new avenues for scientists and humanists. Innovative concepts of social organizations could be imagined for instance redefining the notion of frontiers, of barriers, which will become bridges for dialogue and exchange instead of physical and territorial delimitation."
- "become a framework of reference for building systemic theory and for developing new paradigms"

The considerations developed in the present Discussion Paper support the above-mentioned viewpoint through three fundamental assumptions:

- logistics is an ancient art for connecting different resources (physical and human, tangible and intangible, natural and artificial, near and distant, present and future, endogenous and exogenous, local and global)
- connection unites knowledge and provides the holistic thinking needed by logistics in order to combine different concepts and notions, disciplines, approaches, techniques and tools.

However, it is not easy to affirm and pursue an holistic way of thinking in the logistics domain.

The Sustainable District Logistics (SDL) approach has, in fact, to answer to a fundamental question:

- How to move the current logistics management towards:
 - a multi-interest integration capable of negotiating win-win solutions between different interests (e.g. stakeholders of public, private and social sectors)?
 - a multi-level integration suited to the improvement of subsidiarity and governance among different decision making processes and dimensions (e.g. city, county, region)?
 - a multi-diversity integration that favours the understanding of issues and problems in order to determine solutions, increasing knowledge and innovation?
 - a multi-cultural integration proficient at sharing a common language between different cultures on a European basis?
 - a multi-disciplinary integration adequate to the combination of different knowledge, skills and experiences?

CHAPTER 9: SUSTAINABLE DISTRICT LOGISTICS (SDL)

SDL as a holistic management

Several definitions are given to logistics, but most are directed at two common concepts: management and accessibility. Management regards how the available resources (economic, environmental and socio-cultural) are used. Accessibility is the "capacity to access" the available resources. Both (management and accessibility) require integration of a large amount of elements. This integration requires "good" relationships between the elements.

Logistics services are necessary for access to goods, services, people and places. Logistics, however, lasts over time as a "connecting system" that ensures the interrelationships between resources throughout their life cycles, from sourcing, to transformation, to distribution and final utilisation.

Therefore, logistics is a "nexus", a connection of a series of links between material and immaterial resources with different temporal and spatial scopes. This connecting capacity of logistics reflects different intensities of flows in terms of materials, energy, information, people and knowledge, favoured by several networks and technologies of transmission and distribution (e.g. communication, transport).

Logistics becomes a holistic management when the knowledge of the "system as a whole" (holism) increases on the basis of a broader awareness of the interrelationships between its constitutive parts (components or units) and within each part as individual systems.

Logistics as a holistic management of interrelationships (virtual and factual) allows fluid connection, interdependency, and junctions within and between different territories, taking into account the basic dimensions (economic, socio-cultural and environmental) of local development to ensure quality of goods and services at a fair cost to end-users and society.

Some driving courses of action in this direction are:

- the re-organisation of logistics chains to favour local networks of consumption and production;
- the incorporation of social and environmental costs;
- the promotion of eco-efficiency in product and production processes, during their full cycle of life;
- the integration of intra and inter organisational systems (businesses and the Territory);
- the utilisation of information and communication technology combined with the integration between logistics services (reverse logistics, multi-operational and multi-modal transportation, territorial marketing, and so on)

The results will be a reduction in undesirable displacements, transport intensity and congestion, while favouring the substitution of physical transport by information (immaterial transport), supported by the dematerialisation of the local economies and by the product miniaturisation, with positive impacts on the environment (e.g. the reduction of energy consumption and natural resources depletion).

Costs reduction is expected from a coherent territorial re-organisation and it regards both business costs and those associated with the local environment and social context. From a business-planning point of view, logistics costs (e.g. inventory carrying, administration, warehousing and transportation) can be reduced in a three-year perspective by innovative methods applied at a company level.

The objective of the District Logistics Analysis (DLA) carried out in the Casentino area was to identify the main characteristics of the material flows and the businesses performances. To this end a questionnaire was elaborated and a sample of key businesses was selected. Interviews followed. The information obtained about logistics flows were then used to determine the economic fabric of the Casentino Valley. The results concerning business performances were utilised to determine profiles (corporate “ideal-type”) according to a benchmarking method.

The benchmarking method consisted in determining percentage values (SDL indices) in order to make a comparison between the different business profiles. Detailed information were asked on logistics costs in order to integrate data usually present in the annual balance sheet (legally required). A methodology was elaborated to classify the specific voices of the balance sheet according to the 10 SDL Orientation aspects devoted to the quality improvement of corporate strategy and business planning.

Much more can be obtained through eco-efficiency methods applied at a district level. Collaborating companies can re-engineer their processes to reduce the consumption of resources, to reduce pollution and avoid risks of an environmental and social nature, while at the same time saving costs. Waste from one production process can have value in another. Short distances and time can be optimised within district-based material flows. Transport modes can be integrated and their operators can become logistics professionals.

Within the INNESTO project, the Spanish case study demonstrated how logistics can be linked to favour collaboration, avoiding environmental risks and integrating different sectoral activities. The Vega del Guadalquivir is a complex territory, characterised by a network of population centres and important agricultural activities, all distributed along the Guadalquivir river. The principal challenges to the development of the Valley is related to the high consumption of energy and water and the production of agricultural, industrial and urban wastes. The possibility to create an integrated management and utilisation of the waste for energy generation presents a unique possibility to meet local needs through sustainable development strategies.

All this can happen if companies and local authorities co-operate with each other at district level through partnership and networking, while fostering an open collective learning process that improves the territorial management of material flows.

In the Danish case study, logistics operators and furniture manufacturers participated in a series of Local Scenario Workshops to create a shared vision of local development. The formation of a inter-firm network to optimise logistics and initiate a collective learning process was one of the results of the INNESTO process.

SDL Governance

The SDL approach looks at the complex fabric of interrelationships between the logistics stakeholders (businesses, public authorities, individuals and communities).

The SDL aims are devoted to empower the stakeholders in terms of knowledge and decision-making, emphasising trust and mutual respect.

For these reasons, the SDL approach fosters a "*new social and territorial deal*" to:

- strengthen fair partnership, improving the stakeholders' capacity to understand diversity and to discover the wide range of interrelationships between and within territorially nested systems
- implement the principle of subsidiarity, merging in a flexible way territorial, jurisdictional, administrative, productive, consumption, transmission and distribution criteria (*géométrie variable*)
- develop a culture of participation, involving the logistics stakeholders and taking into account their different interests in negotiation and co-decision processes
- favour fair opportunities of access to goods, services, people and places, pursuing "social equity" in spatial dimensions (local and interregional) and in long-term perspectives (intertemporal)
- pay attention to the available resources, adding value to economic, environmental and socio-cultural diversities

It is a territorially based and socially determined "*deal*" to govern and manage the networked logistics, which is embedded in the complex dynamics of a particular context, through the open-ended, co-evolving and self-organising utilisation of local resources.

SDL boundaries

The boundaries of logistics districts, likewise by definition those of every ecosystem, have to be considered as provisional delimitations.

The boundaries of a "Sustainable District Logistics (SDL)" should be defined in flexible and adaptable way according to the co-evolution and self-organisation dynamics of a *multi-level-governance*, expressed in terms of *openness*, *intensity*, *solidarity* and *stability* of relationships between the district constitutive components and other networked logistics organisations (systems).

These boundaries depend on the capacity to create a clear image (vision) of what the future should look like, to define the suitable trajectories (paths) to meet the vision, to establish coherent organisational and social behaviours (missions) to follow the paths. SDL boundaries are, therefore, related to the consciousness and the values shared by the stakeholders.

Consciousness, values and the related behaviours (ethics) are developed by a recursive "cause and the effect" process. It is an autopoietic and self-referential process, fostered by the actors' potential and attitude to see and anticipate developmental logistics changes.

The cognitive process (consciousness) is inside the collective and individual knowledge. New knowledge changes the cognitive maps through which a system is analysed and managed. As new dynamics are discovered, they are transformed into new consciousness that becomes new knowledge along an open-ended continuity of interlinked feedback loops of concepts, approaches, methods and tools.

This iterative process is based on a dialogical (connecting) attitude that produces new concepts while the old ones are still alive: the cognitive maps are continuously decomposed and recomposed through the integration of new concepts and notions, improving the quality of collective consciousness.

Therefore, the boundaries of districts logistics cannot be defined "technically" through analysis carried out by an external observer who does not participate in the district dynamics.

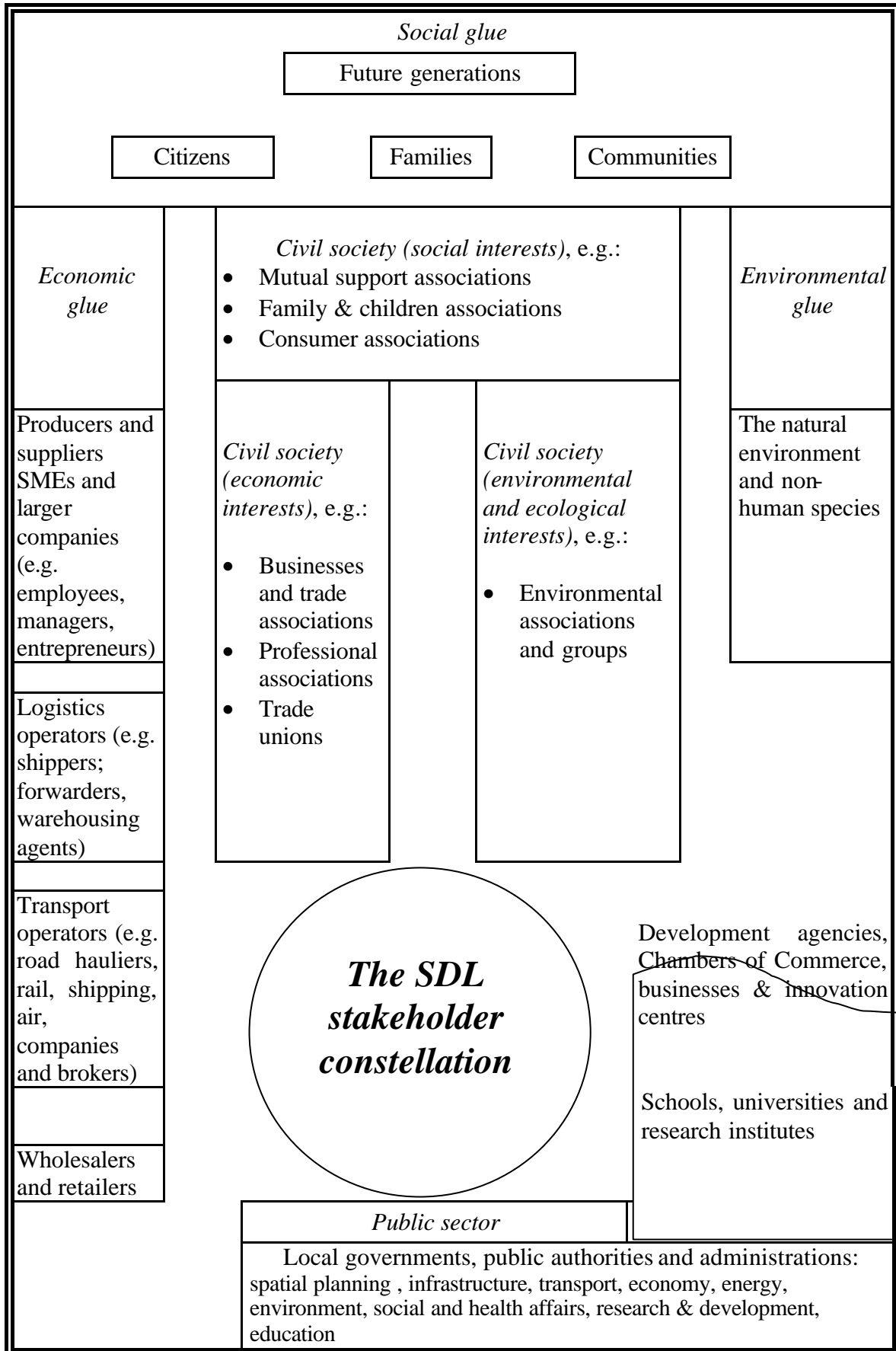
These dynamics are determined by the relationships between all the resources sourced, transformed, distributed and utilised throughout the logistics activities.

Only the logistics stakeholders can represent this spectrum of resources gathering different points of views and interests, of economic, socio-cultural and environmental nature: suppliers, producers, consumers, local communities, natural environment, non-human species and future generations.

SDL stakeholders

Sustainable District Logistics (SDL) is an approach aimed at the integration of intra and inter-organisational systems (the businesses and the Territory), their diversities, their different interests, their levels and dimensions of decision-making.

Therefore, the SDL stakeholders are those concerned by the "territorial governance", where an intensive flow of interrelationships exists between the civil society (groups and organisations of diverse interests), the public sector (governments and authorities) and the constitutive components of the system that act as social, economic and environmental glues.



Different motivations create a range of interrelationships between the SDL stakeholders, which can be translated into the following examples of expectations.

<i>Stakeholder typology</i>	<i>Expectations</i>
Producers and suppliers SMEs and larger companies (e.g. employees, managers, entrepreneurs)	Profit increase Logistics costs saving Logistics efficiency and simplification of procedures Stable and enduring relationships New markets, clients and relationships Collaboration and support from the public sector
Wholesalers and retailers	Remuneration, employment security Health work conditions
Logistics operators (e.g. shippers; forwarders, warehousing agents)	Training and professional career
Transport operators (e.g. road haulers, rail, shipping, air, companies and brokers)	
Local governments, public authorities and administrations	Planning criteria, procedures and efficacy in their fields of competence and responsibility Reduction of environmental and social pressures Public spending reduction Well-trained and experienced employees Citizens acknowledgment and legitimisation
General public (citizens, families and communities)	Equal opportunities of access to goods, services, places and people Efficient logistics, transport and information services Efficient and accountable institutions Better quality of life, also though the reduction of environmental and health problems due to logistics and transport
Environment	Reduction of natural resources consumption, pollution and so on Respect of biodiversity and ecosystems life
Future generations	Opportunities in terms of resources availability to allow them a sound development

Other stakeholders are extremely influential in the Sustainable District Logistics approach, even though they can be considered as secondary stakeholders, being external to the specific local system.

In any case, they are nested in the relationships developed by each typology of the primary (internal) stakeholders.

This is the case of: the regional and national governments; the regional, national and European associations of diverse interests (economic, socio-cultural and environmental); the European Union, where a large amount of actions are decided (policies, strategies, programmes, initiatives) and supported by several sources of assistance and founding (e.g. Structural Funds and the other economic instruments).

CHAPTER 10: ACTORS AND CHALLENGES

Actors

The broad perspective developed in the previous chapters is far from being shared by all actors at the local level.

- How can it then be used for concrete action?
- Who will promote such a more comprehensive approach to logistics at the district level and how is it possible to combine the interests of the different stakeholders and actors?

Very often the different interest groups are acting separately and communication between them is very difficult.

In this game we can basically distinguish three groups of actors:

- manufacturing and trading companies
- transport and logistics companies
- public bodies, institutions and public service companies

Manufacturing and trading companies as well as transport and logistics companies are mainly driven by economic objectives.

Cost arguments are overwhelming. Social and environmental issues are considered when there are legal requirements or when these issues can contribute to a better public image.

Trading and manufacturing companies tend to be more directly susceptible to their public image.

Transport and logistics companies are usually operating in a very competitive environment and follow more directly the requests of their industrial clients.

Public bodies on the other hand would be expected to follow a more comprehensive approach. This is generally the case, but there are many sectoral public institutions with special interests, sometimes linked to a particular industry – e.g. publicly owned railroad or highway companies.

In order to make a somewhat more precise appreciation of the different interests, it may be helpful to distinguish the following categories:

- manufacturing and trading companies
 - large
 - small
- transport sector
 - carriers
 - logistics
- public bodies
 - governments
 - spatial planning
 - economic promotion
 - environmental agencies
 - infrastructure agencies
 - chambers of commerce
- civil society
 - environmental NGOs
 - local citizens initiatives
 - labour unions
 - business and trade associations

The specific policies of these groups of actors and their ability to communicate with others vary considerably between regions. In the table below we tried to make a guess for the average situation in Europe. Despite all variations among regions, the basic orientations indicate that there are structural difficulties for the different partners to cooperate in a common, more integrated framework.

Whereas in business the economic dimension is dominating all other aspects, the picture is much more equilibrated among public bodies. This is intrinsically linked to the fact that the time horizon of companies is considerably smaller than that of public institutions. We estimate that in general the logistics companies tend to a slightly more comprehensive and long-term oriented thinking than the carriers. They can afford it since they are more flexible.

Whereas equity issues are not a particular concern of businesses, their interest in systemic principles has probably grown over the last ten years. Large companies may be more open to modern systemic management approaches in their internal relationships. Small companies on the other hand may – and that differs considerably between regions – put more emphasis on networking and on their relation to the local socio-cultural tissue.

	manufacturing and trading		transport sector		public bodies				
	large	small	Carriers	logistics	government	spatial planning	economic promotion	environment	infrastructure
time horizon	3y	3y	3y	5y	7y	20y	7y	10y	15y
OR01 environment	●●●	●●	●	●●	●●●●	●●●●	●●	●●●●●	●
OR02 economy	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●	●●●●●	●●	●●●●
OR03 socio-culture	●●	●●		●	●●●	●●●	●●●	●●	
OR04 equity individuals	●●●	●●			●●●●	●●	●●	●●	●●
OR05 equity territories	●		●	●	●●●	●●●	●●●●	●●	●●●●
OR06 equity generations	●●	●●●		●	●●●	●●●●	●●	●●●●●	
OR07 diversity	●●●	●●		●●●	●●	●●●	●●●	●●●	
OR08 subsidiarity	●●●	●	●●	●●●●	●●●	●●●●	●	●●	●●●
OR09 networking	●●●	●●●●	●●	●●●●	●	●	●●●●●	●	●●●●
OR10 participation	●			●	●●●	●●●	●	●	●

Table 1: an estimate of the importance of different aspects in logistics for different categories of stakeholders

The interest and the ability to cooperate of corporate and public actors varies considerably depending on the specific local culture. However, one can identify some basic difficulties in cooperation concerning logistics (in a large sense) between the three groups of actors considered here:

- the difference in the time horizon the actors usually consider
- the tendency to only look at the economic dimension in companies
- the sometimes very sectoral approach of small companies, carriers and specialised public agencies
- the very hard and short-term competitive environment in which many small companies and the whole transportation sector are operating as well as their the small capacities for strategic considerations

On the other hand we also can identify some opportunities for a more integrated cooperative approach:

- a growing public awareness for environmental and social and cultural issues in business
- a growing awareness that innovative solutions may pay a double or triple dividend giving positive results in more than one dimension
- the particular local roots of many small businesses which lead them to consider other than strictly economic arguments
- the different role of the regional public bodies: they are not only cooperation partners but they also have some means to influence the rules of the game. They can set boundary conditions or require certain considerations where permits (e.g. for construction) are required
- the innovative role of logistics companies who introduce new planning and management concepts with their clients
- the example of some large companies who have produced some very successful good practices of integrated logistics approaches within their companies
- the new opportunities for cooperation and transparency given by advanced Information and Communication Technologies

However, small companies and their networks, which are the main target group of the SDL approach, have particular difficulties to seize these opportunities without loosening their grown networks which are the basis of their particularly high contribution to economic growth in Europe.

The same logistics companies which for large clients often act as change agents towards a more comprehensive and often more sustainable approach, have difficulties in using their concepts based on hierarchical decision-making in a non-hierarchical network-like environment.

The city of Trier and a regional logistics association are developing a new cooperation between the regions largest operators on waterways, rail and road haulage, in particular concerning tri-modal logistics in the cross-border region of Luxemburg/Trier.

This INNESTO case study focuses on the organisational challenges of tri-modal cooperation, through the development of an organisational concept that optimises the cooperation of the actors in the three different modes considering the interests of public bodies and their possibilities to shape the frame conditions of logistics activities in the region (city of Trier, etc.).

The large transport volumes involved and their implications for infrastructure (e.g. investments in rail and waterways) combine economic, social and ecological aspects (sustainable development) both from a single business and from a regional development perspective.

Challenges

It seems that the efficiency gains from new logistics concepts – which on one hand have a much more comprehensive approach than the traditional trucker, but which on the other hand rely strongly on hierarchical decision-making – are a vital threat to the network-like organisation of industrial district which have been the main motors of economic growth in the last two decades.

As the importance of logistics increases, the pressure for joining highly efficient integrated logistic systems is growing for all companies.

Small companies which work in flexible networks where transport was organised traditionally, can join the logistic system of a large leading company in their sector (the growth of Benetton was mainly due to such a phenomenon) or they can optimise their own logistics needs with the help of a large provider of logistics services.

The second solution however, will only yield major efficiency gains if their main partners work with the same service provider.

The role of this “integrator” would be a very sensible one in the grown relationships of industrial networks. Often the choice of a large logistics provider leads to a less district-oriented and more Europe-oriented perspective of the companies.

In this situation it seems a challenging task to develop new instruments which would allow the actors in place to develop logistics solutions which are more appropriate to a districts perspective.

Based on the foregoing discussion we can formulate some basic challenges for the development of an operational tool-box for Sustainable District Logistics:

- **Network approach:** The instruments should allow to develop logistics co-operations which involve a series of decision-makers in a non-hierarchical structure. The participation should be based on voluntary agreements.

- **Tools for dialogue:** For non-hierarchical decision-making appropriate forms of dialogue are necessary. Appropriate tools should enhance the efficiency.
- **Sharing of information:** An important prerequisite for efficient negotiation is shared information on the main data. Modern ICT based on the Internet can provide new and flexible solutions.
- **Transparency of positions and priorities of the actors involved:** A transparent and systematised overview on the interests and stakes of the different actors involved can help to find optimum solutions for all parties involved
- **A common language:** Sharing information and communicating individual priorities efficiently requires common categories in which to describe these often not explicit things. Especially between private business, public bodies and NGOs different cultures often lead to misunderstandings and time-consuming debates.
- **Multi-dimensional appraisal:** Formal optimisation tools in logistics only look at costs. Multidimensional analysis tools should allow for a more differentiated analysis that can show the acceptability of solutions for various stakeholders with different priorities.
- **Scenarios:** Negotiation between different actors with different priorities cannot rely on one-dimensional optimisation. Scenarios can show the impact of different approaches in different dimensions and can help to invent new solutions.
- **Integration of existing logistics tools:** Existing logistics software tools are highly developed in terms of operational planning. It may be useful to extend their capabilities towards multidimensional approaches or to use them for showing the economic potentials of scenarios developed with other means.
- **Time efficiency:** all methods to be included in the SQM/SDL toolbox should be very time-efficient. Small and medium companies do not think they have much time to invest in such “experiments”. Visual presentation tools may be important for speeding up the mutual understanding process and facilitating the acceptance of new approaches.

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