

**PLANNING AND NEO-ENDOGENOUS MODEL FOR A SUSTAINABLE
DEVELOPMENT IN SPANISH RURAL AREAS**

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Abstract.

Changes in rural areas in recent decades have resulted in a new approach to local rural development, conceptualized as “neo-endogenous development”. This article describes the main characteristics of this new development model, which is based on three pillars, harnessing endogenous potential, developing social capital (endogenous units, local/global actors and neo-endogenous units), and promoting local participative democracy. Then, the balance of top-down - bottom-up approaches and their relationship to improved strategic planning for rural areas are analyzed. Finally, co-construction of a local sustainable development plan, by means of a knowledge model based on the experience of the University of Almeria Rural Engineering Research Group is proposed.

Keywords: Neo-endogenous model, Sustainable rural development, Local economic development, Governance, Social capital, Sustainability indicators, Conceptual Models, Knowledge engineering, Geographical Information System (GIS), rural areas, Social inclusion Policies, Neo-endogenous approach to regional development, Rural renewal.

1 Introduction

The 2007-2013 European Union (EU) rural development policy, simpler because it implements a smaller number of programmes and only one financing fund, will continue insisting on local development, health and food quality, environmental conservation of rural areas and ecological agriculture, economic growth, diversification and creation of employment, promotion of equality, etc. But above all, the policy incorporates new elements, such as:

- Improvement of local governance and development of endogenous social capital.
- Increased interterritorial and intraterritorial co-operation between the private and public sectors.
- Priority on including I+D+i in decision making.
- Promotion of Information and Communications Technology (ICT) and use of Indicator Systems (Arroyos, 2007; EC 1698/2005; EC 144/2006; EC, 2006; Tolón and Lastra, 2008).

Supporting EU policy, the Spanish Government passed Law 45/07 on sustainable rural development, which pursues its own rural policy and sustainable rural development model. It also co-ordinates the competences of Government and other authorities with measures supporting the EU, and is not limited to mere EU programme management. It includes cross-sectional performance with integrated territorial development strategies, by agreement for matters that fall under other governments, mainly regional governments and city councils, and measures adjusted to the differentiated qualification of rural areas (Tolón, 2008). To do this, it defines three types of rural zoning, based on their economic diversification and differential development: peri-urban, intermediate and remote, or areas to be revitalized, which require more intensive measures (Ashley and Maxwell, 2001; Cabus and Vanhaverbeke, 2003; Tolón, 2008).

1.1. Neo-endogenous development model and pioneering experiences in applying the LEADER methodology in rural areas.

Changes in rural areas in recent decades have resulted in a new local rural development model, conceptualized by Ray (2001a) as “neo-endogenous development”, based on harnessing endogenous material and cultural potential, on developing social capital in business, professional and organisation networks, and impelled by local participative democracy or good local government (Cabus and Vanhaverbeke, 2003; Ray, 2001a; Ward et al., 2005). The concept of neo-endogenous development comes under the global-local model, in which social and cultural capital is considered the main driving force (Cabus and Vanhaverbeke, 2003). Different actors in this process are characterized as endogenous units, local/global actors and neo-endogenous units (Ward et al. 2005). Local initiatives can construct ad hoc conceptual frameworks through accumulated experience of their real local experiments, but this perspective can only be reinforced by exploration of the interface where the top-down (exogenous) and bottom-up (endogenous) approaches interact (Ray, 2003).

Studies done under the LEADER Initiative are the main references to understanding this new development model, which focuses on rural areas below the national and/or regional level, both because of their geographic condition and their social and cultural context (Cabus and Vanhaverbeke, 2003). The LEADER Initiative is a progressive program in intent and execution (Saraceno, 1999), which has managed to create a new framework for institutional or community governance able to generate new actions within and going beyond developed programmes (World Bank, 2008), thanks to the emphasis put on acquiring capacities, creating community-based initiatives and partnerships or networks (Ray, 2000; Buller, 2000; Shortall, 1994). Tangible effects of the Initiative being imitated or adapted by other regions, are its capacity to implement new actions to improve the rural economic situation, generation of rural development plans at the multiple levels of government, and local participation and co-operation (High and Nemes, 2007; Saraceno 1999; World Bank, 2008).

A useful tool for neo-endogenous development is the combination of territorial identification and the creation of cultural marks or identifying features with which the territory sells itself to itself and to the outside world. These are generally based on specific differentiated quality products, such as tourism, landscape, specific agrifood products, quality-label products, etc... (Cabus, 2001; Cabus and Vanhaverbeke, 2003; Ray, 2001a; Ward et al., 2005).

Some problems and difficulties identified in applying LEADER programmes are the limited innovation they have produced (World Bank, 2008), the inability of the EU to simultaneously enact its rhetoric on endogenous development and local participation, and also lack of transparency in public spending (Nemes, 2004). Local players must be mobilised and the social and cultural capital developed (Cabus and Vanhaverbeke, 2003), promoting greater governance and co-operation at different territorial levels (horizontal and vertical) based on a system of continuous negotiation between public and private actors (Bache and Flinders 2004; Jahn, Peter, and Knickel, 2006; Marks 1993; Murphy and Chataway 2005; Stoker 1998; van der Ploeg and Retting, 2000). Moreover, the scale, nature and impact of endogenous evaluation of the LEADER programmes must be clearly established by mechanisms, practices and parameters that make it uniform across different contexts and European territories (High and Nemes, 2007).

The neo-endogenous model stimulates links between territorial institutions through intra and inter-territorial co-operation among both rural areas themselves and with non-rural areas. It even proposes the possibility of a Pan-European dimension of neo-endogenous development (Ray, 2001b; Ray, 2003). It also considers the interrelationship between urban and rural areas, especially in the “vicinity of urban areas or peri-urban areas”, where the economy is more closely related to cities, and application to both rural and non-rural contexts is possible (Ray, 1999, Donaldson, 2006; Cabus and Vanhaverbeke, 2003; Ray, 2001a; EC, 1999).

1.2 Local governance in rural areas: Functional Geographic Scope.

In the administrative context of regional development and economic regeneration, the EU uses the Nomenclature for Territorial Statistical Units (NUTS). The NUTS excludes specific and local territorial units in favour of general regional units, represented in Spain by Autonomous Regions (NUTS-2) and Provinces (NUTS-3), because of their political power (Keating, 2001; Donaldson, 2006). Even though no EU-wide comparison is possible (Casellas and Galley, 1999). At a more detailed level, but outside the NUTS regulation, are the districts and municipalities, called “local administrative units” (LAU).

Putman (1993) and Shucksmith (2000) found that endogenous rural development programmes should not be located within, or under the responsibility of ministries of agriculture or economic development agencies, because of the danger of centralised projects eroding their endogeneity (Beckman and Dissing 2005). High and Nemes (2007) affirm that created institutions and local capacity for evaluation and learning must be reinforced to improve the results of the LEADER programme and new neo-endogenous institutional framework. One fundamental aspect of governance is the promotion of participation by local stakeholders and the public at large, which requires democratic decentralisation, community self-organisation, new partnerships with civil society, and combating social exclusion in public and private entities (Ashley and Maxwell, 2001; Goodwin, 2003; Paus, 2007; Shucksmith, 2000; Shortall, 2008).

To effectively promote stable, integral territorial rural development, a new independent and autonomous local government structure is necessary, because conditions and problems are not the same everywhere due to the specificity of each place, and they must be solved where their impact is felt, since there is no single solution for all (Tolón, 2008). But for a “neo-endogenous” model, the simple transfer of competences from central to regional and municipal governments is not enough. There has to be a balance between the community and high levels of government (Reed, Fraser, and Dougill, 2006; Sucháček and Malinovský, 2007).

A new decentralized local power is required, with a regional scope such as the *comarca*, which has a long tradition in Spain, and so seems to have the most appropriate functional scope for LEADER application, especially in rural areas. This supra-municipal unit is not considered at the administrative level, but based on the accumulated experience of present Local Action Group (LAG) structures, with public and private members, or other structures, such as associations or municipal federations, authentic regional governments could be created, which would have broad executive powers, if not exclusive, at least binding beyond the mere “collaboration agreements” provided for in Law 45/07 for sustainable development of rural areas, not only with the National Government, but also with other governments. This situation requires an exercise in courage and political generosity by all governments, especially regional. Some precedents for regionalisation, such as in Catalonia and some one-province Autonomous Regions like the Region of Murcia, should be strengthened (Tolón, 2008).

So the “Plan for Rural Areas”, one of the instruments provided for in Law 45/2007 is of particular interest, because it supports the need to take the supramunicipal districts as functional geographic units, which are constructed with the participation of both local government and social capital, under the supervision of the Autonomous Regions, through the Strategic Territorial Guidelines for Rural Planning – “*Directrices Estratégicas Territoriales de Ordenación Rural (DETOR)*”.

1.3 Sustainability Indicators as an assessment tool in the neo-endogenous model.

International sustainability indicator systems (OECD, UN and EU) as rural development evaluation tools have emerged as an important reference for constructing national and regional systems, especially in developed countries. They have developed new zoning systems and provided the guidelines for adapting the indicator systems to other geographic scales. They have also contributed many reference values and technical procedures for calculating new indicators. But the language and terminology used (today irregular and differing widely) must be standardised and unified, and the operation of existing Sustainability Observatories must be adopted. The target values have usually been those outlined in treaties, or agreements or global targets. Moreover, countries are encouraged to use the development indicators from their Sustainable Development Programmes and Plans as a guideline (Tolón and Lastra, 2008).

Research in the construction of an indicator system in eight Spanish rural areas (www.indirural.ual.es) by a team at the University of Almeria demonstrated the need to delve further into the local nature of indicator systems by acquiring new data (which requires more fieldwork), designing new indicators by aggregation (“indicator baskets”), applying the indicators to new rural areas which are nearby, but have different natures, such as areas with intensive agriculture, and comparing them with those already established in open or mountainous rural areas (LEADER), and involve public and private institutions in the use of indicator systems, submitting them to debate and providing them with legitimacy for decision making.

In particular, perception indicators must be generated in all dimensions and subject areas of the indicator system. The aim is to assess the population’s satisfaction with current conditions, to find out how well accepted the performance of public bodies is, to seek ways of communication that allow them to get closer to the general public, and especially to local authorities, and to foster better use of indicator systems as a tool for assessing and promoting local governance. However, this requires suitable time series data, and current databases are deficient, especially on environmental and local issues, making it difficult to calculate indicators (Ashley and Maxwell, 2001).

1.4 The Information and Communications Technologies as a supporting tool for neo-endogenous governance.

Today, the Information and Communications Technologies (ICT) have become embedded in all fields of science and areas of work, and the social and environmental sciences are no exception.

The term “Enviromatic” or “Environmental Computer Science” includes all Environmental Science ICT applications (Avouris and Page, 1995; Bristow, Steinke, and Green, 1995; Green and Klomp, 1998; Huang and Chang, 2003; Rautenstrauch and Patig, 2001; Raubtold and Brunnstein, 1995; Tochtermann and Maurer, 2000). This term developed mainly in the U.S.A. and parts of Europe, and can be defined as a “discipline that integrates different ICT applications in environmental sciences through a holistic vision of models, techniques and goals.”

This new discipline integrates many ICT methods, along with versatile environmental monitoring networks in partnership with both simulation techniques and multidisciplinary mathematics, for providing solutions that adequately assess risks and are directed at consensus and cost-effectiveness (Huang and Chang, 2003). This emerging discipline, multidisciplinary, instrumental, with a broad spectrum of specific and international applications is focused on developing both technical and institutional standards and protocols for sharing and integrating data and environmental information (Biosphere Data Project, University of California at Berkeley, 2004).

However the development of “knowledge infrastructure” has been limited to urbanized areas, where there are universities, research centres, and concentrations of big business, etc. Nevertheless, the emergence of the knowledge-based economy has potential consequences for the economic development of rural areas in the proximity of urban networks. The availability to nearby cities is a precious asset for economic development in rural areas, as educated people place a high value on recreational opportunities, peace and quiet, and a healthy green environment. Companies have the option of being located in rural areas as long as the distance or time it takes to travel to critical infrastructures such as airports, important knowledge centres, etc., is kept reasonable, and the rapid development of ICT also allows knowledge-based workers to work in rural areas (Cabus and Vanhaverbeke, 2003). Therefore the ICT are a key organisation tool for information to generate local players, and to bring the knowledge contributing to development of rural areas closer to them.

1.5 Planning for rural development.

The problems and deficiencies in top-down rural development planning since the eighties have led to the bottom-up or local development approach, which aims at improving endogenous characteristics, social participation and assimilation of plans and programmes executed.

Today, to improve local governance, it has been demonstrated that a balance between these two approaches (top-down/bottom-up) leads to integral, multi-sector and cross-sectional strategic rural planning (Ashley and Maxwell, 2001; Shucksmith, 2000), including the endogenous characteristics of the particular geographic location (High and Nemes, 2007), and the organisation, canalisation and interaction of the many stakeholders (social capital), all of whom have different definitions of problems and goals, and operate at different political levels (Murphy and Chataway 2005; Paus, 2007).

2 A planning model for neo-endogenous rural development

We present a methodological proposal for the co-construction of a “Local Sustainable Development Plan” (Figure 1), which fills the need for a new form of governance based on an appropriate knowledge model for local rural development, which strengthens a new institutional framework in a subregional functional and geographic scope (supramunicipal and infraprovincial), and which is multi-sector, cross-sectional, and territorial, so it can evaluate the potential development initiatives according to the economic, environmental and social welfare capacity of the territory. In addition, this new form of governance must enable the balanced participation of all local social capital, especially of endogenous units, local/global actors and neo-endogenous units, and promote their capacity for learning and innovation, interterritorial and intraterritorial co-operation, and stakeholder networking, as a way of participating in the new knowledge society.

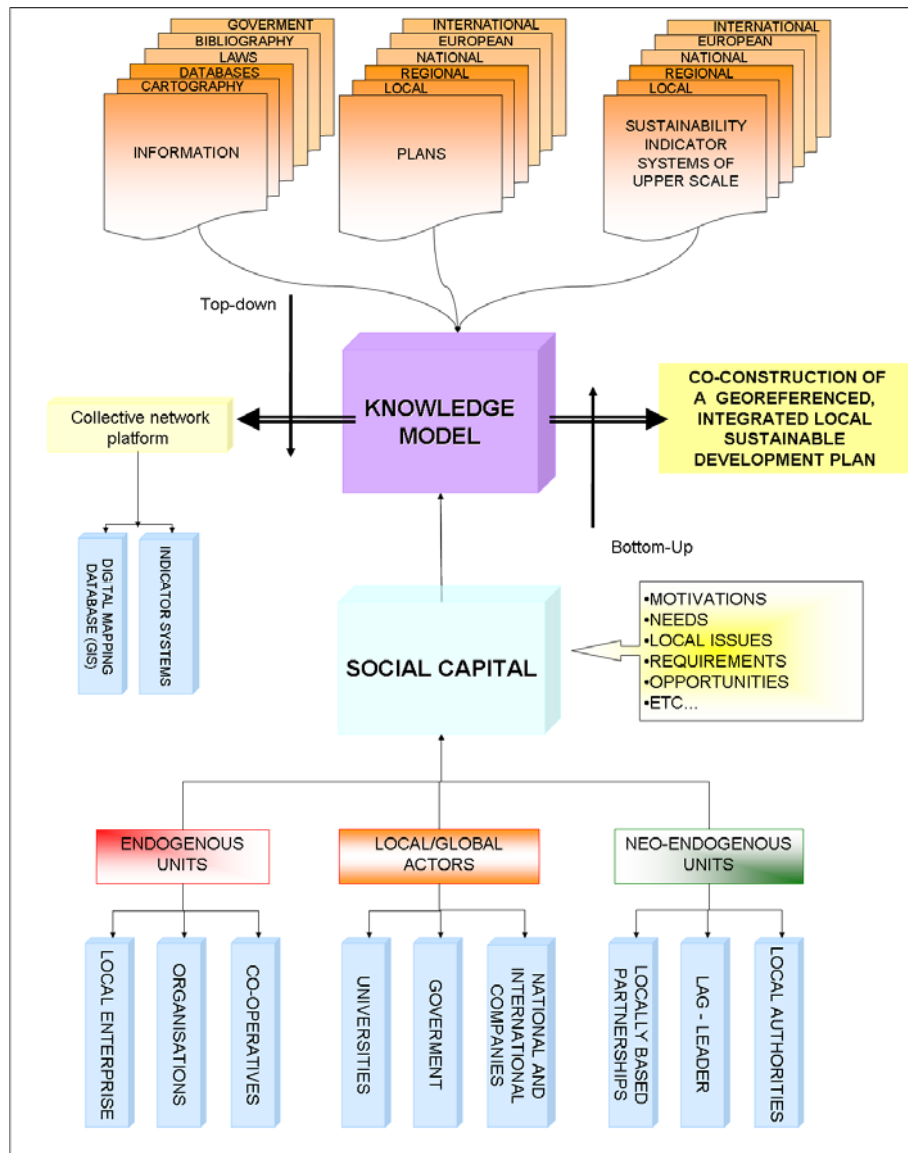


Figure 1 Methodology for the co-construction of a Local Sustainable Development Plan using a knowledge model

For such neo-endogenous development and new form of local governance to be successful, RD&I must become an integral part of decision-making by local authorities and social partners, who must be assisted in this by the innovative service network technologies (ICT) and a standardized knowledge base on local rural development. Finally, the use of a dynamic and georeferenced indicator system is suggested as a monitoring and assessment instrument for finding a balanced solution to the conflicts between economic, environmental and social sustainability targets.

3 Steps and Tools for application in Andalusian LEADER areas.

This section describes the eight tasks considered necessary to achieve these goals based on application experience in many LEADER areas of Andalusia (southern Spain). This process is shown in Figure 2.

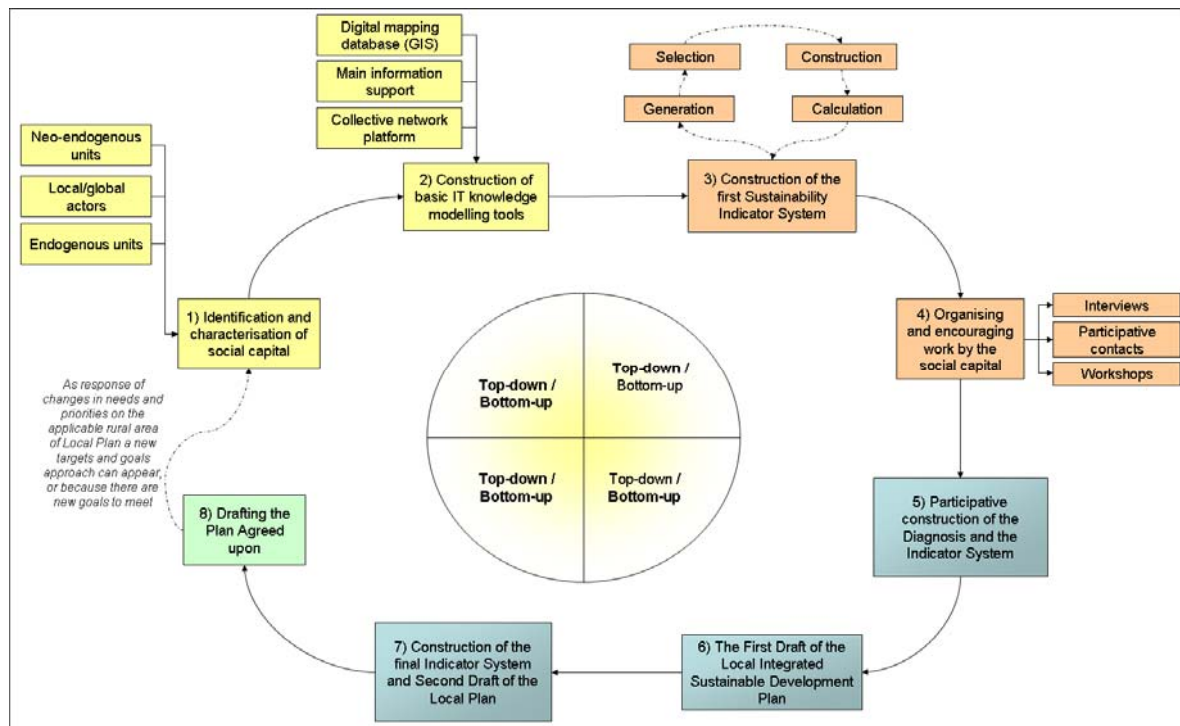


Figure 2. Steps and Tools for co-construction of a Local Sustainable Development Plan using a knowledge model

Step 1. Identification and characterisation of social capital in a rural area

The first task is to identify the social capital and governments in the territory in question. According to the neo-endogenous concept, the institutions identified within the social capital are characterized as: Endogenous units, Local/global actors and Neo-endogenous units (Ward et al. 2005), defined as:

- **Endogenous units** include households, local enterprise, community organisations, producer co-operatives and informal local networks, etc. These agents tend to work almost wholly within a local rural area.
- **Local/global actors** are those who work both locally and globally but do not necessarily have any specific local orientation or commitment. Such actors might include the local elite and VIPs, NGOs, national and international companies, public agencies, trans-local alliances, the media and regional universities. Basically, a local/global actor may take on the role of a ‘neo-endogenous guardian’ if committed to local development.
- **Neo-endogenous units**, which can act as critical intermediaries between endogenous units and local/global actors, include locally based partnerships, EU-funded groups, LEADER groups, LAGs, business support agencies, ‘certified quality product organisations, local authorities and voluntary organisations. These are intrinsically locally rooted and have a local orientation, but also draw upon non-local networks and resources. For example, LEADER groups are able to cluster other groups from across the European Union and local authorities in regional, national, and sometimes transnational networks.

Step 2. Construction of basic IT knowledge modelling tools, and digital mapping database (GIS) for rural areas

The proposed methodology includes the construction of a main information support (knowledge model), and within it a collective network platform, to extend and complete the interdisciplinary ICT work, including economic, environmental and social aspects of sustainable rural development. These tools should facilitate decision-making, by improving the IT architecture for publicising

information more uniformly, and developing such innovative technologies as the Semantic Web, which associates XML labels with different subject areas, enabling automatic analysis of websites.

The knowledge model should contain templates in which researchers and social agents, responsible for the co-construction of a Local Sustainable Development Plan, must include information about the different aspects studied. Moreover they must prepare the necessary infrastructure to support conceptual maps, and the first map links.

The knowledge model should also include digital mapping using a Geographic Information System (GIS) georeferencing any information acquired, e.g., data, indicators, content of plans, etc., as territorial support to facilitate dissemination and communication of information, as well as the work of the Local Plan construction team. Thematic layers with a diversity of georeferenced information on the applicable rural area are recommended.

Step 3. Construction of the first Sustainability Indicator System and a first diagnosis.

Good endogenous evaluation of the results leads to good exogenous evaluation, and therefore, hybrid evaluation is a valid tool that can become an international reference to follow (High and Nemes, 2007), especially when managing new resources, programmes, projects and plans that benefit rural areas. Usually, the impact and effect of rural development can be evaluated by two approaches that must be complementary. The first is with a Sustainability Indicators System for diachronous and synchronous analysis; and the second is founded on stakeholders' or general public's perceptions, which provide a holistic vision of rural development (Paus, 2001, 2003, 2007). For construction of the Indicator System, the databases available for summarising data from different primary and secondary information sources, such as bibliographical information, administrative registries, scientific research, maps and analogical information, etc., must be analysed, classified and characterized.

De Roest and Menghi (2002) and Hirczak and Mollard (2004) believe that the indicator system can be chosen and analysed by experts (Top-down), but in the neo-endogenous model, this approach is limited, and participation of key social stakeholders and general public (Bottom-Up) in the generation, selection, application, use, debates and validation of indicators must be increased, and later used by experts (Paus 2001, 2003), arriving at a Top-Down – Bottom-Up balance, allowing indicator generation to continue iteratively over time, with the changing reality of the medium.

Consequently, in a first stage, the first sustainability indicators are generated, classified, constructed and calculated from a compilation of sustainability indicators collected from other models (Top-Down) following the Initial Thematic Structure. With the basic data acquired and first SIS results, a preliminary diagnosis of the rural area can be made by subject.

Step 4. Organising and encouraging work by the social capital.

In neo-endogenous planning, work with the social capital must be a constructive and participative exercise, not only informative sessions (World Bank, 2008), for which there must be participative contacts, interviews and workshops with stakeholders so a balanced and inclusive representation of each type of social capital and the different government departments can be selected from among those showing the most interest in and availability for active participation in the co-construction of a Local Sustainable Development Plan.

To promote the use and proper handling of IT tools, practical courses must be organised for the main users on the handling and management of the Knowledge Model (participative Web), and especially the tools involved, e.g., CMap-Tools and templates for systematising information. At the end of each course, a discussion forum to gather the opinions, needs, concerns or contributions from Knowledge Model users is recommended.

Step 5. Participative construction of the Diagnosis and the Indicator System

This task should be done through participative surveys, interviews and workshops for local representatives, who are urged to use the Knowledge Model Website, so as to achieve a collaborative network in which the viewpoints and considerations of local actors are entered so they can be dealt with, queried and managed by the research team. This is based on the results of Step 3. Later the diagnosis made by the researcher or expert must be compared with the views of local stakeholders in a consensual Integrated Diagnosis. In addition, the suitability of the Indicators initially proposed (Top Down) must be evaluated with the participation of local stakeholders, generating new Indicators for co-construction and social validation of the Indicators (Bottom-Up). Finally, the results of monitoring Use of the Knowledge Model must be evaluated, and conclusions drawn to improve its performance.

Step 6. The First Draft of the Local Integrated Sustainable Development Plan

When the plans are prepared by governments, there is a lack of co-ordination and cooperation between different levels of government, e.g., EU, national government, autonomous regions and city councils (Marks 1993; Bache and Flinders 2004), and even different departments at the same level (e.g., between different regional ministries) as well as certain dispersion in the administrative transaction of projects, despite the efforts made by Spanish Law 16/2002 on PCIC, which seeks integrated environmental transaction. The impulse given by the Plan for Rural Areas in Law 45/07 on rural development goes in the right direction, because it recognizes the need for co-operation between the different governments and cross-sectional performance through integrated territorial development strategies. Project definition must also be co-ordinated through planning, especially public projects, regardless of the government that executes or finances them, whether national government, autonomous regions, provincial government or city councils (Tolón, 2008).

Consequently, any plans, Projects, Programmes or Research Lines applied in the rural area in question, at all available levels (local, regional, national, European and international) must be identified, compiled and characterized before the draft can be written. These are analysed to detect any unco-ordination, contradictions, redundancies, deficit areas or other problems in their performance or scope of execution, for the purpose of laying the basis for construction of the First Draft of the Local Plan.

In addition, this process offers the opportunity to identify possible transfer of results from the research collected and analysed to the Local Integrated Sustainable Development Plan, to government plans or the community in general. This must be continual, updating the information with the appearance of new plans, programmes, lines of research, etc., that may be generated.

A first draft of the integrated, georeferenced Local Sustainable Development Plan is made on the basis of the information compiled and analysed, which includes all the dimensions of development (economic, social and environmental), and clearly indicates government investment and private action to be promoted, as identified by the research or experts team undertaking the co-construction process.

Under the principles of neo-endogenous development, this activity must be conducted through participative surveys, interviews and workshops among key stakeholders, in which the use of the Knowledge Model website must be promoted through the use of templates and other IT tools developed for this purpose, starting off with the first draft of the Local Plan. A collaborative network considering the opinions and contributions of local stakeholders, which are dealt with, consulted and handled by the whole team is thereby achieved.

The development of this stage advances construction of the SIS, and in particular, definition of critical, desirable and objective values. Thresholds (desirable and critical) based on reference values should be set for each indicator selected and developed in a participative manner, and then

milestones showing progress towards desired goals should be set for key dates. They are then entered in the Knowledge Model Website and on the Collective Network Platform.

Step 7. Construction of the final Indicator System and Second Draft of the Local Plan.

The research or experts team constructs the final SIS on the basis of contributions made in participative instruments (local surveys, interviews, workshops and use of the Knowledge Model). The second draft of the integrated Local Sustainable Development Plan, is also written up with the contributions made, and is evaluated exogenously using multi-criteria indicators (economic, environmental and social).

Step 8. Drafting the Plan Agreed upon.

After the final SIS and second draft of the Local Plan have been made, participative surveys, interviews and workshops must be held to find out opinions on it. This way, the main users learn to use the Knowledge Model better, and new contributions to the Plans are acquired through the use of templates and other IT tools developed for this purpose. These activities enable the Plan to be endogenously evaluated by Knowledge Model users.

A simple and practical methodology that allows all the information and opinions of stakeholders involved in this process to be collected and systematised, is for a Symposium or Workshop to be organised and held. A representative sample of the social capital, government and research or experts should participate, so that the content of the georeferenced, integrated Local Sustainable Development Plan can be agreed upon. It is recommended that the Symposium be structured in subject areas and debates held around major subjects of increasing complexity.

The georeferenced, integrated Local Sustainable Development Plan is drafted by the research or experts team including both the final contributions acquired in the Symposium and in previous participative processes. Finally, a technical document is written up that describes the Knowledge Model and its use, the Local Sustainable Development Plan, the SIS and the impact of rural development plans on the area of interest.

3 Results of rural sustainability indicators on development: experience in Andalusia

The University of Almeria research project “Construction of Sustainability Indicators in rural Spanish LEADER and PRODER areas – Indi-Rural”, found eight rural areas as the geographic scope of performance of LEADER and PRODER in Spain, of which four are in Andalusia: Alpujarra, Almanzora, Serranía de Ronda and Bajo Guadalquivir. In this study, advances were made to Step 3 of the proposed model, in which a preliminary indicator system composed of 228 simple indicators in 8 subject areas was designed for open and mountainous rural areas (Table 1). The associated IT programmes are now under construction and the social capital is being organised and encouraged.

In the characterisation of social capital, associations that manage the EAFRD funds have been identified in Spain, and specifically, in the LEADER methodology regions, as a main neo-endogenous unit, which usually adopts the legal form of a Corporation (S.A.) with mixed participation, public (city councils, autonomous regions, provincial government, etc.) and private (e.g., companies, producer associations), and is responsible for promoting and co-financing rural development projects.

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Table 1 INDIRURAL - Sustainable Indicator System

AREA	INDICATOR	AREA	INDICATOR
Reference Background	- Altitude	Demography	- Population, by sex and age
	- Municipal limits		- Crude birth rate
	- Pasture area		- Crude death rate
	- Area natural grassland		- Infant mortality rate
	- Area in use for agriculture (SAU)		- Rate of natural increase (RNI)
	- Area under cultivation		- Rate of aging
	- Area permanent grazing		- Total internal emigration
	- Area other forested land		- Total internal immigration
- Area other non forest land	- Total foreign immigrants		
- Total housing	- Migratory balance		
Labor means	- Active population	Local economy	- Urban property taxpayers
	- Employed active population		- Rural property tax owners
	- Unemployed active population		- Fiscal income by inhabitant
	- Total unemployment registered		- Balance of budget of income
	- Total female unemployment registered		- Balance of budget of expenses
	- Family income available per inhabitant		- Budget Deficit or Surplus
	- # of income tax declarations		- Total active business premises
	- Net income declared		- Business taxpayers
	- Work units on farms		- Agricultural investments
	- Total labour societies		- Investments in construction
	- Total number of co-operatives		- Investments in industry
- Number of farm co-operatives	- Investments in services		
Tourism, Energy and Transport	- Total capacity accommodations	Agriculture and Livestock	- Ecological farms
	- Total number vehicles		- Cattle census
	- Total road network		- Sheep Census
	- Number of cities and towns		- Goat census
	- Territorial arteries		- Pig census
	- Electricity consumption		- Fowl Census
	- Residential electricity consumption		- Horse census
- Electricity consumption by agriculture	- Census of mother rabbits		
Natural resources	- Weighted erosion index	Social resources	- Public primary schools
	- Soil by slope		- Students per public primary school
	- CO emissions		- Public secondary schools
	- Volume of water supplied to the total population		- Students per public secondary school
	- Volume of water invoiced per municipality		- Adult education centres
	- Annual production of solid waste		- Students per adults education centre
	- Elimination of SUW in controlled garbage dumps		- Total primary care resources
	- Area forest		- Primary Care Resources – health-care centres
	- Number of threatened species of birds		- Total welfare centres and breakdown
- Total protected natural areas (PNA) included in the listing of EU places of interest	- local election voting rate		

In the initial diagnosis of the rural area, considerable differences were identified among the municipalities in the *comarcas*, whether due to their geographic, political or productive characteristics and/or external influences. It was therefore necessary to make an analysis of the whole *comarca* and then again the *comarca* without the municipalities that differ from the rest. Characterising indicators, such as population density, agricultural area, number of industries, number of health centres, and schools, and so on, were developed to obtain uniform areas. Based on

the results, the municipalities differing from the rest were identified, and we proceeded to define “complete” areas and “reduced” areas, the first meaning rural areas including all the municipalities in the *comarca*, and the second a “sub-*comarca*” made up of the more similar municipalities (excluding less rural and mountain municipalities).

In the Alpujarras, Berja stands out for its importance in recent years due to the intensive, or greenhouse agriculture, where it is estimated that there are nearly 1400 hectares under plastic, which is 30% of the agricultural area in use (AAU) within the municipal limits, and 15% of the AAU in the *comarca*. The economy in Macael and Olula del Río, in the Almanzora *comarca*, is based on marble quarries and their associated activities, which has made them stand out within the *comarca* and become a pole of development, a fact that is reflected in their high score on the Business Tax indicator in the extraction and transformation of non-fuel minerals and derived products section, which shows that 61.12% of the *comarca*’s business taxpayers are concentrated in these two municipalities (2005).

The AAU in the municipal limits of Ronda (Serranía de Ronda *comarca*) covers 80% of its area, and represents 30% of the *comarca*, a fact that corroborates the strong agricultural component of the municipality as the activity on which its economy is based. Rural tourism stands out as the main means of economy diversification. The geographic location of the Bajo Guadalquivir *comarca*, on the left bank of the river of the same name, favours agricultural. Utrera is the socioeconomic nucleus, mainly because of its fertile soil and good communication by highway and railroad (16% of the AAU of the *comarca*, and 78.47% of the municipality). The strong economic activity in San Lúcar de Barrameda should also be emphasized, due to agriculture typical of the *comarca*, and the growth of an emergent industry, diversifying the production structure and improving the standard of living of its inhabitants.

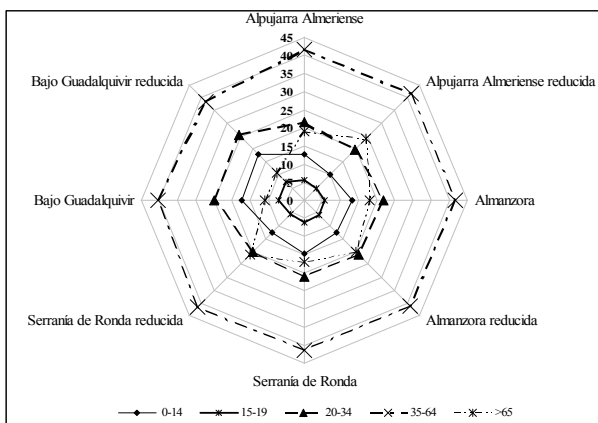


Figure 3. Percentage distribution of the population of the four Andalusian *comarcas* (year 2004).

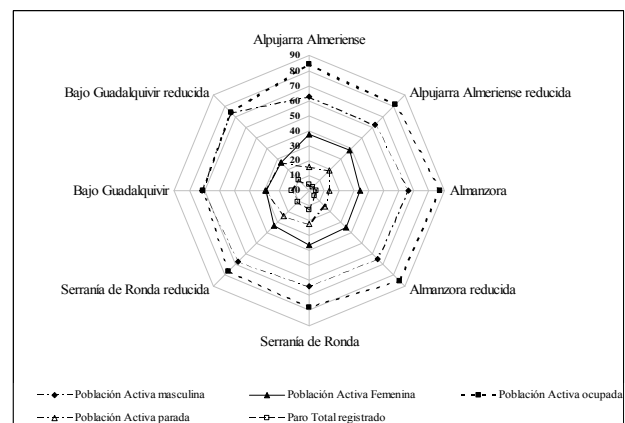


Figure 4. Percentage distribution of the active population of the four Andalusian *comarcas* (year 2001).

Analysis of the preliminary results from the calculation of the socioeconomic indicators demonstrates the aging population in rural areas, with a percentage of 16.90%, which is above the average for Spain (INE, 2009) in the Alpujarra, Almanzora and Serranía de Ronda, in both complete and reduced areas (Figure 3). The Bajo Guadalquivir *comarca* has a lower percentage due to a higher birth rate and increase in the population between 0 and 14 years. In general the population of these rural areas is between 20 and 64 years (over 60%), which is a higher percentage of the active population than the rest of the *comarcas* (Figure 4). But it should be considered that around 40% is between 35 and 64, which means greater aging of the population in the future, with the disadvantages that this represents in the development of production. In all the *comarcas* it is observed that the active male population is twice or even three times higher than the active female population in the Bajo Guadalquivir. Total registered unemployment is lower in the *comarcas* of

Almeria (Alpujarra and Almanzora) than the average for Spain and Andalusia (10.69 and 11.64% of the active population, respectively), and similar in the other two *comarcas*.

In the environmental dimension, wide differences are observed between the inland *comarcas* and the Bajo Guadalquivir, where only 5.37% of the AAU is forest, mainly due to the *comarca*'s strong agricultural component. In all the *comarcas*, bush and grass without trees predominate, followed by scrub (Figure 5). In the *comarcas* of Almeria, there is a considerable percentage of open spaces with little plant cover, because of climate and soil conditions.

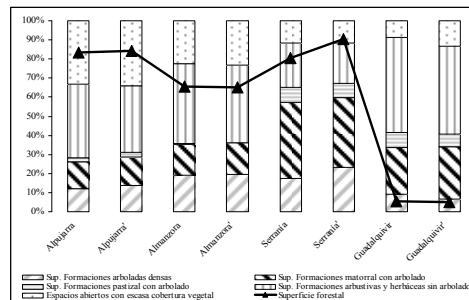


Figure 5. Forested area and percentage distribution of forests in the four Andalusian *comarcas* (year 2004).

4 Conclusions

In order to achieve neo-endogenous sustainable rural development, new forms of governance must be created, and in particular, new ways of designing strategies and integrated local plans, with a multi-sector and cross-sectional approach, that pursues the development of endogenous potential through innovation, participation and validation of its social capital, and innovating auxiliary instruments such as Knowledge Models (ICT), that improve the IT architecture for publicizing information, and Sustainability Indicators for monitoring and evaluation.

Worldwide development of the of Information and Communications Technologies (ICT) has been mostly limited to urban areas, and greater advances in its incorporation in rural areas is necessary, so they can improve the quality of life and work of the rural population, develop new productive activities and, in especially, facilitate and to improve local governance (e-government, e-management...).

The SIS is currently a rural development evaluation tool, and such international systems developed have become an important reference for the design of national and regional systems, especially in developed countries. They have developed new frameworks for zoning and have dictated the patterns to follow for their adaptation to other geographic scales, and have also contributed many reference values and technical indicator calculation procedures, but the language and the terminology used (very dispersed and irregular) must be made more uniform and unified and adopt the operation of the existing Sustainability Observatories.

Future development of a Knowledge Model will allow local public and private institutions to become involved in the use of Indicator Systems, for the monitoring and controlling their legal and administrative instruments (Strategies, Sectorial Plans: Tourism, Agriculture, Transport, Energy,... Territorial Zoning Plans, Sustainable Municipality Network, etc.).

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