Use of knowledge model for neo-endogenous governance in rural areas

Construction of Knowledge based systems in the Spanish rural "comarcas"

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ABSTRACT

New forms of governance are required in rural environments with a neo-endogenous, multisector, horizontal focus that seeks to develop its potential through innovation, participation and validation of its Social Capital. New information and communication technologies (ICT), such as the appropriate knowledge models, that improve the IT architecture used for spreading information, associated instruments, such as Sustainability Indicators, for their follow-up and evaluation, are all necessary to do this. This article first describes and analyzes the main features of new forms of governance and social capital in rural areas. Then, the characteristics of the knowledge models and its use in the co-construction of the Rural zoning plans, under neo-endogenous development principles and the law 45/2007, are analyzed. Afterwards, the main features of Knowledge-based systems (KBS) and its application in the management of the Rural zoning plans are described. Finally, we show the first experiences in the KBS construction in the *comarcas* of Los Velez and Poniente, province of Almeria, Spain.

Keywords: Neo-Endogenous, Knowledge Model, Governance.

USO DEL MODELO DE CONOCIMIENTO PARA LA GOBERNANZA NEOENDÓGENA EN LOS ESPACIOS RURALES

Elaboración de Sistemas Basados en Conocimiento en las comarcas rurales españolas

RESUMEN

En el medio rural se requieren nuevas formas de gobernanza con un enfoque neoendógeno, multisectorial y transversal, que persiga el desarrollo de su potencial a través de la innovación, la participación y la validación de su Capital Social. Para ello, se necesita de las nuevas tecnologías de la información y la comunicación (TIC), como los modelos de conocimiento apropiados, que mejoren la arquitectura informática de difusión de la información, e instrumentos asociados como los Sistemas basados en conocimiento (KBS) para su gestión y los Indicadores de Sostenibilidad para su seguimiento y evaluación. En este artículo, en primer lugar, se exponen y analizan las principales características de las nuevas formas de gobernanza y del capital social en el medio rural. Posteriormente, se analizan las características de los modelos de conoci-

miento y su uso en la co-construcción de los Planes por Zona Rural, según los principios del desarrollo neoendógeno y de la ley 45/2007. A continuación, se describen las principales características de los Sistemas basados en conocimiento (KBS) y su aplicación en la gestión de los Planes por Zona Rural. Finalmente, se presentan las primeras experiencias en la construcción de los KBS en las *comarcas* de Los Vélez y Poniente de la provincia de Almería, España.

Palabras Clave: Neoendógeno; Modelo de Conocimeitno, la Gobernanza.

USAGE DU MODÈLE DE CONNAISSANCE POUR LA GOUVERNANCE NEOENDÓGÈNE DANS LES ESPACES RURAUX

Construction des systèmes basés sur la connaissance dans les régions espagnoles

RESUMÉ

Les zones rurales ont besoin de nouvelles formes de gouvernance avec un accent neoendogène, multisectoriel et transversal, qui poursuivent le développement de leur potentiel grâce à l'innovation, la participation et la validation du capital social. Pour cela, nous avons besoin de nouvelles technologies de l'information et des communications (TIC) comme les modèles de connaissance appropriés qui améliorent l'architecture informatique de la diffusion de l'information, et des instruments associés tels que les systèmes basés sur la connaissance (KBS) et les indicateurs de durabilité pour leur suivi et leur évaluation. D' abord, cet article décrit et analyse les principales caractéristiques des nouvelles formes de gouvernance et le capital social dans les zones rurales. Ensuite, nous analysons les caractéristiques des modèles de connaissances et de son utilisation dans la co-construction des plans de zone rurale, sous les principes du développement neoendogène et la loi 45/2007. On décrit ensuite les principales caractéristiques des systèmes basés sur la connaissance (KBS) et son application pour l´ aménagement des plans de zone rurale. Finalement, nous présentons les premières expériences de la construction des KBS dans les aires rurales locales Los Velez et le Poniente de la province d'Alméria de l´Espagne.

Mots clé: Neoendogène, Modèle de Connaissance; La Gouvernance.

I. NEW FORMS OF GOVERNANCE IN RURAL AREAS

Farinós-Dasí (2008a) shows that the concept of governance came out of the sphere of institutional economy and regulation, for the purpose of simplifying regulation and intervention by public authorities, and to facilitate decision-making by the rest of social agents, especially economic. But, because of its polysemous nature, it developed along different lines and schools of thought, leading to local or territorial governance for channelling the new role and responsibilities of the state and the various actors in political decision-making (Koresawa and Konvitz, 2001; Harris, 2001).

The term governance is a highly controversial concept (Stoker, 1998; Rhodes, 1996), which in principle was considered synonymous with government, but not in the sense of formal institutions and/or governmental structures (Ramos-Real and Delgado-Serrano, 2002). Today it is a broader concept, with many meanings and consequences in the social sciences (Kjaer, 2004), including, among others, the

dynamics of governmental and nongovernmental organisations working together, the way political power is distributed inside and outside of the State, and the emergence of supranational pressure groups pushing worldwide goals (Ramos-Real and Delgado-Serrano, 2002).

Farinós-Dasí and Romero-González (2008) think governance is a new form of territorial government the purpose of which is to manage public policy efficiently, predicting its effects and evaluating its territorial impacts, and becoming an alternative to the demonstrated limitations of both traditional bureaucratic methods and new business models applied to the new public management. The White Paper on European Governance (EC, 2001) gives the five principles that should be applied for good governance (openness, participation, responsibility, effectiveness and coherence), which reinforce the principles of proportionality and subsidiarity of the European Union. In neo-endogenous governance, participation of the population in public affairs and in particular in decisions that impact on the territory (Farinós-Dasí, 2008b) and in drafting public policy (Ganuza and Moyano, 2008) is necessary.

Governance in the new EU and Spanish Rural Development policies

The changes in the European rural environment have led to the incorporation of new elements in European rural development policy, such as improvement of local governance and endogenous development of social capital, incorporation of the ICTs (e-government/e-management) in the rural world, inclusion of RD&I measures in decision-making, promotion of multilevel inter and intraterritorial co-operation in private and public sectors, implementation of sustainable indicator systems for evaluation, etc. (Arroyos, 2007; EC, 2005; EC, 2006a; EC, 2006b).

The importance of developing new, more participative and democratic forms of territorial government has led to the concept of "neo-endogenous development" (conceptualised by Ray, 2001) as a balance of the two approaches applied to date in rural development, top-down and bottom-up (Ray, 2003; Shucksmith, 2000; Ashley and Maxwel, 2001). And which enables co-ordinated and integrated work by the different actors in the territory's social capital (Ray, 2001; Cabus and Vanhaverbeke, 2003; Ward et al., 2005). This sort of development was timidly initiated in the application of the LEADER project, but suffers from problems and difficulties such as limited innovation (World Bank, 2008), scant mobilization of local socio-cultural capital and lack of transparency in public spending (Nemes, 2004).

From the perspective of territorial cohesion, where intraterritorial co-operation is urged, diversification of production and interaction between rural and urban areas increases the importance of supralocal or supramunicipal corporations in developing rural spaces (Moyano-Estrada, 2009). So, a new structure for independent, autonomous local governance is necessary, since the simple transfer of competence from central government to the Autonomous Regions and municipalities is insufficient (Reed, et al., 2006; Sucháček y Malinovský, 2007). This requires a new, decentralised local power in the scope of the *comarca*, with public and private representatives, based on the cumulative experience of current Local Action Group (LAG) structures, or other structures such as associations or consortia,

which pursue a balance between the community and higher levels of administration in the efficient management of public policy, predicting its effects and evaluating its territorial impact (Tolón y Lastra, 2009).

In Spain, "Law 45/07 for sustainable development of the rural environment" pursues its own rural policy (Regidor y Navarro, 2008), which should use State and other government competences, co-ordinated with measures complementary to those of the EU (Regidor and Navarro, 2008; González-Regidor, 2008), including transverse action with integrated territorial development strategies and measures are rated based on their differentiated qualification in rural areas (Regidor and Navarro, 2008; Moyano-Estrada, 2009).

The Law provides for drafting a "Rural Zoning Plan" under the supervision of the Autonomous Regions, through Strategic Territorial Rural Zoning Directives (DETOR), according to the Sustainable Rural Development Programme 2010-2014 (PDRS), and facilitates compatibility of characteristics and potentials of the territory with economic, social and environmental measures to be developed. The great social and territorial scope of the Law is remarkable, because it affects one third of the population and 90% of the territory. At social level, it gives preferential attention to women, youngsters, elderly people and various specific social groups (Regidor y Navarro, 2008).

Social Capital. Participative prospection and social animation techniques

Rural development policies have not had the expected effect of making rural spaces more dynamic, having been found that it is insufficient to make economic investments and change productive Systems. It also requires an educated population (human capital) and an efficient institutional system. Today, human capital and institutionality must be part of a network of social relationships based on trust (social capital) (Moyano-Estrada, 2008).

The social capital concept is useful for analysing the dynamics of development in rural areas and is defined as a certain type of personal and institutional relations with a territory which are carried out in four dimensions: social integration or intra-communitary, socio-institutional connection or extra-community (micro level), institutional synergy and organizational efficiency (macro level) (Moyano-Estrada, 2005; Moyano-Estrada, 2009). Furthermore, social-cultural capital is considered the main driving force of the global-local model in which the neo-endogenous concept is inserted (Cabus and Vanhaverbeke, 2003).

Social capital can be a positive or negative resource for rural development, so it is necessary to know the historical, and therefore changing, conditions, which make the existence of a favourable social capital possible. For the analysis of these conditions its dimensions, its socio-cultural roots and the environment in which it moves must be known (Moyano-Estrada, 2005). Good articulation among the actors conditions the success of rural area development (Moyano-Estrada, 2009).

Ward, et al. (2005) believe that the different actors in neo-endogenous development are characterised by the incidence of their activity in the territory as endogenous units, neo-endogenous units or local/global actors. Moyano-Estrada (2009)

organise the components of a rural development governance system as associative (representation, social, business and local development) and institutional (peripheral and local) actors. Unassociated actors who are in the Ward et al. classification are not included in the Moyano-Estrada typology.

The work to be done with the social capital must be a constructive and participative exercise (World Bank, 2008), which develop and apply innovative, shared ways of planning and managing territorial dynamics, characterised by relationship, negotiation and training of the participants (Farinós-Dasí, 2008a). Under these criteria, the relationships between planning of neo-endogenous development and the principles of new local or territorial governance are explored in greater depth. Some authors (Farinós-Dasí, 2008a, Farinós-Dasí and Romero-González, 2007) give three possible functions for sustainable territorial development planning: zoning (preventive, seeking to correct the negative impact of no action), development (potential, including multilevel relations, both endogenous and exogenous) and co-ordination (linked directly to territorial governance in both its vertical-multilevel and horizontal cross-sectional dimensions, with the participation of the social capital.)

To organise and promote social participation (that is, awareness, ranking and integration for a purpose) in drafting policy, various instruments are available. Martin (2010) proposes four participative techniques for prospection and decision-making (Nominal Group, DELPHI, European Awareness Sustainability Workshop – EASW and Intervention and Citizen Involvement Groups) and two tools for validating action (SWOT analysis and sociograms). Of these, we highlight the well-consolidated Delphi technique and SWOT method, the sociogram as an instrument of analysis for existing social networks, and participative intervention and citizen involvement groups for conflict resolution. The nominal group technique is the most suitable for finding reliable, first-hand information, and the EASW method for looking at concrete proposals and reaching a consensus. In all the participative and social prospection techniques, the role of "monitor" is essential for social animation, or promoting community participation and self-help, which mobilises and organises a community, as it is the catalyst or agent of the desired social change.

II. USE OF KNOWLEDGE MODEL FOR NEO-ENDOGENOUS GOVERNANCE IN THE SPANISH RURAL *COMARCAS*

The enviromatic includes all of the information and communications technologies (ICT) in the Environmental Sciences through a holistic view of models, techniques and goals (Avouris and Page, 1996; Bristow et al., 1995; Green and Klomp, 1998; Huang and Chang, 2003; Rautenstrauch and Patig, 2001; Raubtold and Brunnstein, 1994; Tochtermann and Maurer, 20009). This emerging discipline, with a wide spectrum of application, integrates a diversity of multidisciplinary mathematical modelling and simulation techniques, in order to offer solutions that properly evaluate risk, that are oriented to consensus and that are cost effective (Huang and Chang, 2003).

Today, ICT and knowledge models are not available usually in rural areas (Cai *et al*., 2009), being an obstacle to rural governance. Also, the complexity of territorial planning, because of its many aspects and relationships, impedes decision-making and reinforces the need to include IT programmes able to analyse all the available information (Witlox, 2005), to facilitate the acquisition and analysis of public's perception towards local sustainable development, to promote the local actors participation, and to be easily applied by decision makers at multiple spatial scales (Cai *et al*., 2009).

In this sense, e-government, understood as the use of ICT to improve access and delivery of information to government services by the social capital, has the potential to develop more fluid, easier and more efficient relations between government and society based on knowledge models, promoting universal access, privacy and confidentiality (Layne and Lee, 2001; McClure, 2000). At the level of private enterprise, the main purpose of e-management, or management based on knowledge models, is to facilitate transfer and exchange of information and knowledge among the members of a business network to assist users or agents in decision-making (Chandra et al., 2002).

This knowledge model, used in the neo-endogenous governance, must include the information and data relevant for e-government and e-management of rural areas, using as the main source of information the various governments, current legislation, maps, indicator systems in a higher sphere, and the plans, projects, programmes and lines of research that impact on them.

Process of co-construction of the Rural Zoning Plans through the knowledge model

To achieve neo-endogenous sustainable development in the rural environment, new forms of governance must be set up and in particular new ways of drafting integrated plans in the *comarca*, using appropriate knowledge models that improve the IT architecture for diffusion of information, facilitating innovation, participation and validation of its social capital, with associated instruments such as Knowledge-Based Systems for their management and Sustainability Indicator Systems to monitor and evaluate them.

The process of co-construction of the "Rural Zoning Plan" in Spanish comarcas must be done following the principles of neo-endogenous development, based on an appropriate knowledge model which: a) Strengthens a new institutional framework (independent and autonomous) in a subprovincial and supramunicipal functional geographic area, the *comarca*, based on the cumulative experience of current Local Action Group (LAG) structures, or other structures such as associations or consortia. Besides, it enables interterritorial and intraterritorial co-operation, and networking of its member agents (public and private representatives), as a way of participating in the new knowledge society. b) Enables balanced participation by all the local social capital through the application of a variety of social participation techniques, and promotes their capacity for learning and innovation. A favourable social capital will enable true governance to be achieved in which the relationship between society and government is strengthened, and innovative, sha-

red ways of planning and managing are developed based on the existing relationship, on negotiation and on participant training. c) Is multisectoral, transverse, and with a territorial base that evaluates potential initiatives for development according to the territory's capacity for its economic, environmental and social reception. It avoids the lack of co-ordination and co-operation among the various governments in planning. d) Includes RD&I in decision-making by local authorities and social agents, and it is supported by innovative service network technologies (ICT), by a standardised knowledge base on local development in rural spaces, and by a dynamic, georeferenced Indicator System which solves conflicts between the goals of economic, environmental and social sustainability in a balanced manner. And e) Enables the construction and use of Knowledge-Based Systems (KBS) as a management instrument for local users who exploit the knowledge model and give it practical value. Also, it enables management or government (e-management/e-government) by local actors in rural spaces to be improved and made more efficient in a practical and simple manner.

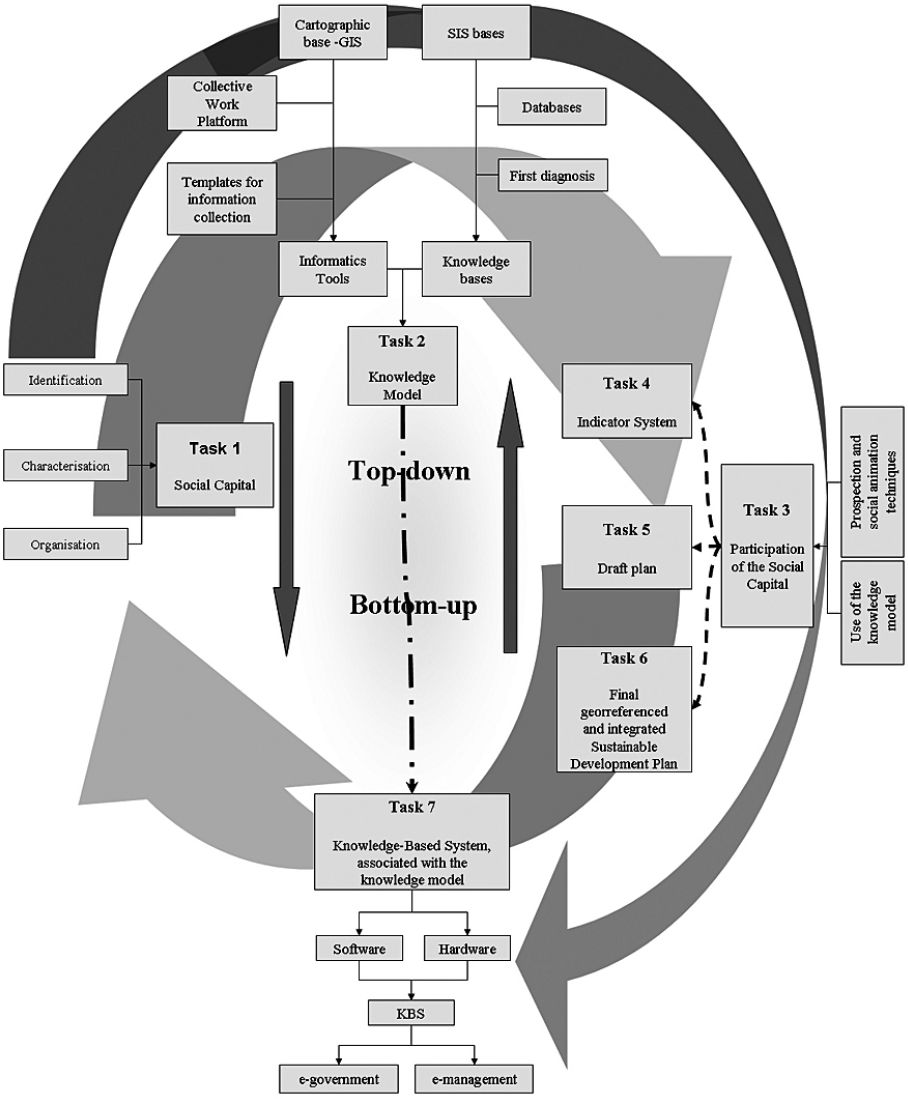
The seven tasks necessary to co-construct a Rural Zoning plan are described in the Figure 1. Their execution will not be linear, but depend on feedback, especially Task 3 on Participation of Social Capital, which is transverse, and affects the tasks 4, 5 and 6.

The process begins with the identification of the social capital in *comarcas* (Task 1) and the characterisation of different actors of neo-endogenous development, according to the Ward et al. (2005) classification. Their contribution to rural development will be valued, and the relationships between them and their dimensions will be analysed to define the best participative techniques to be used in the following tasks. Afterwards, the most active local actors will be selected in a balanced and inclusive manner. They will be the main users of the Knowledge Model, although not the only ones. Task 2 involves the construction of the basic components of the Model Knowledge: IT tools (user interface, Collective Work Platform, templates for data collection and cartographic base - GIS) and Knowledge Bases (conceptual maps, databases and sustainability indicators system). A first diagnostic of the *comarca* will be made using the information gathered in this task. Various prospecting and social animation techniques will be used in Task 3 (Participation of the Social Capital). Especially, those that best adapt to the characteristics of each group, and that make it possible to find the most useful, true information. An attempt will be made to see that all the sectors in the *comarca* are represented in different tasks. In addition, practical courses will be organised for the main users on how the Knowledge model works and its use (participative web), especially on the use of the tools involved: CMap-Tools and information systematisation templates.

Task 4 includes participatory Construction of the Final Indicator System, which allows endogenous evaluation of comarca plans. Collaborative networking can be achieved as the local actors enter their opinions and considerations. In addition, the Integrated Diagnosis of the *comarca* will be made using a similar process. Afterwards, the Indicator System will be examined more closely, and especially, thresholds and targets defined. Participative construction of the draft Sustainable

Development *comarca* plans (Task 5) will be based on the identification, collection and characterization of the Plans, projects, programs and lines of research applied in the *comarca*. The consensual opinions and suggestions of the local actors will be included on the first draft, using participative techniques and the Knowledge Model, on templates and other IT tools developed for this purpose, achieving collaborative networking. The final draft obtained as a result of Task 5 will be presented in the Seminar planned in Task 6 (Joint preparation of the final Plans), for its debate. The

Figure 1. Use of knowledge model in the Rural Zoning Plans co-construction



final Sustainable Development Plan will be obtained when the greatest social participation possible has been achieved and it is approved by consensus in the Seminar

Finally, based on the Knowledge Model and the cartographic base, a Knowledge-based management system (KBS) with the corresponding hardware-software will be constructed (Task 7). The KBS will use the knowledge stored in the model for plans management and decision-making in specific fields (e-government / e-management).

Knowledge-Based Systems (KBS) for Rural Zoning Plans management

Knowledge-Based Systems (KBS) are IT programmes that contain enough "knowledge" on situations and processes and imitate the human reasoning process within a defined scope (Hayes-Roth, 1983; Laudon and Laudon, 2002; Mockler, 1989), so that final users can use the knowledge "acquired" by the computer to solve problems.

A KBS must be able to store, process and handle a large amount of objective and subjective data within its specific logic, so it can facilitate decision-making through multicriteria or unicriterion decision methods. KBS exploit part of the Knowledge Models, giving them value and providing a tool for direct application, and therefore transferable to the various sectors of society.

Integration of a GIS in a KBS provides a framework for integrating the modelling capability, database handling and graphic visualisation capacity with the territorial management and planning knowledge (Sikder, 2009; Filis, 2003; Rafea and Shaalan, 1996). I.e., the image classification KBS helps to correct allocation information (Cohen and Shoshany, 2002). To integrate a KBS with a GIS a set of programming codes (scripts) have to be developed with which the commands available in the GIS are used properly to be able to put into practice the knowledge base.

A KBS must at least be made up of four modules: data and knowledge bases, a set of mathematical models, an inference engine and a user interface (Sikder, 2009; Filis, 2003; Arampatzis *et al*., 1996; Zhu, 2004; Tsamboulas and Mikroudis, 2006; Brand *et al*., 2002). The database is composed of the primary elements of information or of a set of discrete values. The knowledge base must consist of procedures that enable the variables considered basic to be analysed and for the best choice to be selected (Herrero, 2003), that is, it deals with the theoretical knowledge existing or available on the subject of interest. The inference engine is the component in charge of drawing conclusions by applying knowledge to the data (Castillo *et al*., 1998), putting the knowledge base into practice or making it useful. The inference engine must enable the most interaction with and suggestions by future users as possible so the improvements made during evaluation of the processes involved in the sphere of its application can be incorporated (Tsamboulas and Mikroudis, 2006). The user interface is the link between the KBS and the user, and for it to be an effective tool, it must have efficient mechanisms for showing and finding information easily and pleasantly. The user is able to find the answers that the inference engine, based on the knowledge base, provides him through the interface, (Filis, 2003).

The KBS is sometimes based on scenarios created based on a reference scenario (Arampatzis *et al*., 1996; Brand *et al*., 2002). There is also the possibility of incorporating a decision module in the KBS. This enables different alternatives or scenarios to be evaluated and compared (Brand *et al*., 2002) using multicriteria evaluation methods. Comparatively, the KBS is considered one of the most effective tools in making decisions related to sustainable development at multiple scales. It allows the inclusion of tools combination to support decision-making (optimization models and cost-benefit analysis) and various information components into a general decision-making process (Cai *et al*., 2009; Carswell *et al*., 2008). Miah et al. (2009) believe that KBS offers solutions, at decision making in rural areas, in three areas: advisory systems (replacing human expertise to enable decision making), use of diagnosis support tools (focus on symptom/clue based knowledge stored in the system) and planning and management support tools (focus on management support knowledge). However, it is important to emphasise that the KBS assists in decision-making, but does not replace it (Tsamboulas and Mikroudis, 2006).

III. CONSTRUCTION OF THE KNOWLEDGE-BASED SYSTEM, ASSOCIATED WITH THE KNOWLEDGE MODEL IN THE *COMARCAS* OF LOS VÉLEZ AND PONIENTE. FIRST EXPERIENCES

The Research Team of the University of Almería has started the construction of KBS in two *comarcas* in the province of Almería which represent two typological extremes of rurality in Spain, following the typology specified in Law 45/2007. Los Vélez, the type of rural area that needs to be revitalised, and Poniente, a periurban rural area of intensive agriculture.

The *comarca* of Los Vélez is characterised by its low population density (10 inhab km^{-2}), depopulation and aging population, scant technological development, significant large area devoted to agriculture, etc. On the other hand, Poniente represents periurban zones with important economic development, in this case from intensive agriculture under plastic, with an important volume of production in small areas, which has favoured the development of secondary and tertiary sectors, and higher incomes in the local population. It has a high population density (250 inhab km-2), favoured by local demographic growth and by the massive arrival of immigrants, mainly from Africa and Eastern Europe.

Local users interested in the use of the knowledge model may be legally registered local or district entities that can receive and manage funds and may be private or public (government), or mixed (private-public).

Ward, et al. (2005) characterises the various actors in neo-endogenous development as endogenous and neo-endogenous units and local/global actors. The first correspond to actors who work almost entirely locally in a rural area. Actors are local/global if their type of work is local and global at the same time, but not necessarily locally oriented, and if it is committed to local development they may have a role of "neo-endogenous guardians". Neo-endogenous units are those which can act

as critical intermediaries between other types of actors, are intrinsically rooted at a local level and are locally oriented, but can also recur to non local networks.

Moyano-Estrada (2009), classifies social capital as associative and institutional actors. The associative actors are in turn classified as associations for representation, defense and demand of interests, associations for cultural, religious, reational, and leisure activities, etc., associations for economic activities, and associations for management and promotion of local development. Institutional actors may be either public (peripheral and local) or private. The Moyano-Estrada typology does not include actors who are not associated, but are included in the Ward et al. classification.

In Spain, and specifically, in the Leader methodology districts (*comarcas*), the best local users may be the associations that manage EAFRD funds, which are usually legal entities in the form of public limited companies with mixed participation: Public (city councils, autonomous regions, provincial governments, etc.) and Private (businesses, producer associations, etc.), and who are in charge of managing EU funds for promoting and co-financing rural development projects: agrofood industry, local tourism, environmental, professional training, etc.

In the *comarca* of Los Vélez the main user would therefore be the Association for the Promotion and Development of the *comarca* of Los Vélez (APROVELEZ). In the comarca of Poniente, the entity which would take on the role of the main user would be the Asociación de Organizaciones de Productores de Frutas y Hortalizas de Almería - Association of Organisations of Fruit and Vegetable Producers of Almería (COEXPHAL) – Poniente Almeriense, which groups 80% of the produce in the fruit and vegetable production and export sector in the province of Almería.

For these institutions, as well as for other entities the social capital, especially the neo-endogenous units, the Knowledge Model for Governance in Spanish rural spaces and the Knowledge-Based System are of much use in the management of their problems (establishing priorities among projects to promote, establish criteria and amounts of co-funding of projects, requirements, etc., with criteria for sustainability in its triple dimension of economy, environment and social). The aim of the KBS specific to Los Vélez Rural Development Group is the management of the LEADER programme, especially for the multicriteria evaluation of projects with cofunded investments. The KBS specific to the Asociación y Organización de Productores y Empresarios COEHXPAL in Poniente will be applied in the management of all the processes that enter in the production chain of agricultural produce in this comarca.

The Table 1 shows a first list of the entities present in each *comarca*, according to the typologies for Social Capital proposed by Ward, et al. (2005) and Moyano-Estrada (2009). The main users, APROVÉLEZ and COEXPHAL, are shown in bold. The two Almería *comarcas* have a wide variety of local actors and institutions. This situation encourages the social capital creation and increases the potential users of the Knowledge Model and KBS.

To succeed in the development process to be carried out in these *comarcas* (such as the participative Rural Zoning plan or an agro-industrial plan), the commitment of

Table 1. Typology and characterisation of the local actors in the *comarcas* of Los Vélez and Poniente Almeriense

Classification		**Examples**	
Ward et al.	**Moyano-Estrada**	**Los Vélez**	**Poniente Almeriense**
Endogenous units		Households	
		•Casa Rural "Mirador de Alfahari" •Bio Crisara S.L. •Valle de Mahimon •Explotaciones Agrícolas Valmont S.L.	•Hortocampo S.A. •Agrobio SL. •Agrocontrol 2007 SL. • Natural Produce S.L
	Associations for representation, defense and demand of interests	•Junta Rectora del Parque Natural Sierra María-Los Vélez •Asociación Comarcal de Discapacitados (ASOCODI) •Asociación de Mayores Virgen de la Salud •Museo Comarcal Manuel Guirao.	•Sindicato único de oficios varios de la Confederación del Trabajo •Asociación de trabajadores e inmigrantes marroquíes en España (ATIME) •Asociación comarcal de minusválidos físicos El Saliente
	Associations for economic activitie	•El Gamonal S. Coop. Andaluza •Asociación de Empresarios Comarca de Los Vélez •Sociedad Coop. Andaluza •Industrias Cárnicas Torrente •Consorcio Los Vélez	•S.A.T. Costa de Almería, Daliber •Agrupa Adra, Agrupa Ejido, Agrupa Poniente •SUCA •Hortofrutícola MABE S.A.T. •Murgiverde S.C.A
	Associations for cultural, religious, reational, and leisure activities, etc.	•Asociación Grupo Folklórico •Virgen de la Salud •Club Deportivo Egetano •Peña Ciclista Mahimón Los Vélez	•Fund. Red Andalucia Emprende •Asociación Cultural Atenía •Asociación músico-cultural daliense
	•Élites locales y los notables		
	Peripheral institutions of regional and national government	•Oficinas comarcales de la Junta de Andalucía •Oficinas comarcales de la Diputación Provincial de Almería •IFAPA – Centro La Mojonera •Fundación F.E. Universidad de Almería-ANECOOP	
		•Oficina Comarcal Agraria (OCA)	
	Private institutions	•Asociación Ecologistas en Acción •Unión de pequeños agricultores y ganaderos de Almería •CAJAMAR •Universidad de Almería •Instituto de Fomento Andaluz •Coordinadora de Organizaciones de Agricultores y Ganaderos	
		•Asociación de Empresarios •Asociación de Mujeres Rurales	•Fundación Cajamar
Neo-endogenous units	Associations for management and promotion of local development	**•Asociación para la Promoción y Desarrollo de la Comarca de Los Vélez – APROVELEZ** •Asociación Comarcal de Desarrollo Rural - ASODER	**•Asociación COEXPHAL** •Asociación para la Promoción y el Desarrollo Rural de la Alpujarra-Sierra Nevada
	Public institutions oriented to the management of local policies	•Ayuntamientos de: Vélez Rubio, Vélez Blanco, Chirivel, María •Oficina de Información al Consumidor	•Ayuntamientos de: El Ejido, Vícar, La Mojonera, Enix, Fenix, Dalias, Berja, Roquetas de Mar y Adra •Oficina de Información al Consumidor

By author based on Ward et al. (2005) and Moyano-Estrada (2009)

all the local actors (including new stakeholders during the process), the inclusion of all sustainable development dimensions (economic, environmental and social) and

endogenous territory features, and its integral future application (because its obtained as a result of the consensus) are needed.

According to the methodology proposed in Section II, in the task 2 a main IT support, the user interface (INFO-RURAL), will be constructed. INFO-RURAL will allow the user interaction through a user-friendly dialog: easy access to menus and workspaces, icons of easy recognition, and content using a simple and natural language and which also will include servomechanisms operating in real-time, among others. User interface will initially include the following sections:

- Collective Work Platform: it is intended for networking for all users of the knowledge model, who can access it using a username and password. They may participate within the platform in real-time chat or send general or private messages to other members. In addition, users can attach and share images, files and links easily.
- Templates: model users will have access to templates using the Collective Work Platform. The local actors will include information in the templates related to aspects to develop (Rural Zoning Plan, development projects, infrastructure projects, commercial projects, etc.).
- Conceptual maps: The knowledge model contains the infrastructure necessary to support the conceptual maps and links for the first conceptual maps.

The knowledge model and the KBS will include the following relationships: type G2C (government to citizens), type G2E (government to employee), type G2B (government to business) and type G2G (government to government). I.e., they include the improving of the relationship between Government and citizens, employees, companies and the Government itself (greater coordination).

Also, INFO-RURAL will include a section for each of the *comarcas* (INFO-VELEZ and INFO-PONIENTE). Each section will include a KBS specific to Los Vélez Comarca Rural Development Group for management of the LEADER programme, especially for the multicriteria evaluation of projects with cofunded investments, and a KBS specific to the *Asociación y Organización de Productores y Empresarios COEHXPAL* in Poniente for managing all of the processes that enter in the production chain of agricultural produce in this *comarca*.

The cartographic base will be created using a Geographic Information System (GIS), which will be included in the knowledge model, acting as territorial support to georeference all the information found during the project: data, indicators, contents of plans, etc., to do this, subject layers will be constructed that contain diverse georeferenced information on each comarca. The cartographic base allows generate new maps by overlaying maps, scale transformation, graphic representation and databases management. Also, it will facilitate quick search in databases, spatial and alphanumeric, stored in the knowledge model with accurate and current information; and it will allow comparing spatial data efficiently over time (diachronic) and space (synchronous). In addition, new complementary information considered relevant may integrate in the future.

The cartographic base will be constructed as a "collaborative GIS (CGIS)," defined as " a networked collection of computer hardware, software, and user groups with the objective to capture, store, manipulate, visualize, and analyze geographically referenced data and knowledge, so as to provide new information in an institutional setting for solving unstructured planning problems" (Ramsey, 2009). I.e., it allows sharing existing information and generates new knowledge to support rural governance.

Based on the Knowledge Model and the cartographic base, a Knowledge-based management system (KBS) with the corresponding hardware-software will be constructed. The KBS will use the knowledge stored in the model for management and decision-making in both specific areas.

The IT Programme (software) will be constructed and the components (hardware) indispensable to use the knowledge model will be acquired and configured according to a prototype matrix to be adapted with each final user to their goals, and to other Spanish rural comarcas. It will make it possible to manage the plans, programmes and activities specific to each of the possible users (e.g., evaluating the sustainability of the proposals using the indicator systems). That is, it will be configured for each user (Government, local actors, etc.) according to their goals.

In the KBS for the LAG in Los Vélez, the software, directed at e-government, will enable multicriteria evaluation of projects to be developed in the comarca (e.g., a tourist facility, a pig farm or a training course), according to the economic, environmental and social capacity for reception in each geographic point of the comarca. All the information from the plans, programmes, projects, etc., that impact on the comarca, so that the system takes into account the cumulative effects of activities already underway or planned and weights the allotment of economic resources available according to their evaluation.

In the COEHXPAL KBS, the software will be directed at e-management for adequate management of the services rendered by the entity to associated businesses depending on the nature and requirements of the producers and entrepreneurs. The KBS will manage production services, organising access to plant health and pest controls, laboratory services, quality control, etc., and also, find and correct errors in human resource management, occupational accident prevention, promotion of produce outside the comarca, local administration and management, training of human capital, aid management and consulting.

The KBS for e-government in the *comarca* of Los Vélez and KBS for e-management in the *comarca* of Poniente, ensure to all users the integrity, transparency and confidentiality of the information that it contains. In turn, they facilitate accessibility to all local actors and the population who want to use this tool. Therefore, information must be accurate and updated according to the needs of those who will consult the information available.

IV CONCLUSIONS

The concept of "neo-endogenous development" is the result of the search for new, more participative and democratic forms of territorial government, with a

balance of the two approaches applied to date in rural development (top-down and bottom-up). However, further co-ordinated work and mobilizing of the different actors of social capital, ICT incorporating in the planning and management, increasing innovation, improving of the transparency in public spending, and in particular, developing a new structure for independent, autonomous local governance (comarca scope) are required.

Identification and characterization of Social Capital in each *comarca*, and its representatives (endogenous units, local/global actors and neo-endogenous units), together with its organization and its capabilities empowerment, through participative techniques of prospection and social animation, find that they can develop themselves in the future. In addition, neo-endogenous development of rural areas will be promoted and networking of local actors through the model of knowledge will be facilitated.

The knowledge model, and its various associated tools (KBS, sustainability indicators, cartographic base, etc.), is a practical tool to coordinate and harmonize the planning done by the different administrations (EU, national, regional, and local) and lines of research done by research centres related to the *comarcas*.

The construction of a knowledge model, georeferenced in a GIS, in each *comarca*, by a participatory way, enables networking of all representatives of the social capital, supported in the new ICTs, in databases, and in a sustainability indicators system.

The participatory construction of the Rural Zoning Plans, referred to in the Law 45/2007 of sustainable rural development, through the use of a knowledge model must conform to the neo-endogenous development principles. Also, it must include the use of new ICTs, according to current requirements.

The Knowledge Based System, linked to the knowledge model, has the advantage of its adaptability to the characteristics of each potential local user. Also, it helps the local actors to manage their plans and activities in an agile way (e-government / e-management).

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