Role of Networking in Innovation Promotion and Cluster Modernization: "House of the Future" Case

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Abstract:

This paper stresses the potential of innovative business cooperation networks in promoting regional competitiveness. It is based on the case study of a cooperation network, named "House of the Future", carried out in the framework of a project where the University of Aveiro has an important role. It suggests success factors in the development of co-operation networks between firms from various sectors and a university. The aim of the "House of the Future" initiative is to promote an innovative approach to inter-organizational cooperation joining together firms from a number of different industrial activities related with the habitat meta-sector. This collaborative effort can function as an experiment for the design of regional innovation policies.

Resumo:

Este artigo sublinha o potencial das redes de cooperação empresariais na promoção da competitividade regional. A partir do estudo de caso de uma rede de cooperação designada por "Casa do Futuro", sugerem-se alguns factores de sucesso na criação e consolidação de redes que envolvem universidades e empresas de vários sectores de actividade. O projecto "Casa do Futuro" aborda de forma inovadora a cooperação inter-organizacional, juntando empresas de um leque alargado de actividades industriais ligadas ao metasector da habitação e considera-se que pode ser uma experiência relevante para o desenho de políticas regionais de inovação.

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1. Introduction

Economic systems and firms are facing new challenges based on continuous technical change, market uncertainties and high level competition. The more competitive a market becomes, the more imperative it is for the firms to develop differentiated new products in a short period of time.

In this context, innovation and cooperation play a crucial role in ensuring firms' competitiveness. Innovation is a complex process, requiring a high level of interaction between a diversity of economic agents. The firms need to have the ability to interact and cooperate with the other actors to reduce uncertainty and foster relevant complementary knowledge.

The establishment of cooperation networks often results not only in new knowledge generation, but helps to stimulate and reinforce innovative attitudes within firms. Thus, networking should be understood as a permanent activity of a firm and should become an implicit task in its continuous decision-making processes. This leads to the question - a stimulating subject of research within academic and professionals fields - of how to establish successful cooperation networks in order to achieve high level competitiveness and regional economic development.

The experience of the "House of the Future" network has been carried out in the framework of a project where the University of Aveiro has a leading role. The House of Future project aims to promote an innovative approach to inter-firms cooperation putting together a number of different industrial activities related with the habitat meta-sector. All these activities contribute to the same objective: stimulating the technological and innovation capacity of the networked firms.

It can be said that the House of the Future project can contribute to the development and consolidation of the habitat cluster in the Aveiro region, by extending the existing network to other firms and institutions involved in the habitat meta-sector. In addition, this collaborative effort can function as a test-bed for the design of regional innovation policies. This paper will emphasize, among other issues, the methodological guidelines required to put together and consolidate the "House of the Future" network, as well as the factors currently perceived as essential to its success.

2. Cooperation for Innovation and Competitiveness

Innovation appears as a key driver of firms' competitiveness. Innovation is perceived as an interactive learning process, involving a variety of social and economic agents which deal with diverse information and knowledge.

Innovation results from new knowledge creation or from the re-combination of existing knowledge and solutions. These processes can result from individual achievements. Yet they are strongly stimulated when the current mental models of each individual are challenged by (multidisciplinary) group discussion and initiatives. This usually results in an increase of participants' individual knowledge and of group's knowledge (Nonaka and Takeuchi, 1995).

It is widely accepted that the processes of knowledge creation and recombination and consequent innovation become more efficient when actors / individuals with completely different backgrounds (i.e. actors from different industrial sectors or from different communities of practice) share their knowledge and experiences. Consequently, co-operation between actors from diverse organizations with distinct activities and backgrounds is seen as an important factor in stimulating innovation in its different expressions: product, process and organizational innovations (Seufert et.al, 1999 and Szeto, 2000).

It is also recognized that there is a set of external actors whose performance plays a crucial role in innovation dynamics. This has led to the concept of systems of innovation:

"…a system of innovation is constituted by elements and relationships which interact in the production, diffusion and use of new and economically useful knowledge" (Lundvall, 1992)

This notion implies an open and wide vision of innovation as a social and technical process, but also as an interactive learning process between firms and their environment. This leads to the inclusion of a high number of interacting people and organizations in the innovation generation process and also in the expansion of a variety of innovative industry sectors, firms and regions (Seufert et.al, 1999 and Szeto, 2000).

The systemic approach to innovation provides an instrument to analyse the interdependencies of innovation processes, such as the ways in which actors combine available information and knowledge and manage it to innovate.

The interactive and systemic approach to innovation is well represented in co-operation networks which involve firms and institutions. The next section explores this concept and emphasizes the role and importance of networks to the maintenance of knowledge and information flows that sustain innovation.

3. Networks and Learning-by-interacting

Firms rarely innovate alone, and when they do, the innovation process is usually inefficient and unsustainable. More efficient solutions are based on interaction mechanisms with other firms and institutions in order to acquire, develop and share information, knowledge and other resources (Szeto, 2000: 150 and Carlsson, 2003).

Co-operation networks provide impetus to interactive innovation development processes. They bring firms together, and make available the atmosphere and conditions for knowledge creation and sharing and, consequently, for the learning processes that support firms' innovative capacity (Seufert et.al, 1999).

The participation in cooperation networks can stimulate and reinforce innovative attitudes within firms, as actors access a wider set of information and knowledge and are faced with more circumstantial diversity. Strategically, networking should be understood as a permanent activity of a firm and should become an implicit element in its continuous decision-making processes.

Some network benefits are referred to in the literature (Seufert et.al, 1999; Hamalaien and Schienstock, 2000; Arias, 1995 and Akkermans, 2001). First, networks tend to **reduce firms' transaction costs**. This is due to fluid information exchanges between firms, which are closer, benefit from common communication channels and use the same language. Relevant information about good partners or economic agents (clients, suppliers and competitors) is shared easily. In addition, networks constitute a mechanism to reduce uncertainty and tend to discourage opportunistic behaviours. These aspects are intimately related to the reinforcement of confidence and reciprocity between members of networks.

Second, networks facilitate the **access to strategic information and knowledge,** namely in what concerns markets, technologies, and new products, materials and processes. The very own elements of the network filter the information they receive and

share, facilitating the processing of large flows of information. Additionally, networks are a propitious environment for the firms to expose their best and new products and services. Thus, joint competencies and resources add value and generate benefits that a single firm could hardly achieve.

Third, networks may lead to **production rationalization**. This happens because networks function as a structural element of the supply chain, taking advantage not only of economies of scale and variety in production but also of the competency range provided by the actors involved, which exceeds the capacities of each individual actor. Synergies do result from this process.

Considering networks' configuration and the compromise they represent for the different participating firms and organizations, it can be argued that they respond to the necessity of learning-by-interacting. In this context, Morgan (1997) states that inter-firm networks constitute one of the most efficient learning mechanisms.

Nevertheless, the diversity of the actors participating in co-operation networks, the networks' organizational structure, the way the boundaries are defined and their duration, are factors that differentiate networks, and support the saying: 'Each network is a network'.

3.1 Network Typologies

Various types of networks can be found in the literature (Hamalaien and Schienstock, 2000; Arias, 1995; Todtling, 1999; Shapiro, 2002 and Szeto, 2000).

Considering networks' organizational structure, networks can be: a) highly informal – the actors do not have any formalized relationship; b) flexible and trust based networks; c) formal and rigid connections.

Depending on the way their boundaries are defined, networks can be open or closed.

According to their duration, networks may be: a) project teams and virtual corporations – gathering for a short term goal – and b) strategic alliances, joint ventures and business association – implying longer run collaboration.

Considering the actors involved, networks can be: a) vertical – connecting actors along a supply chain; b) horizontal – connecting actors from similar functional areas or sectors; c) diagonal – connecting actors from complementary functional areas or sectors.

According to their geographical scope, the networks differentiate between: a) local; b) regional or national; c) international or global.

It is argued that diagonal and local / regional networks offer better conditions for the competency variance and the wide set of information and knowledge required to innovate. This is due to higher cultural, technical and knowledge diversity between the actors that participate in the network.

The participants in this type of networks can communicate efficiently as they have a common culture and language, due to the geographical proximity. Yet, their competencies and experiences – consequently their knowledge and the information they can encounter – continue extremely diverse, which ensures the diversity of the knowledge base essential to innovate in a sustainable way.

The complementarity of actors participating in diagonal networks triggers mechanisms of growth and leads to innovation (Malerba, 2002). When the actors belong to different sectors, the diagonal network can be referred to as a multisectoral network. The multisectoral co-operation processes

provide better conditions to elude the communication constraints associated with single-sector competitive environments (Szeto, 2000: 154 -155 and Shapiro, 2002: 21-22). The trust, an indispensable success factor, is easier to obtain in such a context of open communication and absence of direct competitors.

Multisectoral co-operation networks can be extremely successful in promoting innovation and can lead to sustainable technological development in participating firms (Nelson and Rosenberg, 1993 cited by Malerba, 2002). Moreover, as innovation in one sector can spill over another sector, this type of networks can ensure first mover advantage to the participating firms (Dietzenbacher, 2000: 28).

This type of networks can be extremely auspicious in territories characterized by the presence of small and medium-sized firms (SME) acting in traditional sectors, where a strong industrial specialization exists.

When these networks (diagonal & multisectoral) surge in a territory characterized by a multisectorial clusterization phenomenon (historical agglomeration of similar activities), they can have a positive impact on cluster[1] consolidation and development.

In the next section, we explore the factors related to multisectoral networking that influence cluster consolidation and development. The territory is considered a context that allows for the network benefits to propagate to specific clusters.

3.2 Cooperation Networks and Regional Economical Development (Clusters)

The territory emerges as a privileged context to promote co-operation networks and cluster consolidation and development, allowing for the economic linkages to be supported on a realistic social base. It is frequent to encounter innovation networks around clusters, as they share non-transactional elements (labour market, regional culture, institutions, norms etc.) and this environment is traditionally used to share the information and knowledge indispensable for innovation.

It is considered that an efficient milieu (from the innovation and interaction perspective) needs to combine a) **internal coherence** – diversified activities and interrelationships between various sectors and firms; co-existence of competition and co-operation, based on trust and on the acceptance that co-operation is positive on a long run; existence of a local institutional base supporting firms in their R&D processes, in providing up-to-date information and competencies, etc. – and b) **external networking** – based on linkages of local firms with regional, national or global markets (Ratti, 1991).

It is widely accepted that cluster consolidation and development is intimately related to ties and linkages with other firms and institutions and is highly dependent on behavioural imitation.

[1] A cluster is "a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities" (Porter, 1998). The clusters bring potential advantages related to the comprehension of the necessities and opportunities for innovation, allowing for the analysis of the complexity of innovation processes and of the sources of economic efficiency. Thus, the clusters can be considered a privileged instrument for regional development (Porter and Stern, 2001).

The network of relationships between firms in clusters is typically characterized by a web of dense and overlapping ties. Via this web, knowledge is rapidly diffused throughout the geographical cluster (McEvily and Zaheer, 1999). This process is highly dependent on the efficiency of the milieu supporting the clusters. When some firms in a cluster show innovative and original behaviour that leads to increased competitiveness, it is only logical to assume that this behaviour will be transmitted and subsequently imitated by other firms in the same cluster. This imitation process can lead, in the long run, to cluster consolidation and collective increased competitiveness and subsequent regional development.

We claim that multisectoral networks, whose actors belong both to the industrial fabric and the S&T institutions, are particularly effective in promoting regional development. These networks are more complex and do not usually occur spontaneously. As a matter of fact, many of these networks fail due to organization and management shortcomings. When successful, they are regarded as original element, especially in geographical contexts characterized by low co-operation processes. The behaviour of the actors participating in these networks has strong imitation appeal and tends to propagate amongst the existing clusters (Arias, 1995; Akkermans, 2001 and Morreira and Corvelo, 2002).

This can lead to other co-operative initiatives between firms and S&T institutions, creating conditions for cluster consolidation and regional development (Narula, 2004).

The second part of this paper contributes to emphasize the role of these multisectoral networks in innovation promotion and cluster consolidation and the conditions for their success, by presenting a successful network that involves firms and a university, gathered around a wide but specific goal: the conception and building of a House of the Future. This network operates in the Aveiro Region, in Portugal, a region characterized by clusterization phenomena in industrial sectors connected to the habitat.

We will present a) a brief description of economic structure of Aveiro region, b) make reference to the historical aspects of the "House of the Future" cooperation network, c) emphasize the network success factors and d) justify the importance of this collaborative initiative in the framework of the development and consolidation of the habitat meta-cluster.

4. Characteristics of Aveiro Region

The Aveiro Region is included in the economically dynamic northern coastal strip of Portugal. Most of the industrial fabric of Aveiro is made of small and medium enterprises, essentially specialized in traditional sectors. The region is characterized by a significant number of industrial sectors covering multiple activities, including the manufacture of goods and provision of services for civil engineering and house construction and furnishing.

The industrial paradigm which characterizes the regional productive fabric is based on spatially concentrated industrial clusters, revealing strong patterns of micro-specialization, stemming from spontaneous agglomeration of firms (new firms are replicas of pre-existent ones), sharing the same labour pool and the same technical culture, recently complemented by the set-up of support activities (Castro, et al, 1998). These agglomerations were, thus, generated by a process of extensive growth, based on imitation.

The majority of firms are characterized by low technological and informational content, by traditional methods of management and by a preponderance

of unskilled labour. In general, they do not have the resources, competencies and even time to access and process information effectively.

Innovations are relatively scarce and tend to be incremental. Their main objective is fulfilling very specific market requirements or solving specific production problems.

The innovative effort of firms is thus mainly guided by reactive responses, rather than by pro-active attitudes reflecting strategies to gain comparative advantages (Castro, et al, 1998).

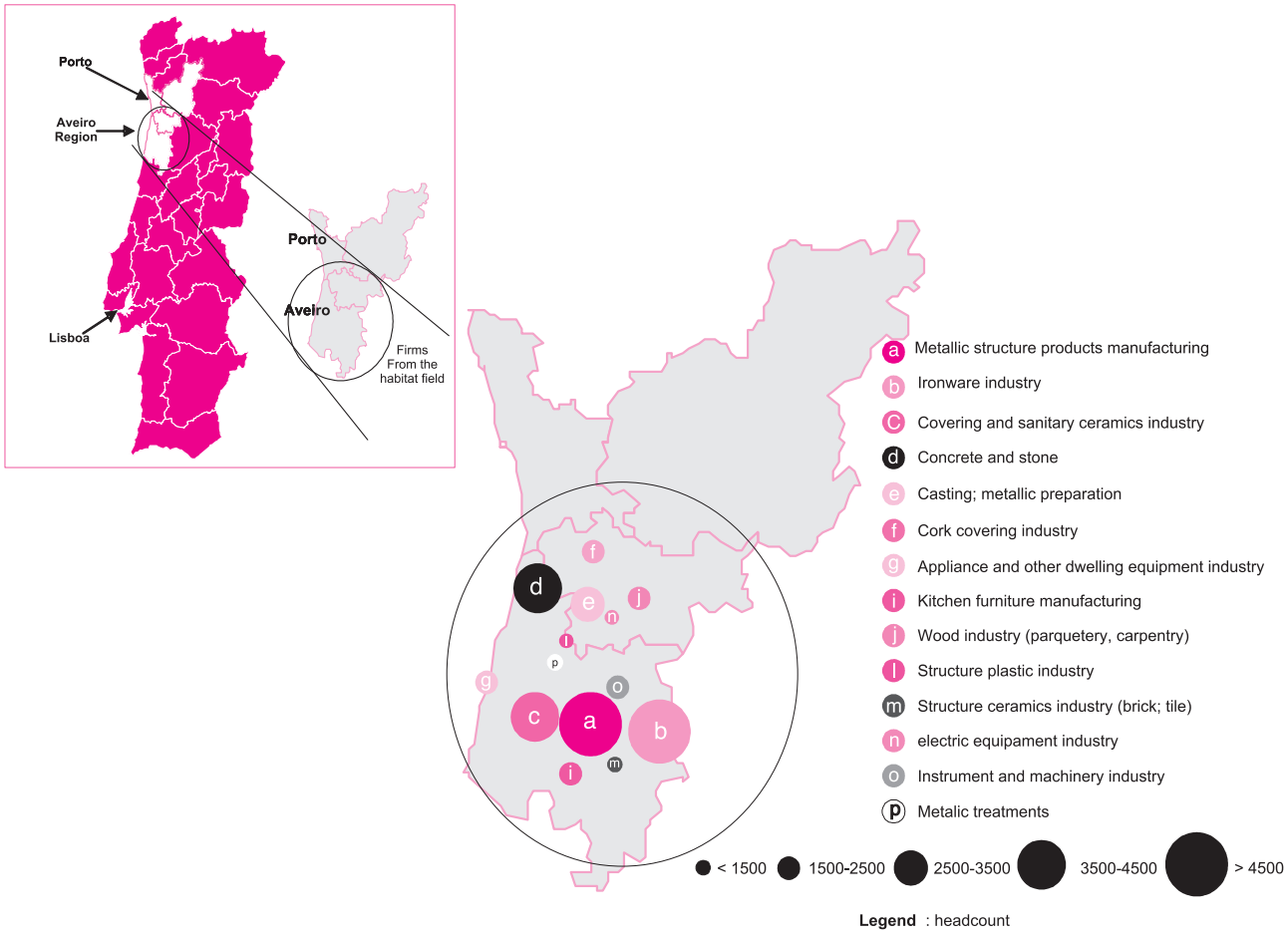
Another pervasive barrier to innovation is the generalized lack of qualifications which affects both labour force and management. The poor academic background of managers explains the individualistic behaviour of firms, reflecting the lack of co-operation between themselves and between firms and innovation support institutions.

Nevertheless, the entrepreneurial spirit is quite strong and there are a large number of export-oriented SME, which is a sign of industrial dynamism and growth potential.

It is important to stress the high and diversified number of industries in the region that manufacture goods and offer services for house construction and furnishing (see Figure 1)[2]. The strong relational

FIGURE 1

Aveiro Region (Portugal) [2] - (adapted from Marques, 2004)



[2] Figure 1 shows the territorial distribution of manufacturing firms linked to house construction and furnishing in Aveiro Region. We emphasize that this distribution is merely for illustrative purposes.

potential between them justifies the presumption that an emergent cluster exists and can be further developed and consolidated.

The coherent integration of those complementary activities constitutes an opportunity to increase firms and region performance in terms of innovation and competitiveness and thus reinforce regional development.

A multisectorial cooperation network has been developed in Aveiro under the umbrella of a Project called "House of the Future". In the next section we present the "House of the Future" initiative and we justify the importance of this experience in the consolidation of a habitat cluster that reinforces regional competitiveness and development.

5. "House of the Future" Network

5.1 Characteristics

The "House of the Future" network (see Table 1) has been operating in Aveiro region since 1999.

The network began rather informally, aiming initially to provide a co-operation forum to firms acting in the habitat meta-sector. It comprised a dozen firms concerned with the project, construction and furnishing of houses and the University of Aveiro.

The firms invited to join the network had particular characteristics, distinguishing themselves from other firms by their innovativeness and competitiveness. They were seen as leading-edge companies.

They joined the network because they identified and valued the opportunity to reinforce their innovative capacity by sharing complementary idiosyncratic knowledge. The strategic goal defined for the network was seen as a credible and attractive challenge, an opportunity for the firms to consolidate their image of excellence in the region.

In principle there is only one company per industrial sector. This means that there are no direct competitors in the network and this obviously facilitates open communication, indispensable for the network's success. The firms complement each other in terms of competencies and access to relevant information and knowledge. We are then facing a multisectoral diagonal network.

Table 2 shows the specific sector of each one of the network members. The network is open to new members in order to fill in the competency gaps, as conceiving a House of the Future calls for wider competencies that those present today.

The network evolved into a formal association, called AveiroDOMUS, whose statutory objectives are "the promotion and dissemination of theoretical, scientific and technological innovation related to new product and processes for the habitat field, particularly by creating the necessary conditions to design and build a structure called House of the Future".

Currently, each member pays an annual fee (at present around 6.000 euros) to participate in the network and the funds are used to organize and manage all network activities. Linkages amongst members and with firms outside the network are encouraged and surge spontaneously, and in many cases have provided opportunities for actual business deals. Occasionally, some linkages are suggested by the project management team.

The initial network strategy was centred on the promotion of technological innovation (i.e. new product and process development). This is a rather

TABLE 1

"House of the Future" co-operation network: main characteristics

Network start date:	1999
N.º of partners (April 2004):	12
Funding:	Self-funding (100% private)
Strategic goals:	Innovation in the Habitat field; Create conditions to build a House of the Future.
Network type:	Open multisectoral diagonal network

TABLE 2

"House of the Future" co-operation network: partners' characteristics

Activity area:	Ownership:	Localization:
Furniture & Fixtures	Private	Aveiro
Aluminium profile	Private	Aveiro
Flushing cisterns and sanitary equipment	Private	Aveiro
Architecture	Private	Aveiro
Pre-fabricated concrete elements	Private	Aveiro
Gardening and Watering systems	Private	Aveiro
Ceramic tiles	Private	Aveiro
Sanitary ware	Private	Aveiro
Civil engineering and building	Private	Porto
Kitchen appliancesa	Private	Aveiro
Hardware	Private	Aveiro
Research & Development (University)	Private	Aveiro

TABLE 3

"House of the Future" project: main characteristics

Duration:	2004 – 2006
Responsible entity:	AveiroDOMUS
Nº of AveiroDOMUS participants:	12
Project goal:	Create the Construction Plan of the House of the Future
Funding:	75% Public & 25% Private
Total funding amount:	~ 3.400.000,00 euros

vague strategic statement. A more tangible challenge was needed to glue together the associated firms and the university and to develop a stable and satisfactory relationship.

This challenge took the form of a multidisciplinary and multisectoral R&D project called "House of the Future" (see Table 3). This project aims at creating the necessary conditions so that the involved institutions develop innovative products and solutions able to ensure enhanced competitiveness by conceptual and technological development.

The main results of the "House of the Future" project, which will take two years to complete, will be between 4 and 8 innovative and interdisciplinary products and the blueprints for the actual construction of the first version of the House of the Future, which make up the Construction Plan.

The Construction Plan is divided into 20 innovative subprojects (see Table 4), which are independently developed and guided by the futuristic orientation of the solutions, but subject to strong co-ordination and interlinking.

Part of the functional specifications and a preliminary design of the House have been prepared. All products and solutions to be developed within the "House of the Future" project are expected to follow these specifications (see Table 5).

The strategic goal of the network and the challenges posed by the "House of the Future" project are being integrated into each network member's strategy.

Multidisciplinary and multisectoral teams are being created to effectively and efficiently address the project objectives and to maximize the benefits to the participants. These teams are made of researchers from the university and professionals from firms and are being motivated by the project management team led by the university.

As a matter of fact, the university has played an important role in the creation, organization and pushing up of the network. It has facilitated the creation of trust between participants, and has provided the infrastructure and the organizational resources required for effective and efficient functioning. It is considered the glue that binds the network together. The multidisciplinary competencies that the university possess complement the competencies of the various firms. The scientific and technological information sources that the university is used to access create a strong, diverse and up-to-date R&D knowledge base, indispensable for sustainable innovation.

The "House of the Future" project is stimulating the technological innovation capacity of the associated firms and is establishing new linkages between them and researchers from the University of Aveiro. The "House of the Future" project is thus meeting the strategic goals of both the firms and the university. It strengthens inter-firm cooperation and university-industry relations, aiming to develop breakthrough innovation, an idiosyncratic goal in the Aveiro region.

5.2 A Successful Case

The main visible goal of the network, building the House of the Future, is still far from being achieved. However, most of the participants already consider the network itself a success.

TABLE 4

"House of the Future" Construction Plan: sub-projects

Sub-projects	
Architecture	Furniture & Fixtures
Access & mobility	Gardening & Sprinkling
Acoustics	Heat isolation
Air quality	Illumination
Civil Engineering	Maintenance & cleaning
Communications	Recycling
Domotics	Security
Electricity	Specific rooms
Energy	Technical textiles
Entertainment	Water recycling

TABLE 5

"House of the Future" specifications

Specifications – Guiding principles	
Adaptation customization, personalization	Flexibility
Comfort	Integration in the environment
Demonstration and testing (of innovative products and processes)	High quality (of materials and constructive processes)
Entertainment	Robustness
Environmentally friendliness	Security, well-being
Evolutionary capabilities	

Tangible indicators sustain their opinion. First, the network has been operating for four years with sensibly the same actors. A cohesive core of firms and university has been created and trust has been developed. The network has a specific culture and new entrants need to adapt to its particular environment.

Second, the network members have been funding their own activities, without any participation from public entities. Each member pays the same amount, mentioned in the previous section, and they all benefit from the communication and knowledge sharing process.

Third, the network members have increased the linkages within the network, and conventional business deals have been done.

It is important to identify and understand the factors that led to the success of this network.

First, the network members were carefully selected. They stand out in terms of their regional impact, innovation capacity, export orientation and competitiveness. These firms have been invited as they represented the leading-edge stratum of the region's habitat meta-sector; they can be role models for other firms and thus instigate imitative behaviour. Furthermore, the absence of direct competitors amongst participants, a deliberate decision when the network was put together, facilitates trust and open communication.

Second, the university was seen by other members of the network as an impartial institution, well adapted to the key role it played in the organization and management of the network in its initial phases. Even today, the university has particular responsibilities in information management and general logistic support.

Third, the network firms are represented by high-level executives in strategic network meetings. This results from the fact that the university, from the very beginning, has had a Vice-Rector promoting and following the network. Since the university is highly valued in the region, the companies reciprocated. This has facilitated the decision-making process in the network.

Fourth, the opportunity and frequency of informal gatherings (sensibly once a month since the network has started to operate) allowed trust to be created and promoted open communication and linkages. The network members see these informal encounters as a way to detach from the day-to-day working problems, share opinions and identify business opportunities with the other network members. This fact stimulates the individuals' adhesion to the network and has insured its stability and development. Furthermore, it allowed for the participants to make joint business deals, which go beyond the network's strategic goals. This reinforces their perception that networking brings benefits.

Fifth, the network members consider that the environment created by the "House of the Future" project forces the firms to innovate. As innovation is part of the strategic goal of each firm and is sometimes put aside due to operational problems, the top-executives present in the network are happy to see that their participation in the network and the compromises this participation implies turn the innovation a continuous priority, which is now part of day-to-day processes of their firms.

And lastly, the network's strategic goal (the planning and construction of the "House of the Future") is seen as a long term challenge and is aligned with the individual strategic goals of firms and the university.

After emphasizing the successful factors of "House of the Future" Network and pointing out some strategic guidelines which can be adapted to other specific socio-economic contexts, the next section will justify the importance of the "House of the Future" network as an instrument that can develop and modernize the cluster of the habitat in the Aveiro region and, thus, increase firms and region competitiveness.

5.3 Impact on the Meta-cluster of the Habitat

Clusters in the Aveiro Region developed through traditional industry agglomeration. Most of them are still insufficiently developed, and they haven't led yet to generalized innovative competitive differentiation.
In these circumstances, the emergence of a successful multisectoral network, with high visibility, associated with excellence and breakthrough innovative products may result in the creation of a specific sectoral identity for the Aveiro Region. This may differentiate it from the other regions and provide momentum for the development of innovative and coherent clusters.

The "House of the Future" network has such a mobilizing potential. It can lead to the development of a modern habitat cluster in the Aveiro region, by enlarging its membership or possibly encouraging the emergence of other business networks centred on the habitat meta-sector.

This idea is reinforced by the conditions in which the network has been operating. It has been self-sufficient, both in terms of the design of its fundamental strategies, and in raising (amongst members) the financial resources required to pay costs. This means that members have recognized the potential of the idea and considered the associated risks as worthwhile.

The continuing successful collaborative experience between the firms and the university will develop into a permanent experimental laboratory, showing why and how mobilizing ideas can foster clusters' consolidation and modernization.

Since the "House of the Future" network is open, more innovative firms and institutions will join the network. This will stimulate even more the regional fabric, and in time will begin to attract competitive organizations linked to the habitat meta-sector to the Aveiro Region.

The "House of the Future" network creates opportunities to develop communication channels and optimize the transfer of competencies between firms and between firms and the university. The consolidation of university-industry linkages is a key driver of innovation, knowledge and skills development, all critical factors for the development of the habitat cluster in the Aveiro region.

The University of Aveiro, the conceptual mentor and promoter of the network, will expand its reputation as an impartial sponsor of complex co-operation initiatives with the regional industrial fabric. This will facilitate future initiatives that involve university and regional firms. The final result will be a practical consolidation of the role this institution plays in regional development, and in broader terms, will increase the milieu's efficiency.

At the same time, the university will create internally a basis for an educational and scientific research programme inspired by the habitat, which will ensure that human resources will be qualified and Research & Development infrastructures consolidated, in order to serve the requirements of this meta-sector. The regional milieu will be provided with knowledge and human resources able to support an advanced habitat meta-cluster.

The network is showing that co-operation is a powerful instrument to increase competitiveness. The continuing success of the network will disseminate this view, helping to overcome the prevailing aversion to co-operative arrangements involving firms. In this context, it can be argued that this initiative may inspire innovation policy schemes, based on diversity, coherence and interactivity as sources of collaborative activities.

6. Implications of the Study

We have stressed out the role of cooperation networks in promoting regional competitiveness. We underlined that cooperation benefits can be maximized when combining multidisciplinary competencies and localized complementary activities.

The case of "House of the Future" is a case of a successful multisectoral network that promotes an innovative approach to inter-firm and inter-institutional cooperation around the theme of the habitat. It reveals a set of opportunities which can influence development policies aiming to strengthen the habitat cluster.

Each network is a specific case, hence generalizations are always precarious. However, we can and must try to learn from the House of the Future experience, and point out some methodological principles that might be successfully replicated in other contexts.

We consider that replications of this experience could gain from a methodological approach guided by the following principles:

a) Network participants should exhibit complementary idiosyncratic abilities. The combination and integration of these abilities provide a common development base.

b) A long-term strategic goal seems essential to ensure network's sustainability and to persuade the firms that the effort is worthwhile.

c) An efficient management structure must be put in place, charged with network logistics but also with the motivation and inspiration of network members.

d) The participants in the network should be top-executives or people close to them, with the authority to decide and engage their organizations.

e) A scientific & technological institution should be involved, as an active member.

Moreover, from the clustering point of view, similar experiences should be based on territories with a high and diversified number of industries gathered in clusters of complementary activities.

We consider that the efficient consolidation and development of clusters requires the involvement of the public sector and the development of coordinated public-private initiatives and does not depend uniquely from the pro-activity of the actors of a successful multisectoral network.

The specific experience described in this paper should be considered as a starting point to the habitat cluster development and consolidation in Aveiro. It helps to comprehend the challenges and opportunities associated to its development and should be reflected in a regional development policy.

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