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INNOVATIVE MANAGEMENT: EXPANDING ITS SCOPE BY DEVELOPING SCIENCE AND TECHNOLOGY ECOPARKS

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Abstract

Innovative management linked to sustainable development of Science and Technology parks, towards an "Ecopark" approach, is an emerging tendency. The "*Ecopark"* concept is based on the enhancement of the potential for communication, interactions and co-operation between different actors (Companies across the value chain, local/regional government, local community or social actors and research institutions) focused on an optimised use of resources and structures

Traditionally, the main aim of Science and Technology Parks is to promote a culture of innovation, technology transfer and competitiveness in their tenant companies and knowledge-based institutions. Because of market demands, companies in Science and Technology Parks need advanced management models and further developments in technology, safety, environmental impact and relations with social actors, among others.

On this basis, the evolution towards sustainable development and the Ecopark approach seems a natural step and the new challenge for Science & Technology parks. The integration of the concept of sustainable development in management activities, together with technological and economic development, is not only limited to the parks themselves but extends to the community where they are located. This advanced and forward-looking approach involves many actors: local communities and authorities, companies and research centres, NGO's and workers' associations, together with the Park Management Organisation as a catalysing vehicle.

Three IASP members, Bilbao Technology Park, Tampere Technology Centre (TTOY) and Madam Park, have initiated an "Ecopark" approach, through a Project called ECOPADEV, funded by the European Commission (DG XXIII). The project aims to develop new decision-making tools that will promote sustainable development in European cities based on Eco-industrial park strategies.

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Introduction

Concern for the environment is growing and markets for innovative management technologies have emerged over the past few decades, encouraged by dwindling resources, increased quality and cost competitiveness. These challenges can be met by a new organisational paradigm that carries on and oversees the actions of all the actors and processes involved.

The traditional aim of Science and Technology Parks is to promote a culture of innovation and competitiveness among their tenants companies and knowledge-based organisations. They target technologically advanced as well as new emerging market companies. Their profile is defined as an aggregation of companies whose advanced management models have been forced by the demands of their market, and high professional skills. This profile strongly influences the type of services demanded of them.

During a park's early stages, the management board is mainly involved in developing construction plans and assuming the role of promoter while building infrastructures and joint facilities. However, management in the ensuing stages focuses on attracting new companies, assuming a commercial and marketing role and promoting knowledge transfer and co-operation.

After development and the early growth stages, what new challenges must Science and Technology Parks face? How can parks offer high added value to tenants? How can we build habitats of excellence?

These next stages require innovative and attractive services. One possible approach consists in involving the park's board in advanced management processes in which managers would become instrumental in achieving common interests, leading towards *sustainable development:* ***"...*** *meeting the needs of the present without compromising the ability of future generations to meet their own needs".*

Considering the relevant role of Science & Technology Parks in regional development, park management board could promote sustainable development as a starting point for future sustainable industrial growth.

Three IASP members, Bilbao Technology Park, Tampere Technology Centre and Madam Park, are involved in an RTD European Project, called ECOPADEV, that aims to promote sustainable development in industrial parks. The project seeks collaboration with the city authorities where the parks are located, and with technology experts in different aspects of sustainable development (environment, communication systems, social involvement, energy, buildings, transportation, etc.)

Global innovative management: Integrating Sustainable development into management

The evolution of Park management towards the integration of issues related to sustainable development is specially relevant in Science and Technology parks due to the demands and possibilities of the above-mentioned profile of companies and the role of Park management boards.

Due to market demands, companies in Science and Technology Parks need advanced management models and further developments in technology, safety, environmental impact, and in their relations with social actors. On the other hand, their high technology and professional skills make them a unique area for promoting development, and integrate some individual strategic objectives in global park core business.

From this basis, integrating *sustainable development* into management according to worldwide policies seems a natural next step that some authors see as a new challenge for Science and Technology Parks. It involves managing environmental, technological and economic aspects, not only with the tenant companies in the park but also within community where the park is located.

Management is no longer limited to industrial activities. It also involves sustainable development in the broadest sense, including technological development, transportation, buildings, reduced environmental impact, local development and human resources.

The traditional role of Science and Technology park management boards is extended to become a catalyst for these interactions, taking advantage of the way Science and Technology park frequently manage knowledge and technology among Universities, R&D institutions, companies and markets.

Therefore, Park managers should assume an active role in sustainable development management, bringing together the interests of all the elements and actors. Park managers are in close contact with companies and with local authorities, are well placed to drive sustainable development processes. This new role will also allow Park managers to enter into contact with communities, NGO's and other organisations that are not currently involved in park life.

As this general trend shows, the structure matches the overall principles defined in Local Agenda 21, which seeks to address local problems and development potential within a broad ecological and regional framework in a multigenerational perspective.

The Eco-Park approach. Management strategies

The "Ecopark" concept is very suitable for managing sustainable development in Science and Technology Parks. This concept is based on the enhancement of the potential for communication, interactions and co-operation between different actors (industrial companies across the value chain, local/regional government, local communities or social actors and research institutions) focused on an optimised use of resources and structures.

An Eco-park can be defined as:*" a community of businesses that co-operate with each other and with the local community to efficiently share resources (information, materials, water, energy, infrastructure and natural habitat), leading to economic and environmental gains, together with and equitable enhancement of human resources for the business and local community".*

The park aims to improve the economic performance of participating companies while minimising their environmental and social impacts. This approach includes a new or retrofitted design of park infrastructure, pollution prevention and energy efficiency[3,5].

Meeting sustainable development targets, as a collective role in parks, requires the implication of all Technology Park actors: companies, workers, local authorities, the local community, NGO's, and others; performing a conflict of interest scenario.

This overall aim is based on the following basic tools:

- Co-operation of all actors in management oriented towards sustainable development.
- Constant improvement systems for companies, maximising efficiency through correct planning.
- Promotion of co-operation and symbiosis between companies in material and energy exchange or in technology improvement.
- Setting up communication structures and information systems for on-site connections between companies, between companies and the park management board and between the park and the social actors.
- Monitoring and evaluating performance.
- Active localisation strategy for new companies to improve the life cycle of the industrial activities involved.

The park management board may drive these tools, but at from then on, competence problems among social, governmental, local authority and industrial actors must be avoided and co-operation among them towards common objectives must be enhanced.

Environmental associations, businesses, unions, government agencies, and other organisations are considered when defining park management with other organisations, although each case has to find a suitable structure. However, communication and connections among all the participating actors must be considered.

When bringing together all the actors with their different needs and interests, it is difficult to decide a unit of management for individual objectives. Experience suggests that during the first stage, management could be based

on individual projects for each objective. Therefore, project analysis must consider who are the actors most affected, and park managers should encourage these actors to become involved in order to obtain a result. The result will be obtained after a detailed analysis of economic, environmental and social trends.

Benefits of innovative management

Many benefits can be derived from this innovative management system, including a global view of all the economic elements and their relation to the environment, as follows:

- Structures: The system allows identification of the needs for common or shared infrastructures among companies. Thus, issues such as transport and land use are improved, and economic, environmental and social benefits are achieved.
- Technology: Development of new technologies, co-operation and technology exchanges between companies through global innovation networks are some of the key actions easy to implement in a Science & Technology park. Improved energy efficiency, clean technology use, and reduced pollution levels, are some of the benefits that directly carries this management model.
- Human Resources: Local actors play an important role in exploiting local potential for co-operation and improvement; companies' own personnel, the local community, and other external stakeholders should take action in global management. Therefore, co-existence could offer great benefits: training for workers and the local community, improved job and education opportunities, as well as enhanced surroundings and overall environmental management.
- Services: Eco-Park management should ensure on-going system for improvements involving research actors in a close contact with each other. This would provide a wide variety of services, including the development and promotion of innovative products and processes, interconnected communication systems for internal an external processes, strategic partnerships and networked manufacturing for better administration.

Parks advancing towards innovative management structures: the Ecopadev project

Over the past few years, some industrial parks have initiated the process towards Eco-Park and environmental approach: Kalundborg (Denmark), Environment Park (Turin), Eco Tech (UK), Ecosite (France), and Frankfurt-Höchst Industrial Park (Germany).

Industrial symbiosis in the Kalundborg district is based on cooperation between five industrial enterprises and the municipality of Kalundborg. The enterprises exchange waste as by-products, the waste from one enterprise becoming a raw material for one or several partners. The result is a reduction of both resource consumption and environmental impacts.

From the very beginning, these parks that have initiated the "Ecopark approach", were developed with the environment and a high level of local community participation in mind. This model is not easily applied to Technology and Science Parks, mainly to already established ones where high

technology and clean companies are located. Three IASP Members, aware of the benefits of a sustainable development approach, have started a Research, Development and Demonstration project funded by the European Commission (FP5, EESD Program)

The project, called ECOPADEV, aims to develop a decision-making tool, based on the Eco-park strategy that will promote and facilitate sustainable development in European cities. A wide range of Technology Parks, cities and Research Centres have joined forces to meet this goal.

Project participants include six experts from Research and Technology Centres who are involved in different aspects of Sustainable Development (Environment, Human resources, ITCs, urban development, energy, transport, buildings…), and three IASP Technology Parks with their respective cities where the tool is going to be applied:

- Bilbao Technology Park (the coordinator), a very innovative and fairly well established Technology Park in the north of Spain where the 2001 IASP Conference was held, and the Town Council of Zamudio, a small town near to the park site, very close to the city of Bilbao.
- Tampere Technology Centre. TTOY (Finland), a fairly well established Technology and Science Park in the centre of Finland, and the city of Tampere, Finland's second largest city.
- Madan Park -: Parque de Ciência e Tecnologia Almada/Setúbal] (Portugal), a recent science park supported by the Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa (FCT/UNL), and the city of Almada, near Lisbon

The ECOPADEV project follows the European Commission's objectives in the assessment of new policies, methodologies, plans and decision-making tools to promote urban sustainable development. Additional project objectives include guidelines to gather key data to reach the specific local indicators, and a definition of bottomline criteria to be met by industries in order to promote sustainable development and implement future town planning.

With these aims in mind, the ECOPADEV project seeks to determine the best strategies for facilitating the integration of innovative management structure for the development of Eco-Industrial or Eco-Science and Technology Parks.

The project follows a problem-solving approach and is divided into five Work packages. WP1 and WP2 gather scientific-technological activities related to compilation of currently used decision-making tools. They deal with key aspects of eco-industrial park development strategies: good practice, materials exchange, benchmarking, conflicts of interest, limits of application, benefits, etc. The final conclusions will be incorporated into local policies to promote sustainable development.

The second stage (WP3) involves adapting the project's methodologies and decision-making tools so they can be tried in the Technology Parks of three cities, evaluated, and eventually validated. WP5 and WP4 disseminate project management and outcomes. The work packages are being developed by all the participating stakeholders.

In addition, external or public policy experts from the Netherlands, Finland, Poland, Spain and Portugal offer their points of view and evaluate the progress of the project to ensure that it develops according to future European policies, thus adding extra value to project outcomes.

The project started in January 2002 with the compilation of different methodologies or models used in industrial parks and by local administrations. We are currently finishing the model for a decision-making tool that will soon be tested at the three technology parks that participate in the project.

The tool will be designed to verify the level of sustainable development the parks have achieved, including the following actions:

- **Environment, health & safety**: shared environmental information systems, minimized waste, recycling, risk & accident prevention and emergency response, Eco-design, etc.

- **Materials:** Shared buying and purchasing; recycled by-products; new markets for new materials, customer/suppliers relationships.

- **Transport:** car-pooling; shared goods transport; integrated logistics; shared maintenance; intrapark transport.

- **Energy:** Green buildings, energy efficiency, and alternative energy sources.

- **Production processes:** Technology exchange, emerging technologies, shared subcontractor or equipment, pollution prevention.

- **Marketing:** Shared marketing actions, joint ventures, and creation of new companies.

- **Human resources & quality of life/community connections:** Integrating work and leisure; co-operative education opportunities; local community involvement, etc.

Conclusions

Rising concern for the environment, the need for innovative management and for forward-looking guidance is clearly future trends within the development of Science and Technology Parks. Market demands make the Ecopark approach and the integration of sustainable development issues in parks particularly relevant.

The Ecopark approach envisages the integration of sustainable development, and economical and technological development into industrial park management, taking into account the local community's needs. Co-operation and interaction between different actors and improved communication networks are basic steps towards sustainability that should be taken by the Park Management Board. The Board should guide the park towards its first improvement objectives, promoting sustainable development that involves transportation, buildings, reduced environmental impact, local community development and improved human resources.

The enormous benefits derived from innovative management should provide the primary motivation for Park's managers to adopt guidance of this kind: enhanced structures, reduced environmental impact, the development of new and progressive technologies, improved production processes, as well as enhanced services, human resources, and community connections.

Thus, and in view of the long-standing success of parks that have already adopted this innovative and forward-looking guidance system, the ECOPADEV project will constitute a very important decision-making tool for the promotion and implementation of management of this kind.

Innovative management that guides towards sustainable development is therefore the next step that all the Science and Technological Parks, as well as Industrial parks should apply as a future step in their on-going development: a new challenge for Science and Technology parks.

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