Management of Research, Development and Innovation Systems and the New NP 4457 Standard: an Implementation Case Study

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ABSTRACT

To be efficient and to create value, research, development and innovation (RDI) activities should be supported by a management system that promotes and integrate them according to the organization strategy. Brisa, the main Portuguese highway operator, is implementing an innovation management system since 2002, based on the concept of creating value in a changing context. Linked with the initiative of creating a new Portuguese standard, the NP 4457:2007, which concerns the management of RDI systems, Brisa sought, through a pilot project with other major companies, to adapt its innovation management system according to the new standard, as a logical step and an excellent opportunity to rationalize the RDI management processes, introducing at the same time a set of concepts and frameworks that were somewhat incomplete on the initial system.

This paper describes Brisa's innovation approach and the adjustment process made in order to accommodate all the requirements of the new standard, making simultaneously a number of remarks on the difficulties and capital gains observed along the process.

INTRODUCTION

In a report by IBM consulting firm [1], innovation is defined as the use of new concepts or the application of existing concepts to new situations, causing significant changes in the environment. An innovative process thus requires an inventive spirit but also a strong commercial element of leadership and allows transforming inventions into innovations. With the validation of the invention in a market context is the awareness that innovation should be something useful, valuing the transition from initial idea to a market reality.

The vision of innovation as a source of competitive advantage has been growing and is especially visible in popular management literature. This increase is also noted at institutional and governmental level. The Lisbon Strategy, set for 2010, as an objective to Europe to assume itself as the most competitive and dynamic economy worldwide, with sustained economic growth and improved social cohesion and employment, underlines that innovation is a preponderant factor for this growth [2].

Innovation in Portugal is also a main subject, because it is seen as a major vector for economic growth. One of the most active entities in this area is COTEC Portugal – Associação Empresarial para a Inovação (Portuguese Association for Innovation). COTEC was created in April 2003, following an initiative of the President of Portugal, by a group of the main companies established in Portugal. Since COTEC Portugal began, the President of Portugal has been its General Assembly President. Its mission is "promoting the competitiveness of companies established in Portugal, through the development and the diffusion of a culture and a practice of innovation as well as of knowledge, specially that generated in our country" [3]. Over the years, COTEC, with the support of its associated companies and all agents of the National Innovation System (NIS), implemented a set of initiatives in a multiplicity of areas.

In order to encourage and support companies operating in Portugal and to develop innovation in a more systematic and efficient manner, COTEC created the "Sustained Development of Company Innovation" (SDCI) initiative.

SDCI INITIATIVE

The SDCI has the flowing set of projects [4]:

Project 1: Identification and diffusion of management models, inducers of sustained innovation development

Project 2: Definition of a methodology for classifying Research, Development and Innovation (RDI) activities

Project 3: Accredited certification of Research, Development and Innovation (RDI) management systems
Project 4: Development of an Innovation Scoring System

All this projects contributed to the main goals of this initiative. In this paper we will take a closer look at Project 3, noting although that all the projects have contributed to the global success of the programme.

The deliverables of the Project 3 were a set (family) of standards on RDI management systems, prepared by a Technical Committee (TC 169), headed by the President of IPQ, the Portuguese Standardization State Agency, and including members from universities, governmental innovation agencies, technology and research centres, company associations, individual companies and certifiers. The final publication was in January 2007. These set of standards are the following:

- NP 4456: 2007 Terminology and definitions of RDI activities
- NP 4457: 2007 RDI Management system requirements
- NP 4458: 2007 RDI project requirements
- NP 4461: 2007 Competence and assessment of RDI management system auditors and RDI project auditors

The NP 4457:2007 Standard – RDI Management System Requirements

Regarding the RDI Management System (RDIMS) issues, the applied standard is the NP 4457. Right from the start of the standards development process, some basic guidelines were adopted:

- Terminology and definitions supported on the Oslo Manual. According to this, a company innovation is broader, not being restricted to technological innovation [5]
- The standards were made to be applicable to all organizations irrespectively of size, complexity or sector in which it operates
- A chain-interactive innovation model was developed in Project 1 [6]
- It was used a PDCA (Plan – Do – Check – Act) approach, similar to ISO (International Standard Organization) standards and an effective tool to continuous improvement
- Spanish innovation systems standards concerning RDI management systems were taken as a starting point
- A strong compatibility approach with other key management system standards generally used by organizations, like ISO 9001 and ISO 14001 was taken in to account

- Easy application of the standard to different types of organization. In order to achieve this goal, the standard was designed to be simple, flexible and adaptable, leaving the solutions that fulfill the specified requirements to be selected by each particular company rather than prescribing them

THE NP4457 HAS THE FOLLOWING STRUCTURE [7]:

- General Requirements
- Management Responsibilities
- Planning RDI
- Implementation and Operation
- Evaluation of Results and Improvement

To confirm the suitability of the standard, it was selected a pilot group of 15 companies from different economic sectors and different sizes, belonging to COTEC, that would serve as "guinea pigs" to the new standard. They would implement the requirements set by NP 4457 and after a set of audits that would certify the conformity of their innovation systems to the new standard.

Next we will briefly describe Brisa and the adaptation process in order to implement the NP 4457 within the organization.

BRISA CASE STUDY

Brisa – Auto Estradas de Portugal SA, founded in 1972, is today a reference company among European toll highway operators, because of the network extension and technological innovations that Brisa improved and implemented along last decades. For the sustainability of its business, Brisa regard as essential to control the development of equipment and systems involved in the tolls control and payment and also on road telematics. As a result, a large amount of the equipment and systems used in the operation and management of its network are developed using internal research and development resources and/or in collaboration with a wide innovation network, enabling greater control and adjustment to Brisa's requirements. This independence of critical suppliers and the knowledge of technology have enabled Brisa an extra competitive advantage in access to international markets, acting as a distinguishing factor. Innovation, along with the ethics and ambition, are considered fundamental values of "Brisa's culture."

Brisa's toll equipment, in particular the electronic toll collection system of Via Verde has been a distinctive factor in the company image in Portugal and abroad.

Having an Innovation Management System implemented since 2002, Brisa, through its Innovation and Technology Department, ensures the company's innovation process management.

The Innovation and Technology Department has clear objectives: to engage in projects that create value, with motivated people and not to be a cost to the company.

Some of the activities related to innovation management developed since 2002 until the beginning of 2007 were:

- Brisa's Innovation Policy definition, firmly based on the notion of value creation
- Evaluation of the projects value creation
- Innovation Model definition

Brisa felt that its objectives of growth would only be sustainable if the company provides simultaneous awareness of issues related to Quality, Security, the Environment and Energy. Thus, the process of innovation should be developed in partnership with other institutions, according to their skills, expertise and motivation, because Brisa should be a catalyst for structuring technological development at the national level.

One of the distinctive characteristic of Brisa's innovation system is the intense collaboration with a broad network of entities, promoting close cooperation with various partners in order to maximize the innovation outputs. This innovation network (Fig. 1), which includes entities of higher education, technology centers, suppliers, startups with origin on Brisa's projects, business angels, competitors and government authorities, among others, have allowed obvious gains for all parts involved.

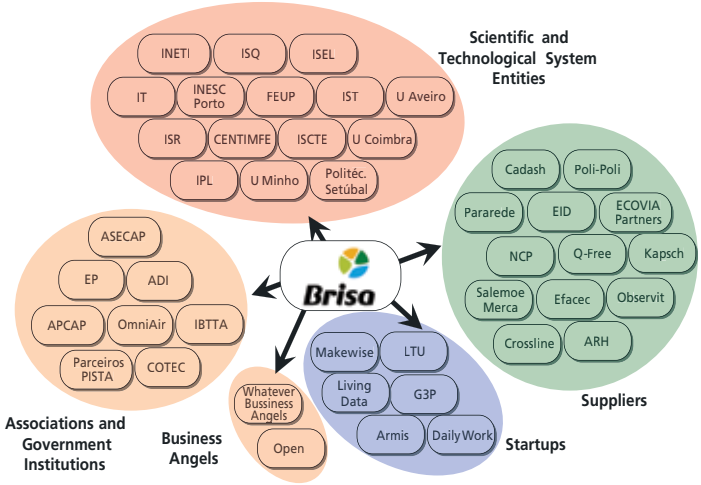

Fig. 1 – Brisa Innovation Network

Brisa's requirements, materializing market needs, are the engine of innovation, promoting and encouraging the development of new products and new solutions with its partners, who as co-designers and co-innovative increase its competitive capabilities. These partners in turn will similarly affect the other entities and organizations with whom they interact.

With this background, Brisa had the opportunity to participate in the SDCI project, along with other major Portuguese companies. Brisa contributes with its knowhow and experience within a pilot group.

The first contact with the definitive innovation standards were on February 2007, on a Cotec session, where the new innovation standards were presented.

After that, a new innovation project was launched, the "Certification of Brisa's Innovation System". This project was seen as an organizational innovation project, showing that other aspects of innovation are also needed in technological areas. A planning phase began and it was appointed a project leader.

The new standards were analysed, specially the NP 4457. Some subjects that were new for the organization were discussed and their importance demonstrated.

An assessment of the adequacy of the innovation management system implemented to the new standard was done. In this phase it is important to refer the Innovation Scoring tool. This diagnosis tool was developed along the Project 4 framework and using a set of questions which allows organizations to asset both the intensity and

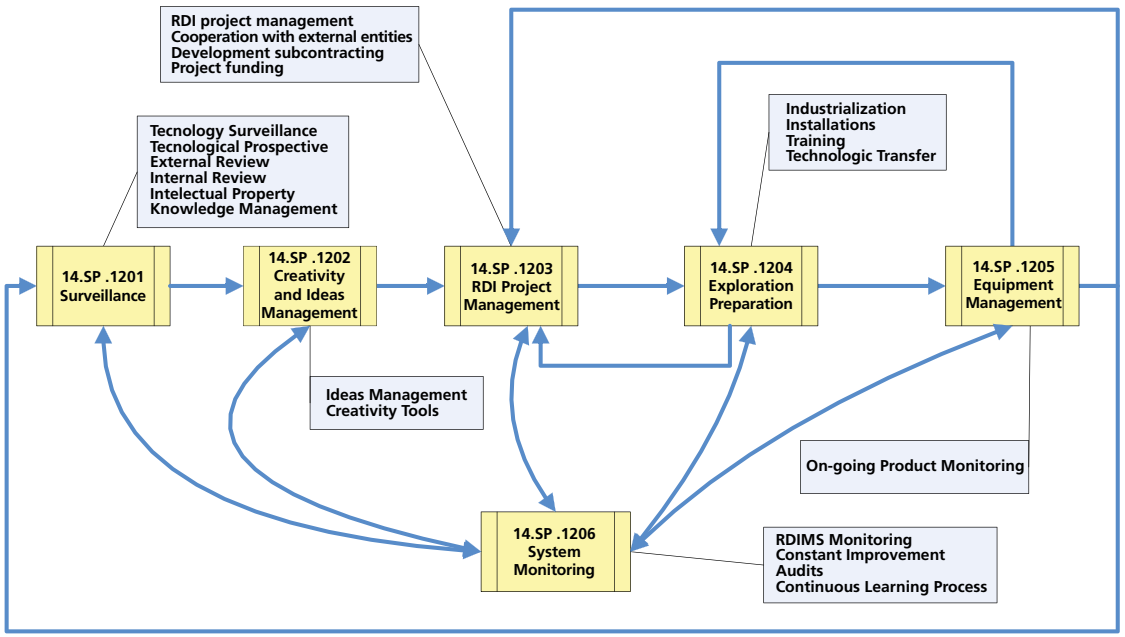

Fig. 2 – Innovation Processes Mapping

the quality of their innovation activities. Brisa used this tool on the first half of the project and the benefits were vast, because of the linkages with the NP4457 requirements and that allows the creation of a common language regarding innovation issues.

Along the second half of the project an intense collaborators training (internal and external) was preformed.

The next phase was the mapping and development and/or review of processes related with the RDI. The following figure (Fig. 2) shows Brisas processes map. Some of them were new areas for the organization, especially the surveillance and intellectual property management, where the existing practices were formalized.

To monitor the system's performance, new or re-arranged innovation metrics were developed, to measure de inputs, efficiency and outputs of the innovation processes. Some of the indicators we used were:

- Projects value creation
- Intellectual property outputs
- Total R&D investment
- Market and technological surveillance gains
- New ideas and creativity rate
- Project's Innovation character
- Project's objectives achievement

Brisa's Innovation model (Fig. 3) was also improved. This model is the framework that guides all the innovation activities. In this model capabilities are transformed into outcomes/results through a continuous cycle of development, sustained by value creation and an efficient resources management, including a strong project management approach.

Fig. 3. Brisa Innovation Model

Along the entire project a strong interaction/support with the other Brisa departments was in practice, especially with the Quality Department (Innovation System integration with Brisa Quality System according ISO 9001) and with Strategic Planning Department (responsible for the Organizational Innovation and for the ideas portal management). Other organizational change was the creation of an Innovation Committee, a consulting organ, where innovation projects and their priorities, resources and potential gains are discussed by Brisa top management.

After this adaptation effort, the validation between the implement system and the NP4457 requisites has to be given by an independent entity, in order to guarantee full credibility to the certification. So a certification scheme was performed, with an internal audit and a grant audit with two phases and witnessed by IPAC (October 2007). The audit process occurred with success and Brisa was among the pilot enterprises that receive the RDI Management System (RDIMS) certificate, in November of 2007.

The outputs and gains with this process were huge, including the following:

- Support value creation obtained by the innovation activities
- Achievement of the objectives, ensuring that products/services developed match the defined requirements
- Meeting the Quality and Innovation Policy

Although with its RDIMS implement and running, Brisa always seeks a continuous improvement, in order to get a strong of the consolidation RDI system, so some areas are now the focus for an upgrading process:

- Brisa's internationalization process
- Intellectual Property and Technology Transfer Managing
- Strengthening of the value creation by innovation projects
- Knowledge Management
- Innovation network extension the to international partners

Brisa is also working with COTEC on Stage 2 of the SDCI project "Sustained Development of Innovation", promoting and widening the implementation and RDIMS certification of the other 100 companies COTEC universe.

CONCLUSIONS

The investment in innovation aims to reduce costs and capture new opportunities, looking for a positive differentiation regarding its competition and following the strategic framework delineated, in order to obtain positive and sustainable results.

It is developing projects and partnerships that create real value for the company that a payback of innovation occurs.

However, to obtain a good return from this investment its necessary that a fine innovation system was implemented, that efficiently uses the resources and obtains increased gains, because questions related to the project coordination, the clear identification of the objectives and innovation drivers, partners roles and responsibilities are considered crucial for a successful outcome.

With the new NP 4457 standard, organizations have a set of guidelines and tools to perform a good work. Organizations have now a standard that could help them achieve a more systematic approach to innovation. It's a lengthy and hard process but the gains with a more robust system pay the effort.

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