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# Principles for the design of management control systems in knowledge networks

## Experiences involving the European technology networks

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### Abstract

The aim of this paper is to analyse technology-knowledge networks, especially the aspects relating to management control. The management of technology knowledge in a network is characterised by a number of special features that are typical of this form of organization, on the basis of which, we point out the main obstacles and disadvantages that condition the achievement of efficiency of their management. We will analyse management in these networks in light of the experience of various European institutions that actively participate in networks for the development of technological projects. The principal mechanisms used for the control of management will be obtained from the empirical study. Finally, on the basis of the empirical verification, we will consider the development of certain general principles for control in order to achieve greater efficiency in the management of knowledge in these networks. © 2002 Elsevier Science Inc. All rights reserved.

*Keywords:* Technology; Networks; Control; Complexity

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## 1. Introduction

Over the last few decades, we have witnessed radical transformations that are affecting not only the organization of production companies as a whole but also the way in which economic policies are designed by the different national or supranational institutions. These transformations, linked to the new and continual innovations in the fields of information processing and transmission, are helping companies to break through both their internal barriers and their external boundaries, which, in turn, is facilitating the international presence of a large number of companies. This phenomenon, which has been called “globalization” by numerous authors, entails greater international collaboration among companies and organizations for the joint development of technology projects in certain sectors of activity, especially in those in which the competitive pressures are greater.

In general, international collaboration for the development of technology projects materializes through various “common organization” formulas, among which the networks constitute the most novel example, which, moreover, is acquiring greater protagonism. Normally, not only companies are involved in the development of projects in a network, but also other series of socioeconomic institutions, which may belong to either the public or the private sector.

The aim of this paper is to analyse the technology-knowledge networks, especially the aspects relating to management control, and, therefore, we will develop certain general principles for control in order to achieve greater efficiency in the management of knowledge in these networks.

This aim is pursued in the following sections.

(1) *The identification of the main difficulties of network management.* The management of technology knowledge in a network is characterised by a number of special features that are typical of this form of organization, on the basis of which we point out the main obstacles and disadvantages that condition the achievement of efficiency of their management.

(2) *The analysis of experiences.* In this section, we will analyse management in these networks in light of the experience of various European institutions that actively participate in networks for the development of technological projects. The principal mechanisms used for the control of management will be obtained from the empirical study.

(3) *Finally, the results and conclusions.* On the basis of the empirical verification, we will consider the development of certain principles for the control of management in technology-knowledge networks.

## 2. The complexity of technological network management and the need for control systems

The first stumbling block in studying technological networks is the lack of a single theoretical reference upon which to base this study, since these types of agreements and structures take in a host of different aspects and, hence, different approaches (for a review, see Ref. [1]). Networks and alliances constitute a new “ubiquitous phenomenon” [2] expressing

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