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The joint R&D project: The case of the first Brazilian microcontroller chip

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RESUMO

P&D colaborativo: o caso do primeiro *chip* microcontrolador brasileiro

A cooperação interorganizacional, por meio da atuação conjunta com diversos atores, permite que empresas de setores de alta tecnologia possam complementar recursos, especialmente em projetos de P&D. Os projetos colaborativos têm sido apontados em diversos estudos como uma importante estratégia para produzir produtos e serviços complexos em ambientes de incerteza e competitividade. Nesse sentido, pretende-se com a presente pesquisa aprofundar o entendimento de como ocorre a dinâmica de desenvolvimento de um projeto colaborativo de P&D em uma indústria de alta tecnologia. Para alcançar o objetivo proposto, definiu-se como objeto de análise o projeto de P&D do primeiro microcontrolador da indústria brasileira de semicondutores. A escolha empírica justifica-se pela singularidade do caso e por trazer uma diversidade de atores e um nível de complementaridade de recursos que foram significativos para o êxito do projeto. Dada a motivação para conhecer quem foram os atores e quais as principais formas de coordenação utilizadas neste projeto interorganizacional, realizaram-se entrevistas bem como se utilizou um questionário e demais documentos relativos ao projeto. Os resultados apresentados evidenciam uma rede de nove atores e suas funções no processo de colaboração interorganizacional, bem como as formas de imbricamento social e temporal utilizados na coordenação dos esforços coletivos. Focalizando nos mecanismos de inserção temporal e de inserção social destacados ao longo do estudo, propõe-se a inclusão dos projetos de P&D na tipologia para projetos interorganizacionais proposta por Jones e Lichtenstein (2008).

Palavras-chave: P&D, projeto colaborativo, imbricamento, tipologia de projetos, semicondutores.

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1. INTRODUCTION

Inter-organizational cooperation – work performed jointly by different organizations – enables companies in the high-tech sector to access new features and complement existing resources, especially in research and development (R&D) projects. Inter-organizational cooperation is also referred to as collaborative projects and has been identified in numerous studies such as those of Jones et al. (1997), Berggren et al. (2001), Jones and Lichtenstein (2008), Saenz Perez-Bouvier (2014) and Conell, Kriz and Thorphe (2014) as an important strategic alternative to develop products and services in environments surrounded by uncertainty, complexity and competitiveness. The academic work of Dittrich and Duysters (2007) on Nokia, Dyer and Nabeoka (2000) on Toyota, Dodgson and Gann (2006) on P&G, highlight the importance of collaborative relationships in innovation processes. Additionally in this context, we highlight the work of Jones and Lichtenstein (2008), who detail the ways that various companies participating in a collaborative project coordinate the implementation of joint activities.

This literature may suggest that, in the environment of high-tech industries, innovation is often the result of the collaborative exchange of information and resources with actors that are external to the company, which requires joint action between various agents. Contributing to this problem, we intend to deepen the understanding of how the dynamic of the development of a collaborative R&D project in a high-tech industry occurs. To achieve this proposed objective, we define the joint R&D project of the first microcontroller in the Brazilian semiconductor industry as our object of analysis. This empirical choice is justified by the uniqueness of the event and the diversity of actors and the resource complementarity level, which were significant for the success of the project, which were involved.

To facilitate the presentation of the theoretical reflections and empirical evidence, this paper is organized as follows: in addition to this introduction, we present the theoretical framework that will be the basis for the description of the experience of the study project. Then, we describe in detail the methodological strategy employed. In the third part of the article, we present the main results of the study and, finally, the concluding remarks.

2. THEORETICAL FRAMEWORK

2.1. Collaborative R&D projects

Since the 1990s, the innovation model has been highlighted as corresponding to an open and networking model, especially by scholars such as Rothwell (1995). The trend is that R&D teams work collaboratively with various internal and external actors. Thus, the result of innovation becomes a joint and cooperative action between different stakeholders of the company. In general, innovations in technology require the simultaneous use of different skill sets and knowledge bases in a process of innovation that is difficult for an individual company to solve (Powell et al., 1996). Hage and Hollingsworth (2000) point to the lack of research in the area of innovation that analyzes the influence of external actors, and they indicate that most published articles have considered only the internal organizational characteristics that affect innovation, bypassing external aspects.

Authors such as Del Giudice and Maggioni (2014), Huizingh (2011) and Huston and Sakkab (2006) claim that inter-organizational collaborative relationships can enable access to a wealth of knowledge for innovation processes, allowing the company to open up to new ideas from the outside environment and move towards the development of combined R&D models and new value co-creation practices (Huston & Sakkab, 2006). Some knowledge-intensive industries in areas such as semiconductor, telecommunications, biotechnology and communications systems, for example, have already adopted collaborative processes in R&D projects (Dittrich & Duysters, 2007; Dodgson & Gann, 2006; Saenz & Perez-Bouvier, 2014). This strategy has been adopted with the aim of expanding the possibilities for knowledge creation, process synergy and the reduction of risks and costs.

In addition, Aronson (2001) complements the concept, considering that cooperation in R&D projects is defined as the merger of two or more parties, institutions or individuals who have a different assignment but work together to achieve better results. According to Jones and Lichtenstein (2008), collaborative projects involve working together to create a product or service for a limited period of time, represented by a set of activities that enables multiple organizations to achieve individual and collective goals.

The initiation of the R&D process in cooperation with external actors is an attempt by companies to access additional resources to innovation beyond their borders. Thus, companies engage in the acquisition of specific forms of knowledge and technology through a wide range of collaborative arrangements: licensing, joint ventures, alliances and joint projects with universities and other public and private institutions (Roijakkers & Hagedoorn, 2006). Typically, among the main actors intertwined in innovation processes, we highlight the following: suppliers (Un et al., 2010; Pittaway et al., 2004.), science and technology institutions (Cohen & Levinthal, 1990), consumers (Gassmann et al., 2010; Bueno & Balestrin, 2012), competitors (Bengtsson & Kock, 1999) and intermediaries (Howells, 2006).

2.2. Collaborative R&D project management

Managing collaborative projects with different actors is a task of significant complexity (Coussi et al., 2015). The complex nature of R&D in industry is associated with very different activities, including: innovation in concepts