



## Coordinating decentralized research and development laboratories: A survey analysis

Dimitris Manolopoulos<sup>a,\*</sup>, Klas Eric Söderquist<sup>a,1</sup>, Robert Pearce<sup>b,2</sup>

<sup>a</sup> Department of Management Science and Technology, International MBA, Athens University of Economics and Business, Evelpidon 47<sup>A</sup> and Lefkadas, Athens 11362, Greece

<sup>b</sup> John Dunning Centre for International Business, Henley Business School, University of Reading, Whiteknights, Reading, RG6 6UD, UK

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### ABSTRACT

The growing internationalization and strategic diversity of research and development (R&D) activities create important managerial challenges for the globally competing multinational enterprise (MNE). Driven by recent theoretical considerations and empirical studies, we provide complementary insights to the international management literature by investigating the impact of strategic variables (roles of decentralized R&D units) and some commonly studied FDI characteristics (industry, size and country of origin) on the coordination patterns used in the context of international R&D. As a conceptual background, five categories of coordination mechanisms are generated (structural, formal hierarchical, people-based, social and information technology platform infrastructures). Our findings, based on a quantitative inductive analysis, reveal that laboratory-related characteristics (roles, age and size) stand out as the most influential determinants of coordination mechanisms and instruments. The study also highlights that MNEs are moving towards a more complicated and multifaceted integration pattern of their decentralized technology strategies. Implications for international managers, academic researchers and decision makers are discussed.

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### 1. Introduction

Early analysis (e.g., [Caves, 1971](#); [Vernon, 1966](#)) of the capability of firms to become multinational enterprises (MNEs) saw sources of innovation as entirely centralised and conceived the only international knowledge-related function as being the *transfer* to overseas use of centrally generated technologies ([Manolopoulos et al., 2007](#)). Hence, initial perceptions on the internationalization of technology saw no systemic role for decentralised research and development (R&D) activity, but only the limited one of supporting the ability of subsidiaries to *adapt* parent company technologies to the needs of their market environments (host countries and local conditions). This traditional explanation though, seemed unable to account for the acceleration in the worldwide diffusion of MNEs' elements of knowledge-related competitiveness and the redefined missions of expatriate R&D ([Niosi, 1999](#)).

Current work (e.g., [Cantwell and Piscitello, 2007](#); [Marin and Bell, 2006](#)) has recorded a quantitative expansion of MNEs' basic research and industrial R&D activities, which now takes place at a much faster pace and spreads more widely with significant international cross border flows ([Criscuolo and Narula, 2007](#)). In addition, it involves more than the effective *application* of the parent's creative inputs to host environments, including also the generation of other asset-augmenting activities; derived mainly by the need of MNEs to employ distinctive technological competencies from geographically dispersed locations ([Papanastassiou and Pearce, 1999](#)). Three factors underpinning the gradually more advanced positioning of decentralized laboratories can be extracted from the literature.

\* Corresponding author. Tel.: +30 210 82 03 660; fax: +30 210 88 28 078.

E-mail addresses: [dmanolop@aueb.gr](mailto:dmanolop@aueb.gr) (D. Manolopoulos), [soederq@aueb.gr](mailto:soederq@aueb.gr) (K.E. Söderquist), [r.d.pearce@henley.reading.ac.uk](mailto:r.d.pearce@henley.reading.ac.uk) (R. Pearce).

<sup>1</sup> Tel.: +30 210 82 03 679; fax: +30 210 88 28 078.

<sup>2</sup> Tel.: +44 118 378 5044; fax: +44 118 378 4029.

First, the new imperatives of global competition are increasingly related to: (i) original product *development* rather than mere technological *adaptation* (Hansen et al., 2005; Kuemmerle, 1999), and (ii) the importance of foreign subsidiaries in patenting (Belderbos, 2003), which will nurture major inventions and innovations for both the local and the world markets (Niosi, 1999). Second, supply-side influences (the extent to which MNEs may gain a competitive advantage by tapping into foreign located assets and innovation systems, such as highly skilled scientific personnel, proximity to universities, research centres and scientific institutions and access to low cost supply of R&D personnel) comprise another influential factor in determining the scale and scope of foreign R&D (Crisuolo et al., 2005; Dunning and Lundan, 2009; von Zedtwitz and Gassmann, 2002). Finally, the centripetal organizational forces that were supposed to secure MNE-specific advantages have now become weaker, mainly due to the improved means of international information and communication technologies (Gassmann and von Zedtwitz, 1999). For the individual decentralized R&D laboratory, this extended strategic diversity now underpinning its operations significantly increases the physical, financial, informational, knowledge, as well as temporal interdependencies, leading to an upgraded importance and complexity of the coordination function.

In spite of the apparent importance of how to coordinate globally dispersed R&D operations, our knowledge on the topic is still neither complete, nor conclusive (Ambos, 2005; Brockhoff, 1998). While the coordination concerns of R&D internationalized activities have been raised by strands of both an earlier (e.g., Hirshey and Caves, 1981) and a more nascent (e.g., Frost and Zhou, 2005; Manolopoulos et al., 2007) literature, there are three main deficit areas that have been identified; providing sources of new insights for research: first, while there exist many different instruments for achieving MNE inter-unit vertical integration, we are not aware (with the exception of Reger, 1999) of any systematic, empirical investigation of this wide variety of coordination mechanisms that are suitable for application in the context of international R&D. According to Reger (2004: 56), in most of the relevant studies “...the mechanisms are not explicitly systematized, and, in most cases only a small selection of possible instruments are described or analyzed”. Second, the majority of research undertaken in the field has been done at the level of the parent firm (e.g., Asakawa, 2001; Belderbos, 2003). In fact, only a very limited number of studies have examined the determinants and characteristics of MNE integration at the subsidiary level (Ghoshal et al., 1994; Harzing, 2001). However, when research emphasis is placed on the management of MNEs' functional units which are characterized by internal diversity within the network and specialization (notably R&D units), the scholarly importance given to HQs is not quite attenuated, since decisions that impact on potential interdependencies should be better analyzed at the subsidiary level (Doz and Prahalad, 1984). Finally, much of the extant literature in the field is anecdotal, conceptual or limited in focus, in the sense that it mainly draws on qualitative information only (e.g., Reger, 1999; Asakawa, 2001) and/or empirically explore the influence of only few contingency factors that influence integration and inter-unit coordination (e.g., Martinez and Jarillo, 1989; Ghoshal et al., 1994).

We attempt to address these gaps in the literature by categorizing the coordination instruments identified in the broad international management literature and by providing some systematic, albeit limited, empirical evaluation of the impact of key strategic variables (together with some commonly studied subsidiaries' characteristics) on the coordination mechanisms employed in the context of internationalized MNE R&D activities. Hence, the broad question we address in this research is: *What are the suitable mechanisms employed for the coordination of international R&D in MNEs, and what are the relations between these coordination mechanisms and the strategic role of decentralized R&D labs?* By surveying these relationships we respond to the recent plea for research focused on the organization and management of global R&D (Hansen et al., 2005; Reger, 2004).

Two distinctive contributions emerge from our analysis: First, by adopting a quantitative inductive logic, we move away from the straight-jacket of conceiving the research within the boundaries of a deductive hypothesis-driven approach, which limitations are obvious from the scarcity of related literature. This approach enables us to generate a contingency-dependent typology of coordination patterns – modes and mechanisms – and analyze their applicability in integrating decentralized R&D activities. Thus, conceptually, we complement existing integration literature by considering the potential impact of specific coordination instruments that were underexplored in the context of international technology management. Second, by including in our analysis both organizational and strategic variables and adopting the decentralized “subsidiary-focused” perspective – which appears to have gained considerable momentum in the literature recently – we revisit and extend empirical research by providing insights on the following: (i) the prevalence of the “traditional paradigm” of the management of MNEs which assumes tight integration and de-emphasizes subsidiaries' autonomy and influence, and (ii) the explanatory power of contextual and strategic variables in determining coordination patterns within MNEs' technology trajectory.

The paper is organized as follows: we first propose the theoretical background and framework for classifying overseas R&D laboratories and coordination mechanisms and generate our research propositions. We then present the research methodology, followed by the evaluation of the coordination patterns of decentralized R&D in the focal country. Next, we present and discuss our empirical results. In the final section we conclude, by positioning our findings into a wider conceptual, managerial and strategic perspective.

## 2. Literature review and theoretical development

The pioneering studies by Lawrence and Lorsch (1967a,b) demonstrated how different conditions in the organizational environment result in differences in the nature and forms of coordination. For relative stable environments that are characterized by little differentiation and face routine problems, simpler forms of integration appear to be effective and usually take place at the higher levels of the organization (Moreno-Luzón and Lloria, 2008). On the other hand, for differentiated environments that are characterized by uncertainty, complexity and dynamism (such as the knowledge-creating units), coordination seem to be a complicated process that requires more sophisticated mechanisms (Moreno-Luzón and Lloria, 2008). Literature supports that in the context of international R&D, coordination is a multifaceted function that should be tailored to the specific tasks assigned to each distinctive unit (Asakawa, 2001; Nobel and Birkinshaw, 1998). Further, Reger (2004) argues that apart from organizational attributes, coordination at the MNEs'

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