Technological Forecasting & Social Change 116 (2017) 181–195

Contents lists available at ScienceDirect

Technological Forecasting & Social Change

Do we really know the predictors of competence-creating R&D subsidiaries? Uncovering the mediation of dual network embeddedness

Fariza Achcaoucaou [a,*], Paloma Miravitlles [a], Fidel León-Darder [b]

[a] University of Barcelona, Faculty of Economics and Business, Department of Business, Av. Diagonal 690, 08034 Barcelona, Spain
[b] University of Valencia, Faculty of Economics, Department of Management, Av. dels Tarongers s/n., 46022, Valencia, Spain

ARTICLE INFO

Article history:
Received 24 March 2016
Received in revised form 19 October 2016
Accepted 20 October 2016
Available online 23 November 2016

Keywords:
Technology strategy
R&D
Network embeddedness
Multinational
Subsidiary
Competence-creating role

ABSTRACT

Many changes have been recorded in the R&D role played by the foreign subsidiaries of multinational corporations (MNCs), to the extent that today many are recognised as key players in the development of firm innovation-related competences. Given this trend, we examine the predictors of a subsidiary's R&D role as a competence-creating contributor to the MNC's long-term success. Traditionally, the predictors of subsidiaries' R&D roles have been sought in the specific features of the internal corporate and external host-country environments. However, we find that favourable corporate- and country-level conditions may not necessarily lead to the enhancement of a subsidiary's R&D role unless dual embeddedness – that is, the subsidiary's embeddedness in the knowledge networks of the MNC (internal embeddedness) and in those of the host country (external embeddedness) – is well established. The main contribution of this paper is the development of a multiple mediation model that disentangles the way in which corporate and host-country environments interrelate with a subsidiary's dual embeddedness in the expected configuration of its competence-creating R&D role. In developing the model, we use the PLS-SEM method to estimate the relationship between these elements and, eventually, to forecast the subsidiary's competence-creating R&D role. The proposed model should help managers shape the fate of the subsidiary's R&D strategic role.

1. Introduction

Prior research has documented the increasingly important role played by the subsidiaries of multinational corporations (MNCs) in building innovation-related competences in an international basis. This development has, in turn, triggered international knowledge-seeking strategies in the quest for long-term competitiveness (Edler, 2004). Some subsidiaries are accordingly given R&D mandates to explore local knowledge and gain access to expertise that is complementary to the firm (Santangelo, 2012), which when leveraged through the transfer of knowledge between MNC units provide a competitive advantage for the whole corporation (Birkinshaw et al., 1998; Foss and Pedersen, 2004; Frost, 2001). As a result, over time, some subsidiaries become 'competence-creating' units contributing to the knowledge of other subsidiaries, while many others become the recipients or 'competence-exploiting' units of this knowledge (Cantwell and Mudambi, 2005). This dichotomy has emerged in parallel with the evolution of MNC structures towards network-based systems (Wang and Suh, 2009). The notion of the internationally networked MNC, and its corollary, the geographical dispersal of sources of knowledge (Cantwell, 2009), implicitly recognises the subsidiary's potential to access and share knowledge within two distinct contexts: within the MNC itself and within the host countries in which it operates (Ghoshal and Bartlett, 1990). Given the importance of subsidiary engagement in network linkages for upgrading their own competences and contributing to the MNC's overall capabilities, this study explores the "dual" embeddedness of competence-creating R&D subsidiaries as a key factor for future firm-specific advantage.

Existing studies on subsidiary R&D roles pay little attention to the impact of subsidiary involvement in corporate and local network linkages (Wang et al., 2009). On the one hand, traditional academic models view the MNC as a set of units operating in multiple environments and the R&D role of each subsidiary largely as a function of the characteristics of its local environment (see, for e.g., Ghoshal and Nohria, 1989; Jarillo and Martínez, 1990). They tend to consider this environment as a determinant force that affects all units operating at the same location equally (Holm et al., 2005). On the other hand, many other studies consider subsidiary roles as being driven primarily by the internal corporate management and focus on the traditional facets of the headquarters-subsidiary dyad, such as headquarters assignment or subsidiary initiatives (e.g. Ambos et al., 2010; Birkinshaw et al., 1998; Dörrenbächer and Gammelgaard, 2006), in part, assuming that an

* Corresponding author.
E-mail addresses: farizaa@ub.edu (F. Achcaoucaou), paloma.miravitlles@ub.edu (P. Miravitlles), fidel.leon@uv.es (F. León-Darder).

http://dx.doi.org/10.1016/j.techfore.2016.10.019
0040-1625/

MNC's subsidiaries have the same opportunity to benefit from the same corporate background.

Yet, earlier research has shown that subsidiaries located in the same country and subsidiaries of the same MNC operating in different countries varied markedly in their ability to fulfil international responsibilities, ranging from the undertaking of multiple competence-creating mandates to the fulfilling of none whatsoever (Moore, 2001). This suggests that environmental predictors (both corporate- and country-level predictors) by themselves cannot fully account for the heterogeneity of R&D subsidiaries and that a third explanatory factor concerned with unequal access to knowledge resources in the two contexts must exist. With the aim of uncovering this predictor, this study seeks to provide fresh answers to the traditional question of: Why are some champion subsidiaries more R&D competence-creators than others although operating in the same location or belonging to the same MNC?

It is our contention that the answer to this question can be found in the concept of network embeddedness, whereby the way in which, and the extent to which, subsidiaries are embedded in internal and external networks can vary. We believe that directly linking corporate- and country-level predictors to subsidiary R&D roles can result in misleading forecasts. This is because differences in the relational embeddedness of subsidiaries – understood as the variety of interactions and the quality of the linkages they develop in their networks (Figueiredo, 2011; Giroud and Scott-Kennel, 2009; Santangelo, 2009) – lead to differences in their absorption, creation and sharing of knowledge and, hence, to different R&D roles. In exploring this question, we aim to provide a better understanding of the twin impacts of environmental predictors and dual (internal and external) embeddedness.

While studies examining subsidiaries from this dual-network perspective are increasingly common (see, e.g., Figueiredo, 2011; Helble and Chong, 2004; Wang et al., 2009; Yamin and Andersson, 2011; Ciabuschi et al., 2014; Oehmichen and Puck, 2016, Bresciani and Ferraris, 2016), few consider the simultaneous effect of internal and external embeddedness on subsidiary R&D roles (with the notable exceptions of Wang et al., 2009; Andersson et al., 2014; Achcaoucaou et al., 2014) and even fewer, if any, attempt to demonstrate how corporate- and country-level predictors might be related to dual embeddedness in determining a subsidiary's R&D role. Indeed, the calls to 'unpack' the dual or multiple-embeddedness of subsidiaries from other organisational arrangements are constant in the literature (Cantwell, 2009; Meyer et al., 2011; Collinson and Wang, 2012; Oehmichen and Puck, 2016).

This study seeks to contribute the literature by developing a model that combines both the influence of the corporate and country environments with the effects of dual embeddedness so as to provide a better understanding of the predictors of subsidiaries' competence-creating roles. By adding concepts and insights from the network-based view to the literature on subsidiary's R&D, our analysis is able to go further than previous studies and uncover several mediations that determine the strength of internal and external influences. Using a partial least square (PLS) approach to structural equation modelling on a sample of 111 foreign-owned subsidiaries in Spain, our results indicate that performing a competence-creating R&D role depends not only on favourable corporate and country environments, but also on the subsidiary's simultaneous embeddedness in corporate and local networks, since they mediate the relationship between environmental predictors and R&D roles.

The paper is organised as follows: the next section provides a brief overview of the relevant theory, while Section 3 derives the hypotheses that should serve to disentangle the effects of corporate- and country-level predictors and dual embeddedness on competence-creating R&D roles. Section 4 describes the data, methods, and variables used to run the forecasting model. The empirical findings of the multiple mediation analysis are presented in Section 5 and their implications are discussed in Section 6.

2. Theoretical framework

Since scholars began to identify subsidiaries as important actors in the creation and maintenance of the MNC's firm-specific advantage (Cavanagh and Freeman, 2012), two prominent views emerged. At the beginning of the eighties, many empirical studies, taking an industrial-organisation perspective (Porter, 1980), claimed that the differentiated roles played by subsidiaries was largely dependent on the characteristics of their local environment (Ghoshal and Nohria, 1989; Jarillo and Martínez, 1990). Later, towards the end of the eighties, studies grounded in the resource-based view suggested that as subsidiaries develop their level of competences, they become better equipped to fulfil more advanced roles (Cavanagh and Freeman, 2012).

Although these two perspectives have added greatly to our understanding of the way in which subsidiaries contribute to achieving a firm's competitive advantages, they overlook the fact that a MNC constitutes a network of internationally dispersed units (Zander, 1999), each of which is embedded in local networks (Foss and Pedersen, 2002; Forsgren et al., 2005). This conceptualization of the MNC as a differentiated network gave way in the late nineties to the network-based view (Dyer and Singh, 1998; Gulati, 1999). From this perspective, the MNC is able to share existing knowledge and to combine it to build new knowledge, by tapping into a range of sources available in its subsidiaries (Frost, 2001). As such, a subsidiary's critical resources can extend across country or firm boundaries and can emerge from idiosyncratic exchange relationships with different counterparts (Dyer and Singh, 1998). Thus, each specific relationship may expose subsidiaries to new ideas and opportunities, providing them with unique strategic access to new knowledge and learning opportunities (Santangelo, 2009).

Consequently, each of the foregoing perspectives differ in its primary focus – be it industry/location, resources/capabilities or linkages, respectively. The central thesis of this article, however, is that focusing on just one of these areas severely limits our ability to account for a subsidiary's contribution to a firm's competitive advantage. Hence, what we propose and test is a comprehensive framework that integrates theoretical insights on the effect of both country- and corporate-level predictors and dual embeddedness in the shaping of subsidiary R&D roles.

3. Hypothesis development

3.1. Mediating effect of the external MNC network

Grounded in the industrial-organisation perspective, environmental factors in host countries are assumed to contribute to the development of MNC subsidiary competences and, thus, to predict subsidiary R&D roles. Birkinshaw & Hood (1998: 775) refer to them as factors of '*local environment determinism*' and Cantwell & Mudambi (2005: 1113) allude to '*locational determinants*' to show that R&D development is conditioned by the '*characteristics of the location in which the subsidiary is situated*' in terms of quality and resource conditions. The main argument underpinning this environmental deterministic view is that, in essence, each subsidiary is affected by operating under a unique set of conditions (identified in Porter's (1990) diamond model as customers, competitors, suppliers and factor endowments) which constrains or determines a firm's competitiveness. For instance, the level of competition in the environment puts pressure on firms to be innovative and to upgrade their competences in order to outperform their competitors (Holm et al., 2003). Similarly, consumer discernment and sophistication push MNC units to develop new practices and competences to satisfy demanding customers (Beise, 2004). Specialised suppliers, too, may stimulate the development of competences in firms that agglomerate in a particular location (Shaver and Flyer, 2000). Physical proximity clearly matters in generating agglomeration economies and knowledge spillovers among firms located in the same territory (Jaffe et al., 1993; Audretsch and Feldman, 1996; Almeida and Kogut, 1999; Alcacer and