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Research Policy 31 (2002) 1417–1429

research
policy

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Global production networks, knowledge diffusion, and local capability formation

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Received 15 October 2001; received in revised form 7 January 2002; accepted 11 February 2002

Abstract

This paper develops a conceptual framework that explores the linkage between the evolution of global production networks (GPN), the role of network flagships in transferring knowledge, and the formation of capabilities by local suppliers. GPN are a major innovation in the organization of international business. These networks combine concentrated dispersion of the value chain across the boundaries of the firm and national borders, with a parallel process of integrating hierarchical layers of network participants. The network flagships transfer both explicit and tacit knowledge to local suppliers through formal and informal mechanisms. This is necessary to upgrade the local suppliers' technical and managerial skills, so that they can meet the flagships' specifications. We also examine how GPN can act as mediators in the capability formation of local suppliers.

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Keywords: International business strategy; Global production networks; Multinational Corporations; Organizational knowledge; Knowledge diffusion; Capability formation; Local suppliers

1. Introduction

Multinational corporations (MNCs) have been around for a long time (e.g. Wilkins, 1970). Until recently, their international production has focused on the penetration of protected markets through tariff-hopping investments, and on the use of assets developed at home to exploit international factor cost differentials, primarily for labor (e.g. Dunning, 1981). This has given rise to a peculiar pattern of international production: offshore production sites in low-cost locations are linked through triangular trade

with the major markets in North America and Europe (e.g. Dicken, 1992).

A progressive liberalization and deregulation of international trade and investment, and the rapid development and diffusion of information and communication technology (IT) have fundamentally changed the global competitive dynamics, in which MNCs operate. While both market access and cost reductions remain important, it became clear that they have to be reconciled with a number of equally important requirements that encompass: the exploitation of uncertainty through improved operational flexibility (e.g. Kogut, 1985; Kogut and Kulatilaka, 1994); a compression of speed-to-market through reduced product development and product life cycles (e.g. Flaherty, 1986); learning and the acquisition of specialized external capabilities (e.g. Antonelli, 1992; Zander

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and Kogut, 1995); and a shift of market penetration strategies from established to new and unknown markets (e.g. Christensen, 1997).

In response to the increasingly demanding requirements of global competition, three interrelated transformations have occurred in the organization of international economic transactions. First, global production networks (GPN) have proliferated as a major organizational innovation in global operations (e.g. Borrus et al., 2000). Second, these networks have acted as a catalyst for international knowledge diffusion, providing new opportunities for local capability formation in lower-cost locations outside the industrial heartlands of North America, Western Europe and Japan. Third, a long-term process of “digital convergence” (e.g. Chandler and Cortada, 2000), enabling the same infrastructure to accommodate manipulation and transmission of voice, video, and data, has created new opportunities for organizational learning and knowledge exchange across organizational and national boundaries, hence magnifying the first two transformations (Ernst, 2002c).

The combination of these three transformations has changed dramatically the international geography of production and innovation. We focus on the first two of these transformations. The first transformation signals a new *divide* in industrial organization: a transition is under way from “multinational corporations”, with their focus on stand-alone overseas investment projects, to “global network flagships” that integrate their dispersed supply, knowledge and customer bases into global (and regional) production networks (Ernst, 1997, 2002a). There is a growing acceptance in the literature that, to capture the impact of globalization on industrial organization and knowledge diffusion, the focus of research needs to move from the industry and the individual firm to the international dimension of business networks (e.g. Ghoshal and Bartlett, 1990; Rugman and D’Cruz, 2000). Our understanding of these networks is limited. Most studies have focused too narrowly on the perspective of the network flagship (“flagship bias”). We need research that explores as well implications for network suppliers, especially lower-tier suppliers from developing countries.

Equally important is the second transformation: GPN in their operations reportedly disseminate important knowledge to local suppliers in low-cost locations, which could catalyze local capability formation.

Knowledge transfer, however, is not automatic. It requires a significant level of absorptive capacity on the part of local suppliers and a complex process to internalize disseminated knowledge. Our understanding of knowledge transfer and local capability formation is limited. International knowledge transfer has been extensively studied, but research has primarily focused on such formal mechanisms as foreign direct investment (FDI) and foreign licensing (FL) (Reddy and Zhao, 1990). These formal mechanisms, however, are only the tip of the iceberg. A larger amount of knowledge is transferred through various informal mechanisms (Westphal et al., 1985; Kim, 1991; Ernst, 2000a). Research on informal knowledge transfer is scarce. The importance of local capabilities in assimilating, adapting, and improving imported technology has long been recognized, but few studies exist on the complex process of local capability formation in developing countries (e.g. Kim, 1997).

GPN transform the production and use of knowledge, with far-reaching implications for an evolutionary theory of economic change. There is a fundamental trend towards an increasing mobility of knowledge, yet little do we know about drivers and implications. A major constraint is a lack of communication between research on GPN, research on international knowledge diffusion, and research on local capability formation. While all three are highly relevant strands of research, their lack of interaction obstructs our understanding of how global networks affect knowledge diffusion and the formation of local capabilities. There is a need to bridge this gap through “appreciative theories”, as defined in Nelson’s (1995) thought-provoking review of economic growth theory.

This paper develops a conceptual framework that links together the above three areas of research, as a first step towards an appreciative theory. We argue that globalization has culminated in an important organizational innovation: the spread of GPN. These networks combine concentrated dispersion of the value chain across firm and national boundaries, with a parallel process of integration of hierarchical layers of network participants. This has created new opportunities for international knowledge diffusion that lower-tier network suppliers should strive to exploit. To substantiate this argument, we proceed as follows. Section 2 analyzes the three dynamic forces that drive the rapid development of GPN and highlights the

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