

Foreign Direct Investment, Intra-organizational Proximity, and Technological Capability:
The Case of China's Automobile Industry

by

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Submitted to the Department of Urban Studies and Planning
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To my parents

尊敬하는 父母님께 本論文을 獻呈합니다.

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Abstract

This dissertation consists of three self-contained essays, each of which examines part of the causal link among inward/outward foreign direct investment (FDI), intra-organizational proximity, and in-house technology development performances.

The first essay explores why international joint ventures (IJVs)—an FDI-hosting arrangement often employed by the global South to strengthen foreign investors' commitment to local economic development—may lead to only partial success in nurturing local technological capability. The experience of China's passenger vehicle sector demonstrates that, in the existence of a substantial technological-capability gap between alliance partners, the IJV arrangement is likely to create a "passive" learning mode where foreign firms determine what, when, and how their local IJV partner firms should learn. Accordingly, learners using this IJV arrangement may be able to strengthen their production capability, where interests of both IJV partner firms often converge, but it leaves their project-execution and innovation capabilities largely undeveloped.

The second essay discusses how outward FDI can complement the IJV-based technological capability-building process, through an analysis of the Shanghai Automotive Industry Corporation (SAIC) case. When a firm is upgrading its technological capability, outward FDI can allow learners to have access to human-embedded skills and knowledge and other intellectual assets that are hardly accessible through the inward globalization strategy. Access to a wide range of external resources is a critical ingredient for improving technological capability, and it can also promote self-learning capability by encouraging subsequent learning-by-doing practices. Accordingly, outward FDI can augment "active" nature in the "passive" learning mode created by the inward globalization strategy.

The last essay examines why intra-organizational proximity matters for the technological catch-up process, through a comparison of the Chinese Big Three automotive groups. As a firm's asset-seeking inward/outward globalization strategy and domestic mergers are accompanied by substantial growth in their organizations and assets, intra-firm governance affects the internalization outcome of the acquired assets. The comparative analysis demonstrates that SAIC surpasses the First Automotive Works and the Dongfeng Motor Group in terms of in-house

technology development partly because the former has managed its corporate growth within a tight geographical and relational space, compared to the latter. Intra-organizational proximity contributed to SAIC's technological capability-building process by encouraging the sharing and integration of acquired resources across sub-operational units, thus creating group-wide synergy for the effective internalization of the resources.

Dissertation Supervisor: Alice H. Amsden (MIT)

Readers: Karen R. Polenske (MIT) and Calestous Juma (Harvard)

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The primary data for this research are drawn from the 25 in-depth interviews that I conducted in China and Korea in the winter of 2007 and the summer of 2008. I deeply appreciate the valuable input from all of the interviewees, who are managers, engineers, public servants, journalists, and researchers from China's major automotive groups, Sino-foreign auto assembly joint ventures, Chinese subsidiaries of global automakers, Chinese government institutions, China-based supply firms, China's automotive magazines, and China- and Korea-based research institutes. However, I regret being unable to list their names here due to my confidentiality obligation.

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Abbreviations

AMC	American Motors Corporation
CARI	Changchun Automotive Research Institute
CATARC	China Automotive Technology and Research Center
CKD	completely knocked-down
DF	Dongfeng
DFM	Dongfeng Motor Group (formerly known as the Second Automotive Works)
DFPVC	Dongfeng Passenger Vehicle Company
EMNC	emerging-market multinational corporation
ESC	electronic stability control
FAW	First Automotive Works
FDI	foreign direct investment
GM	General Motors
HAG	Hainan Automotive Group
HAW	Hainan Automotive Works (predecessor of HAG)
HKM	Hyundai-Kia Motors
HQ	headquarters
IJV	international joint venture
IS	import substitution
ISI	import substitution industrialization
JV	joint venture
KIET	Korea Institute for Industrial Economics and Trade
M&A	merger and acquisition
M-form	multidivisional organizational structure
MNC	multinational corporation
MOFTEC	Ministry of Foreign Trade and Economic Cooperation
MPV	multi-purpose vehicle (e.g., van)
NAG	Nanjing Automotive Group
NBSC	National Bureau of Statistics of China
NDRC	National Development and Reform Commission, P.R. China
OEM	original equipment manufacturing/manufacturer
PATAC	Pan Asia Technical Automotive Center
PSA	Peugeot Citroën Automotive Group (Peugeot Société Anonyme)
R&D	research and development
RMB	renminbi (Chinese yuan)
SAIC	Shanghai Automotive Industry Corporation
SAW	Second Automotive Works
SDPC	State Development and Planning Commission, P.R. China
SGM	Shanghai General Motors
SIMEE	Shanghai Institute of Mechanical and Electrical Engineering
SKD	semi knocked-down
SOE	state-owned enterprise

STAC	Shanghai Tractor and Automobile Corporation
SUV	sports utility vehicle
SVW	Shanghai Volkswagen
SYM	Ssangyong Motor
TAG	Tianjin Automotive Group
TWMNC	Third World multinational corporation
UNCTAD	United Nations Conference on Trade and Development
VCC	Vale Columbia Center
VW	Volkswagen
WTO	World Trade Organization

Overview

Foreign Direct Investment, Intra-organizational Proximity, and Technological Capability

Developing countries have long been interested in nurturing local technological capabilities in order to move up the global value chain. They have been active in hosting foreign direct investment (FDI), which is often called knowledge-embedded capital, seeing it as one of the most effective and feasible vehicles for technology transfer. However, a higher presence of FDI does not always ensure better local technological capability, and the FDI-based inward globalization strategy often fails to serve as an effective means of technological catch-up. Empirical studies suggest that FDI's long-term contribution to host economies, particularly from a local technology-development perspective, is uncertain in both its sign and magnitude.

In this study, I explore the following two questions. One is why the FDI-based technological catch-up strategy in the developing world often ends up in only partial success; the other is how latecomers can overcome the limitations involved in the FDI-based catch-up model to improve their technological capability. These questions may primarily interest scholars in the fields of development studies, business strategy, or industry research, but the topics of technology transfer and technological capability-building in the developing world may bequeath important implications to much broader academic fields. For example, scholars of environmental studies and science may also see the topic's relevance to their concerns, as global environmental damage may not be able to be mitigated substantially unless the majority of developing countries adopt clean and energy-efficient technologies, which demands active technology-transfer activities

from the developed world and intensive self-initiated capability-building practices in the developing world.

To explore the main research questions specified above, I focus on the two-decade experience of China's modern passenger-vehicle sector development. A primary fact that draws my attention in the case selection is that the inward globalization model for China's passenger-vehicle sector, based on the international joint venture (IJV) requirement with a strict control of non-Chinese equity-share in each IJV, has not yet met its ultimate goal of nurturing Chinese automakers' technological capabilities according to global standards. This goal has not been met, although huge domestic market potentials have given China the critical advantage, which is rarely found in other developing countries, of attracting foreign direct investment (FDI) and influencing foreign investors to commit to local technology development. Through detailed studies of major firms in China's passenger-vehicle sector, I intend to demonstrate that (i) the partial success of China's "exchange-market-for-technology" strategy is due to the limitation inherent in the strategy itself rather than to the inappropriate implementation of the strategy; and (ii) for a more comprehensive technological catch-up, thus, the sector would need to incorporate some alternative approaches that can complement what is missing in the FDI-based learning model.

In the first chapter, I focus on the cases of Shanghai-Volkswagen and Shanghai-General Motors, which are often considered two of the most "successful" Sino-foreign auto-assembly joint ventures (JVs). These case studies demonstrate that even the two leading IJVs have limited their contributions to local production-capability building without nurturing local project-execution and innovation capabilities. The primary reason was the "passiveness" inherent in the IJV-based learning model, where multinational corporations control the contents, timing, and

method of learning for local JV partner firms and which discourages learners from being proactive in building project-execution and innovation capabilities on the basis of their improved production capability. Given the substantial gap in technological capability between IJV partners, local firms have only limited opportunities to overcome the passiveness.

In the second chapter, then, I ask what learners can do to surmount the challenge raised by the inward globalization model in the midst of building technological capability. To draw implications, I analyze the case of the Shanghai Automotive Industry Corporation (SAIC), which has been leading China's passenger-vehicle sector in terms of market share and in-house technology development and, at the same time, has held a larger stock of overseas investment than any other Chinese automaker. The SAIC story tells us that outward FDI, if used in an appropriate way, can complement the IJV-based learning model substantially in terms of the following aspects. First, acquired foreign assets have formed base technologies, which provide SAIC a starting point for initiating a series of new vehicle development projects and to which SAIC gradually added innovations through self-application practices. Second, outward FDI has allowed SAIC to establish broad access to external knowledge and skills embedded in humans, and this broad access has helped SAIC internalize the capability underlying external technologies together with the technologies themselves. Finally, SAIC's improved technological capability, thanks mainly to outward FDI and subsequent learning-by-doing practices, has strengthened its IJV partner firms' commitment to China-based technology development projects. The key implication from the SAIC case is that latecomers can turn into "active" learners from "passive" ones with their outward globalization scheme.

In the last chapter, I highlight intra-organizational proximity as another key factor that can affect technological capability-building outcomes. My central argument in this chapter is that

how to utilize acquired external resources to maximize firm-wide synergy is as important as how to establish access to target external assets, and intra-organizational proximity is one critical factor, particularly for M-form organizations to facilitate such synergy-creating process through internal knowledge integration and sharing. To demonstrate this point, I compare SAIC with the First Automotive Works (FAW) and the Dongfeng Motor Group (DFM), SAIC's two principal domestic rivals. All of the three firms in the past were single-factory firms, but now they have become large multi-divisional automotive groups as a result of their growth and knowledge-acquisition strategies, involving new IJV establishment and domestic/cross-border mergers and acquisitions. My comparative study of the three firms shows that (i) SAIC's in-house vehicle development capability, considerably ahead of FAW's and DFM's, is partly due to its effective intra-group governance system, optimized to mobilize internal resources for group-wide technological learning; and (ii) SAIC's intra-organizational proximity has been a critical asset in creating the governance system.

As usual in most qualitative studies, my study may also be susceptible to critiques regarding the reliability of the interview-based primary data that its central argument depends on or about the generalizability of its central argument based mainly on the case of China's automotive industry. My research, however, may be shielded from such critiques, in the following sense. First, I made substantial efforts to minimize individual biases that may be involved in the interview process and to determine the credibility of the information collected through interviews. Most of my firm interviews were conducted with mid-high level managers and senior engineers, who had extensive knowledge about corporate strategies, history, and in-house technology development. To avoid personal biases, I asked the same questions of multiple interviewees, and adopted only the answers supported by more than one interviewee, in most cases. In addition,

whenever possible, I cross-checked the interview-based primary data with the information from various secondary sources, such as statistics yearbooks, automotive magazines, newspapers, etc. In general, I used only the primary data that were confirmed by other reliable sources, throughout this study.

The second kind of critique, on generalizability, would be largely irrelevant, as I do not intend to generalize the case of China's automotive sector to other industries or countries. Instead, the main goal of my research is to offer one possible approach to explain why the FDI-based learning model adopted by developing countries is often less successful than expected and how some latecomers have successfully overcome the limitations of the model. In each chapter's concluding section, however, I try to provide key lessons or implications drawn from my case studies, which may convey general insights into the FDI-based catch-up in the developing world, Third World Multinationals, or proximity within an M-form organization. In this respect, the primary value of this study is that it enriches the currently sparse literature on the topic of the new technological catch-up model, which involves *outward* as well as *inward* globalization (thus, gives rise to Third World Multinationals) and has been adopted actively by large emerging economies like China and India.

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