ESTABLISHING MANUFACTURING SUBSIDIARIES ABROAD: THE INFLUENCE OF INTERACTION CAPACITY ON TECHNOLOGY TRANSFER

by

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ABSTRACT OF DISSERTATION

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Title: **ESTABLISHING MANUFACTURING SUBSIDIARIES ABROAD: THE INFLUENCE OF INTERACTION CAPACITY ON TECHNOLOGY TRANSFER**

This study combines the knowledge-based and the capability views of the firm for building and testing a model of technology transfer between units of multinational corporations (MNCs). Within the model, the technology to be transferred is presented as organizational knowledge, which is partially tacit, distributed, and embedded in a social context. The transfer process can be carried out more or less efficient depending on a firm's transfer capability, which is decomposed into the sending unit's emissive capacity, the dyad's interactive communication capacity, the receiving unit's absorptive capacity, and the receiving unit's local adaptation capacity. The empirical study focuses on interaction capacity and seeks to identify those organizational practices that speed up or slow down the transfer process. The transfer event under study is the setup of manufacturing facilities by MNCs. The dependent variable was the time required for setting up a new manufacturing subsidiary. Different versions of the dependent variable were defined by the milestones of start of construction, arrival of machines, first

shipment, full capacity, and corporate-level productivity. The sample consisted of the manufacturing subsidiaries of foreign MNCs set up in the Northeast Mexican state of Nuevo Léon that started operations between 1998 and 2007. Data were gathered through a survey applied to the focal subsidiaries managers. A general finding of the study was that setup times differed by a ratio of up to 1:100. Subsidiary size was not found to be relevant, but complexity was. The mathematical model for analyzing the data was a moderated regression analysis, where four different indicators of the difficulty of the transfer task were used to make the transfer events comparable among each other: supplier diversity, documentation, teachability, and interunit similarity. Supplier diversity made the initial phase of the setup process especially difficult. Contrary to the literature on knowledge codification, documentation of technology was found to be helpful only when combined with face-to-face communication. Teachability proved to be the most reliable indicator of the difficulty of the transfer task. The fourth moderator, namely interunit similarity, showed that firms that replicated an existing organizational structure had an easier task for the initial phase of the setup. Six main hypotheses were tested in the study. H1 posited a positive effect of interunit communication on transfer efficiency. With frequency of incoming visits as independent variable, H1 was confirmed for all phases, while more expatriates were only helpful in the ramp-up phase. H2 concerned the difference between mediated and face-to-face communication. The data not only confirmed H2 but showed a reverse causality in the sense that phone communication increased when the setup was slow, but did not improve the process. H3 predicted a positive effect of interunit trust on transfer efficiency, which was found only for the less well defined tasks within the setup process and when trust had had time to evolve. H4

posited that a buyer-supplier relationship between the sending unit and the receiving unit would help with setup performance, but was not confirmed. To the contrary, new subsidiaries that depended on their MNCs as suppliers took longer for their setup processes. H5 concerned the MNC's host country experience, which was found to be significant for the less structured tasks within the setup process. Finally, H6 predicted that the general manager's setup experience would have a positive effect on transfer times. This effect was found for the ramp-up phase when the technology was easily teachable. Furthermore, host country nationals as general managers had an advantage for starting and ramping up when technology was not too complex; in all other cases, foreign experts achieved higher performances. The study discusses the implications of these findings for management theory and MNC practice and presents suggestions for further research.

RESUMEN

ESCUELA DE GRADUADOS EN ADMINISTRACIÓN Y DIRECCIÓN DE EMPRESAS, INSTITUTO TECNOLÓGICO Y DE ESTUDIOS SUPERIORES DE MONTERREY, CAMPUS MONTERREY

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Título: **ESTABLECIENDO SUBSIDIARIAS MANUFACTURERAS EN EL EXTRANJERO: LA INFLUENCIA DE LA CAPACIDAD DE INTERACCIÓN SOBRE LA TRANSFERENCIA DE TECNOLOGÍA**

Esta disertación combina la visión de la empresa basada en el conocimiento y el enfoque de las capacidades para construir y probar un modelo de la transferencia de tecnología entre unidades de corporaciones multinacionales. El modelo presenta la tecnología a transferir como conocimiento organizacional, el que es parcialmente tácito, distribuido y se inserta en un contexto social determinado. El proceso de transferencia puede realizarse con mayor o menor eficiencia, dependiendo de la capacidad de transferencia de la empresa en cuestión, misma que puede descomponerse en capacidad de emisión de la unidad emisora, capacidad de interacción comunicativa del binomio, capacidad de absorción de la unidad receptora y capacidad de adaptación local de la unidad receptora. El estudio empírico se enfoca en la capacidad de interacción y busca identificar aquellas prácticas que aceleren o frenen el proceso de transferencia. El evento de transferencia estudiado es el establecimiento de subsidiarias manufactureras por parte

de corporaciones multinacionales. Se definieron diferentes versiones de la variable dependiente en base a los hitos de arranque de la construcción, llegada de la maquinaria, primer embarque, plena capacidad y nivel de productividad establecido por el corporativo. La muestra consistió en las subsidiarias manufactureras de multinacionales extranjeras establecidas en Nuevo León, México, entre 1998 y 2007. Los datos fueron obtenidos mediante una encuesta aplicada a los gerentes de las subsidiarias en cuestión. Un hallazgo general del estudio fue que los tiempos de establecimiento difirieron a una razón de uno a cien. Se encontró que el tamaño de la subsidiaria no fue relevante, pero la complejidad de la tecnología sí lo fue. El modelo matemático utilizado para analizar los datos fue una regresión múltiple con moderación, en la que se usaron cuatro indicadores para hacer los eventos de transferencia comparables entre sí: diversidad de proveedores, documentación, enseñabilidad y similitud entre unidades. La diversidad de los proveedores dificultó especialmente la fase inicial. Contradiciendo la literatura sobre la codificación del conocimiento, se encontró que la documentación de la tecnología ayudaba sólo cuando se combinaba con la comunicación cara a cara. La enseñabilidad de la tecnología resultó ser el indicador más fiable de la dificultad de la tarea de transferencia. El cuarto moderador, similitud entre unidades, demostró que las compañías que replicaban una estructura organizacional existente tenían una tarea más fácil durante la fase inicial del establecimiento de su subsidiaria. En la disertación se probaron seis hipótesis principales. Según H1, existía un efecto positivo de la comunicación entre unidades sobre la eficiencia de transferencia. Tomando la frecuencia de las visitas a la subsidiaria como variable independiente, H1 fue confirmada para todas las fases, mientras que un mayor número de expatriados sólo ayudaba en la fase de expansión de la producción. H2 se refería a la

diferencia entre la comunicación por medios electrónicos y la directa. Los datos no sólo confirmaron H1 sino que mostraron una causalidad invertida, en el sentido de que la comunicación por teléfono incrementaba en frecuencia cuando el establecimiento se retrasaba, sin que eso haya mejorado el proceso. En H3 se predecía un efecto positivo de la confianza entre unidades sobre la eficiencia de la transferencia, mismo que se encontró sólo para las tareas menos bien definidas dentro del proceso y cuando había tiempo para desarrollar dicha confianza. En H4 se predecía que una relación de proveedor-cliente entre la unidad emisora y la receptora iba a ayudar con el tiempo de establecimiento, pero tal efecto no fue encontrado. Al contrario, las nuevas subsidiarias que dependían de insumos proveídos por sus propias multinacionales necesitaban más tiempo para su proceso de establecimiento. H5 sobre la experiencia de las multinacionales en el país anfitrión se confirmó sólo para las tareas menos estructuradas dentro del proceso de establecimiento. Finalmente, según H6 se predecía que la experiencia de establecimiento del gerente general iba a tener un efecto positivo sobre la eficiencia de la transferencia, mismo que se encontró para la fase de expansión de la producción cuando la tecnología era fácilmente enseñable. Además, los nacionales del país anfitrión tenían una ventaja para el arranque y la expansión de producción cuando la tecnología no era muy compleja, mientras que en todos los demás casos, los expertos extranjeros obtuvieron mejores resultados. Al final de la disertación se discuten las implicaciones de sus hallazgos para la teoría de la administración y la práctica de las empresas multinacionales y se presentan algunas sugerencias para estudios futuros.

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF FIGURES

1 Introduction

1.1 The Research Problem

In many sectors of our present-day economy, firms compete against each other on the basis of organization-specific knowledge as their most important asset. In order to exploit economies of scale (cf. Nachum, 2003), to access new markets, and to take advantage of cost differentials, these technology-based companies grow by transferring their knowledge to additional production facilities within the same country or abroad. In principle, the recipients of the transfer can be either internal units or external partners, such as joint venture partners or licensees. There is empirical evidence that multinational corporations (MNCs) are increasingly relying on intrafirm transfer (Desai, Foley, & Hines, 2004) over joint ventures. In this sense, MNCs can be defined as specialists in cross-border knowledge transfer (Kogut & Zander, 1993). From the capability or competence perspective of the firm (cf. Foss, 1993), an MNC's transfer capability is an important strategic advantage (Argote & Ingram, 2000) that allows for both the expansion of identical production processes and international corporate diversification (Fang, Wade, Delois, & Beamish, 2007).

Since Teece (1976, 1977a) showed that transfer processes can be extremely costly, the process of knowledge transfer within MNCs has been the object of many case studies, which demonstrate the practical difficulties of these processes. Since the mid-1990's, there have also been numerous quantitative studies, which build mostly on the concepts of the recipient's "absorptive capacity" (Cohen & Levinthal, 1990) or the "stickiness" (von

Hippel, 1994)[1] of the technology. All these studies clearly show two things: The difficulty of the transfer task varies from one case to another and MNCs differ widely in the efficacy of their transfer processes.

For example, in this study, it was found that from the arrival of the machines to the first delivery, setup times for new manufacturing plants varied between less than one month and over nine years, i.e., in a proportion of one to one hundred. Similarly, while new plants took an average of two and a half years from their first shipment to reaching corporate-level productivity, other subsidiaries needed over eight years before they achieved similar results. The sample of the present study even included an MNC where the subsidiary's original general manager had been fired for continuously missing productivity targets. Obviously, these differences in transfer efficiency can have a significant impact on overall performance: When production targets are not met, MNCs risk incurring in higher costs or even in losing their customers. On the other hand, a speedy transfer process can reduce the time for introducing products to new markets before the competitors have theirs available. Finding out which organizational practices increase or diminish transfer performance is the main goal of the present study. Almost all other studies of technology transfer so far have focused on isolated practices; so it is by no means clear if the results from the literature are equally valid for the setup of whole plants.

For obtaining an adequate representation of the phenomenon, a comparative study of technology transfer has to fulfill two conditions: First, it must take into account the properties of the knowledge to be transferred, which varies in its degree of complexity

[1] For an overview of the field and its literature, cf. Howells (2000), Becker and Praest Knudsen (2003), and Schlegelmilch and Chini (2003).

while it is always partially tacit, distributed among different members of the organization, and embedded in a specific social context. Second, the study should be framed within a coherent model of technology transfer that takes into account the actors, their motivations, and the channels used for transmission. Building on the literature on knowledge transfer in MNCs, this study presents such a model and applies it to a specific situation of interunit knowledge transfer in the MNC. According to Roth and Kostova (2003), the MNC is an especially adequate context for validating and expanding existing theories of the organization. The study thus hopes to make a contribution to the underlying theories of the MNC and the knowledge-based view of the firm.

1.2 Technology Transfer by Multinational Corporations within a Wider Context

Economists classify the cross-border transfer of manufacturing technology and practices between units of international firms under the label of Foreign Direct Investments (FDI). Emerging nations have three major reasons for attracting FDI: The arrival of advanced technology in the country is supposed to lead to so-called "trickle-down effects"[2] that are expected to help advance the domestic technology. New plants established by international firms also offer jobs to the local population. Finally, the balances of payment of FDI host countries benefit from the export of goods manufactured within their territories, as MNCs play an increasingly important role in global trade. In a broad sense, this study thus belongs to the literature on FDI in emerging economies.

Furthermore, the term "technology transfer" covers a variety of different types of activities and relationships (cf. Amesse & Cohendet, 2001), which extend from the sale of

[2] Empirical studies have not found clear evidence for these general spillover effects (cf. Aitken, Hanson, & Harrison, 1997), although it seems to be clear that FDI improves the domestic firms' export capacity (Aitken & Harrison, 1999).

high technology to developing nations to the transmission of innovations from the lab to the factory floor. This study is concerned exclusively with the setup of new production facilities by multinational corporations in countries other than their home bases. In most cases, the manufacturing technology that is transferred to developing or emerging economies has already been tried out in another country, often the MNC's home country. To the extent that these technologies are not altered significantly compared to the home country operation, the transfer can be called "horizontal", as opposed to "vertical" transfers, which run from the development of the pertaining technology to its application in manufacturing processes (Zander, 1991, quoted in Autio & Laamanen, 1995). This theoretical distinction may have to be qualified in today's speed-oriented, globalized economy, which forces MNCs to apply state-of-the-art technology at all their production sites, so that each site includes at least some elements of new technology that had not been previously tried out in mass production.

1.3 The Task of Setting up New Manufacturing Subsidiaries

MNCs can be considered to be specialists for cross-border transfer (Kogut & Zander, 1993), a function they are supposed to perform more efficiently than both alliances and markets (Almeida, Song, & Grant, 2002). In the sense applied here, "[t]echnology transfer is ... the replication of existing activities", an inherently complex and difficult task where "[t]he goal of the firm is to reduce the costs of this transfer while preserving the quality and value of the technology" (Kogut & Zander, 1992: 390). When an MNC chooses to transfer its technology internally as opposed to licensing or forming a joint venture with a local partner, one of the main rationales is often to keep control over the proprietary rights of patented and non-patented knowledge.

Managers of FDI projects have to integrate a transferred core (machines, technological knowledge, and organizational knowledge) and local resources (workers and physical inputs) to form new socio-technical systems, which vary in their degrees of similarity to existing systems in the sending organization. Conceptually, the overall task can be divided into five groups of activities:

- Sending technology from the home country;
- Receiving technology in the host country;
- Adapting the transferred knowledge to local constraints;
- Acquiring local resources;
- Integrating transferred and local resources and knowledge to form a functioning system by establishing "routines" (cf. Nelson & Winter, 1982) within a "hybrid" (Lorenz & Lazaric, 2000) organization.

Compared to this set of activities, it becomes clear that both the customary term "technology transfer" and Robinson's (1991) concept of "communication of technology" oversimplify an FDI project manager's task and exclude vital elements from it, notably those related to the organizational integration of knowledge (Grant, 1996b) and to the organizational adaptation to local conditions and constraints.

The mutual adaptation of technology and organization is a phenomenon that has been documented in case studies of the introduction of new technologies, where "the adaptation process is necessary because a technology almost never fits perfectly into the user environment" (Leonard-Barton, 1988: 252). Similar arguments have been applied to technology transfer (cf. Lachman, Nedd, & Hinings, 1994), although empirical evidence is scant (e.g., Lin, Tan, & Chang, 2002; Malik, 2002; Maritan & Brush, 2003). FDI

projects thus go beyond the information-forwarding paradigm, a fact that most researchers have only hinted at (cf. Amesse & Cohendet, 2001) although it has been recognized that "no definite distinction between transfer of knowledge and creation of new knowledge exists" (Bresman, Birkinshaw, & Nobel, 1999: 444).

1.4 Delimitation of the Research Topic

Technology transfer is a phenomenon that takes on many forms (cf. Amesse & Cohendet, 2001) and has been the object of different streams of research. The following paragraphs describe the type of technology transfer that is the topic of this study.

Concerning the scope of transfer, this study looks at the whole process with many overlapping and interconnected single transfer events as opposed to the transfer of specific technologies or organizational practices that other researchers have studied (e.g., Kostova & Roth, 2002; Szulanski, 1996).

Concerning the temporal unity, this study looks at the transfer process as a succession of stages with specific milestones, similar to Szulanski's (2003) stagewise approach to technology transfer.

Concerning the ownership and setting of the focal subsidiary, the sample is limited to greenfield investments implemented and owned by foreign MNCs, excluding joint ventures and other forms of cooperation between national and foreign partners such as mergers, acquisitions, or strategic partnerships because of possible differences in organizational culture and motivation. This choice supposes to minimize problems related to commitment and identity between both units (cf. Kostova, 1999), as the recipient unit is initially highly dependent on the sending unit as the main source of the technology to be used.

Concerning the phase in the life cycle of the transferred technology, this study only considers the (approximate) replication of an existing technology and organizational structure, analogous to Nelson & Winter's (1982) concept of replicating routines from a "template". Cases where the results of research and development are applied to production for the first time are explicitly excluded, as they present a completely different set of phenomena. Nevertheless, the study will control for possible deviations from the simplifying assumption that transfer is pure replication.

Finally, the study considers the transfer of technologies in manufacturing industries, leaving out the service sector.

1.5 Objectives of This Study

On a theoretical level, this study deals with how firms' specific capabilities build on mechanisms that foster the transfer of knowledge. This supposes a specific case where the capability or competence view of competition is grounded in the knowledge-based view (KBV) of the firm (cf. Grant, 1996b). The comprehensive model that is proposed here aims at bridging the theoretical gap between firm capabilities and organizational practices in order to build a more "fine-grained model of governance" (Grandori, 2001). The goal is to find an answer to Kogut and Zander's (1996) rhetorical question "What do firms do?" applied to the task of technology transfer.

From the theoretical point of view, the study applies the general propositions of the KBV about the internal structure of organizations to dyadic relationships within MNCs. Although there has been substantial research on the transfer of isolated organizational practices between MNC units, there is next to zero systematic evidence about the process of setting up whole facilities and making them operational. The literature (e.g. Gupta &

Govindarajan, 2000) suggests that face-to-face communication plays a pivotal role in these kinds of processes, but research results are still missing or contradictory concerning the influence of aspects such as trust, interdependence between units, and transfer experience on transfer performance.

On a practical level, the study looks for answers to two empirical questions: First, are there substantial differences between the technology transfer capabilities of different firms? If these differences matter, they could explain why a technological advantage in itself is not sufficient to gain a competitive advantage in the global economy (cf. Jones, 2002).

Second, which organizational practices explain these differences? For managers of MNC headquarters and subsidiaries, it is important to know how they can accelerate their technology transfer projects and make them more effective and less expensive. As Almeida, Song and Grant found in interviews with MNC managers, "every company we spoke to recognized the need to improve the efficiency of internal knowledge transfer" (2002: 159). The results of this study are expected to offer practical guidance for managers of MNCs, which should enable them to improve the setup of new subsidiaries not only in Mexico, but worldwide.

1.6 Structure of This Study

This introductory section is followed by a systematic review of the literature on knowledge transfer from two different points of view: the underlying models and the dependent variables. Section 3 contains the justification of the research model: The characteristics of organizational knowledge and its implications for transfer. The main axioms of the Knowledge-Based View are reviewed and connected to the concept of

transfer capability, which is developed into a general model. The discussion of the cost and difficulty of technology transfer leads to the formulation of the specific research hypotheses for the MNC's dyadic interaction capability. The methodology is outlined in section 4, which explains the operationalization of the variables, the establishment of the sample, the method for collecting the data, and the analytical tools used. A substantial part of this study consists of the detailed data analysis in section 5. The results of this study are presented and discussed in section 6. Finally, section 7 summarizes its contributions and limitations and offers an outlook at connected research topics.

2 Literature Review

Within the research on multinational corporations, technology transfer has become a common topic: A search performed on May 27, 2007, on the Proquest database using the alternative terms "technology transfer" OR "knowledge transfer" AND various synonyms for "multinational corporation"[3] in the "Citation and document text" field plus the additional restriction "scholarly journals, including peer-reviewed" came up with 1,505 articles. There are at least three explanations for this impressive research interest: Firstly, on the level of general focus, it can be taken as evidence for the fact that knowledge or technology and its transfer have been recognized as the key element for the expansion of multinational corporations and their efforts to maintain their competitive advantages, which is the main axiom of the knowledge-based view of the firm (Grant, 1996b). Secondly, the large number of studies points to the lack of a unified research prism, where authors from different traditions focus on similar phenomena using different lenses. The result is a multitude of models that do not allow building on each other but rather coexist independently of each other. Finally, papers on technology transfer in MNCs are so numerous because "technology transfer" and "knowledge transfer" are umbrella terms for a wide range of phenomena. The large number of articles found also demonstrates that a fully comprehensive, detailed review of the whole field of technology transfer is simply not feasible any more.

Instead, this review presents some representative examples of the empirical literature on technology transfer that have been published mostly in management journals,

[3] "international corporation" OR "international firm" OR "MNC" OR "MNE" OR "multinational enterprise" OR "multinational firm" OR "multinational corporation" OR ""transnational firm" OR "transnational corporation"

especially in the field of international management. The goal is to present a clearer picture of what the literature really refers to, which aspects have been covered in detail, and where there remain unchartered waters in the collective knowledge on technology transfer. This review presents the literature along two axes: The first part explores the different paradigms that authors have used in their studies for framing the complex phenomena of technology transfer. The second part classifies the empirical studies according to their dependent variables.

2.1 The Current State of Research on Knowledge Transfer

Most studies of knowledge transfer within MNCs have focused on formal organizational structure (for a historical review, cf. Martinez & Jarillo, 1989). Notably Bartlett and Ghoshal (1989) have developed this approach into the "transnational solution" of MNC organizational design (cf. Hedlund's (1994) similar concept of the "N-form"), which has been used as a basis for much international business research (e.g., Lord & Ranft, 2000). On the other hand, it is being recognized that "[w]e currently know little about the micro-processes involved in an intraorganizational search and transfer of knowledge" (Levine, 2003). Gupta and Govindarajan concur that "[c]onceptual work in this area is still in the early stages and empirical work is almost literally in the stage of infancy" (2000: 491).

As to conceptualization, some articles contain lists of factors relevant for technology transfer (e.g. Gibson & Smilor, 1991; Goh, 2002), but very few papers develop a comprehensive theoretical perspective on the matter. Two notable exceptions are Seaton and Corday-Hayes' (1993, quoted from Taschler & Chappelow, 1997) accessibility-mobility-receptivity model and Rebentisch and Ferreti's (1995) research propositions

built around the concepts of transfer scope, transfer method, knowledge architecture, and organizational adaptive ability. However, both models remain underspecified in important aspects and lack an overarching framework. To date, the empirical paper that builds on the most developed theoretical framework is Gupta and Govindarajan (2000), which served as a starting point for developing this study.

2.2 Models and Classifications of Technology Transfer

Technology transfer is a vast topic that has been studied within the disciplines of economics, sociology, anthropology, and management (Zhao & Reisman, 1992). There have been several attempts to give a systematic view of the different studies of technology transfer. An example is Amesse and Cohendet's (2001) classificatory quadrant, where different kinds of transfer are presented along two dimensions: A continuum between knowledge production and knowledge use and another continuum between intra- and inter-organizational transfers. A similar framework is Mudambi's classification of four types of knowledge flows "through source-target characterization" (2002: 2); knowledge flows either from subsidiary to parent (source of network leverage), from location to subsidiary (local competence exploitation and resource utilization), from subsidiary to location (spillovers), or from parent to subsidiary (exploiting home-based knowledge advantage). The latter type of flow is the object of this study.

Focusing on the depth of learning, Lall (1997) presented a hierarchy of transfer levels that went from operational to duplicative, adaptive and innovative transfers, depending on the competences acquired by the recipient. The transfer of an innovative competence goes beyond the scope of this study. One might also question if such a learning process can really be transferred or has to originate in the location itself.

One of the most comprehensive treatments of technology transfer is the list of variables assembled by Gibson and Smilor (1991), who did not offer a coherent classification. Similarly, Goh (2002) presented a list of factors helping with knowledge transfer effectiveness, but failed to offer a unified framework. Malik (2002) also presented a list of factors supposed to increase effectiveness, which he inserted rather loosely into a communication model (see section 2.1.1).

A model that refers to the internal aspects of knowledge transfer and is therefore more useful for the present study is the one proposed by Rebentisch and Ferreti (1995) linking transfer scope (general knowledge, specific knowledge, hardware, and behaviors) to transfer methods (impersonal communication, personal communication, group interaction, and physical relocation).

Rather independently from these meta-analytical approaches, researchers of technology research have always applied an underlying model of technology transfer, whether they made it explicit or not. The following is a list of these models and a brief discussion of their respective advantages and shortcomings.

2.2.1 Models of Technology Transfer 1: Communication Theory

The most frequently used model underlying studies of technology transfer is based on telecommunications and has been applied since the earliest systematic studies of technology transfer (cf. Allen, 1966). Technology transfer is presented as information transmission, where the following elements come into play: a sender as source of the information, a receiver as end point of the transmission, and a message that contains the information. In its more elaborated forms, this approach also allows distinguishing between different channels for transmitting and can include a feedback channel (e.g.

Malik, 2002). Building on the communications metaphor, this model can also account for the influence of codes (foreign languages and/or technical jargon) that might not be fully compatible between sender and receiver and the possibility of noise in the transmission. However, the effect of language has mostly been ignored in the international management literature (Welsh, Welsh, & Piekkari, 2005). Apart from a case study (Buckley, Carter, Clegg, & Tan, 2005), the only quantitative investigation into the effect of language on technology transfer did not find support for the thesis that linguistic distance harms knowledge transfer (Schomaker, 2006).

The main advantage of this model for studying technology transfer is its straightforwardness and the fact that it allows for including interaction. On the other hand, the model is built around technical devices and does not consider the subtleties of human interaction. More severely, it supposes that an ideal transfer is a one-on-one copy of the information content and that the explicit information is really all what is needed for a successful implementation of the technology in a different setting.

2.2.2 Models of Technology Transfer 1A: Translation

An interesting variation of the communication model has been proposed by Holden and von Kortzfleisch (2004). These authors establish an analogy between technology and translation, where they look at such phenomena as ambiguity, interference and lack of equivalence. The translation metaphor goes beyond the exact copy in the standard communication paradigm, but remains within the other limitations of the information transmission framework.

2.2.3 Models of Technology Transfer 2: Organizational Learning

Although in principle, only individuals can learn, “organizational learning” has become a widespread metaphor for more complex internal processes that can be demonstrated by their outcome: Due to learning, organizations can do things they previously could not accomplish. The most cited theoretical underpinning for this stream of research is Argyris and Schön’s (1978) three-loop framework, which distinguishes between single-loop learning (minor adjustments), double-loop learning (innovations), and triple-loop learning (learning how to learn). Within the strategy literature, most of the literature pertaining to the learning perspective has used the "absorptive capacity" concept, as presented by Cohen and Levinthal (1990)[4]. Additionally, Seaton and Cordey-Hayes (1993) coined the conceptually similar term of "receptivity" within their *AMR* framework.

Conceptualizing technology transfer as collaborative learning (cf. Tenkasi & Mohrman, 1995) implies a change of perspective: From transfer as a “push” activity to learning as a “pull” activity, while ignoring the sender. Learning happens at the inside of the organization or unit; transfer from the outside is not explicitly considered. This framework has mostly been applied in the learning curve literature within the operations research tradition (cf. Argote 1996, 1999; Argote, Beckman, & Epple, 1990; Argote & Epple, 1990; Benkard, 2000; Epple, Argote, & Devadas, 1991; Epple, Argote, & Murphy, 1996). Steensma (1996) explicitly proposed that a learning gap could be explained by a discrepancy between learning capability, characteristics of the technology, and collaboration.

[4] See the discussion in section 3.

The major advantage of this perspective is that it focuses on human beings and their activities. It also allows looking at different degrees of difficulty in the learning process. On the other hand, the connection between the theoretical models and their operationalization is not evident.

2.2.4 Models of Technology Transfer 3: Knowledge Management

When talking about technology transfer within companies, a much touted instrument is computer-based knowledge management. The basic idea is to set up a computer database with a directory and search functions and then design a system of incentives to make knowledgeable employees use it.

Information technology can probably be helpful as a support in technology transfer efforts (Albino, Garavelli, & Gorgoglione, 2004; Bolisani & Scarso 1999; Garavellia, Gorgoglione, & Scozzi, 2002). It has also the advantage of appealing to many technology-oriented companies. Its main shortcoming, however, is that databases capture only explicit knowledge, while tacit knowledge has to be transferred through mechanisms that are not included in the model. Furthermore, there are no reliable recipes for involving employees; organizational culture remains the key factor (cf. O'Dell & Grayson, 1998).

2.2.5 Models of Technology Transfer 4: The Knowledge View

The previous models have been enriched by the epistemological distinction between knowledge and information, which presents knowledge as a richer concept than what can be written down. Polanyi (1967) formalized this approach by introducing the concept of the "tacit dimension" of knowledge. This approach is complemented by the further

distinction between know-what and know-how (originally by Ryle (1949), according to Orlikowski, 2002).

The knowledge view has opened up the field for a whole range of subjects that are more or less related to knowledge transfer: The debate about codification (cf. Ancori, Bureth, & Cohendet, 2000) looks at the possibilities and potential benefits of tacit-explicit conversions of knowledge; Nonaka (1994, although based on a misunderstanding, cf. Tsoukas, 1996) has linked this conversion to social processes; Teece (1998) has stressed the importance of "negative" knowledge (about failures). On the other hand, the knowledge perspective leaves unclear whether it is more appropriate to speak of knowledge as an object or of knowing as an activity. In the approaches mentioned above, transfer is not explicitly dealt with.

2.2.6 Models of Technology Transfer 4A: Knowledge Flows

Based on the above perspective, knowledge has been likened to a liquid which flows from one point to another. Von Hippel's (1988, 1994) concept of "stickiness" –a measure of the difficulty of knowledge transfer– builds directly on this metaphor.

The most evident advantage on the knowledge flow approach is its focus on transfer. Many researchers have used this concept in their empirical studies (e.g., Andersen, 1998; Jones, 2002; Riusala & Smale, 2007; Schulz, 2003; Szulanski, 1996, 2000). The liquid metaphor has also been applied in the 'communities of practice' approach (cf. Brown & Duguid, 2001; Snyder, 1997) that is concerned with knowledge exchange between experts across organizational boundaries. As discussed below, however, "stickiness" has not been clearly defined, which has led to a confusion between knowledge characteristics on one hand and human and organizational factors, on the other hand.

2.2.7 Models of Technology Transfer 4B: Knowing As an Activity

Based on Giddens's (1984) structuration theory, Orlikowski (1992, 2002) has developed an approach that conceives of knowing as an activity rather than knowledge as an object. Besides Orlikowski, the most prominent researchers in this vein have been Brown and Duguid (1991, 1998, 2001).

The obvious advantage of this approach for the study of technology transfer is that is directly based on human activities and human relations. However, it seems difficult to come up with a convincing operationalization of these concepts for quantitative studies of knowledge transfer.

2.2.8 Models of Technology Transfer 5: Project Management

Some empirical studies of technology transfer (e.g., Bresnen, Edelman, Newell, Scarbrough, & Swan, 2003; Fernie, Green, Weller, & Newcombe, 2003; Huang & Newell, 2003; Koskinen, Pihlanto, & Vanharanta, 2003; Lin & Berg, 2001; Saad, Cicmil, & Greenwood, 2002; Sicotte & Langley, 2000) have adopted the project management perspective. Focusing on the best methods for managing these processes, they are almost completely descriptive in nature. For case studies, the project management perspective allows gaining a comprehensive view of the phenomenon. On the downside, it does not offer an underlying theory.

2.2.9 Models of Technology Transfer 6: Social Networks

A more person-focused approach to technology transfer is the one based on network theory. As Levine (2003) points out, the main feature of a knowledge exchange network are the persons' performative ties and the firm's regime of generalized exchange, which allows offering help even when direct reciprocation cannot be expected. Hansen (1999,

2002) has carried out quantitative studies linking network structure, tacitness/codification and transfer performance, while Reagans and McEvily (2003) broke down network structure into cohesion and range, establishing a relationship between these two features and the ease of knowledge transfer. These results have the advantage of being built on rigorous mathematical models, but their practical application is limited, as the underlying premise is that the organization could somehow reconfigure the network in order enhance transfer efficiency, even though Reagans and McEvily's own "results showed that it is easier to transfer all kinds of knowledge in a strong tie and more difficult to transfer all kinds of knowledge in a weak tie" (2003: 262). Other than by enhancing ties through group-wide meetings or job rotation, this seems hardly likely.

On the other hand, Tsai (2001, 2002) has applied network analysis to the interunit level, which allowed him to formalize the earlier work on relationships within the MNC (Ghoshal & Bartlett, 1988; Ghoshal, Korine, & Szulanski, 1994).

2.2.10 Models of Technology Transfer 7: Controls Theory

Focusing exclusively on a mechanism for feedback based on controls theory from engineering, Kremic (2003) has proposed a model where the sender checks the success of a transfer based on the output. If the result is unsatisfactory, the sender takes corrective action. Of course, this phenomenon can be observed in practice, e.g., when the general management of an MNC changes the head of a subsidiary due to lack of performance. The model, however, treats the organization as a black box and does thus not offer any insights into the internal mechanisms of knowledge transfer. Interestingly, an earlier effort of framing technology transfer within a much more elaborate systems concept (Joshi, 1977) based on matrixes seems to have been ignored by the subsequent literature.

2.2.11 Models of Technology Transfer 8: Expatriate Performance

A substantial part of the cross-cultural human resource literature has dealt with the topic of expatriate performance (for a recent overview of the field, cf. Holopainen & Björkman, 2005). The main line of research has been to relate expatriates' personal characteristics to their degree of success, in order to help the MNC find appropriate candidates. The motivation for this avenue of research are the numerous examples of MNCs who had unsatisfactory results in their foreign operations and have typically focused on the subsidiary managers' performance as the decisive factor, although a recent review suggest that the massive expatriate failure might be more a myth than a reality (Harzing & Christensen, 2004). This approach has been adapted to technology transfer by Minbaeva and Michailova (2004), who build their concept of "disseminative capacity" around individual communication behavior.

At first sight, this approach to technology transfer looks convincing. It certainly corresponds to how some firms function: If something goes wrong, find someone to blame. The basic problem, however, is that technology transfer is an organizational, i.e., social phenomenon, where a single person can never achieve anything by herself or himself.

2.2.12 Models of Technology Transfer 9: Transfer as a Stagewise Process

All models mentioned above look at technology transfer as a unit, although actually transfer projects –even for a single organizational practice– extend over months or even years. Those technology transfer studies that deal with the implementation of new technologies at the shop floor typically adopt a stagewise approach as the corresponding activities tend to be segmented into organizational units, such as R&D, design, process

engineering, and manufacturing. A stagewise approach has also been applied to the process of organizational problem solving in manufacturing (Tyre and Hauptman, 1992). For the interunit transfer of tried technologies, however, it was Szulanski (1996, 2000, 2003) who divided the process into the stages of initiation, implementation, ramp-up, and integration.

This micro approach to knowledge transfer can offer new insights with the transfer of specific technologies or organizational practices. Its empirical application hinges on the possibility to clearly separate sequential phases, without too much overlap among them.

2.3 Empirical Studies of Technology Transfer in MNCs

Most technology transfers are singular events that happen under specific circumstances. Therefore, many papers on this subject are case studies, which are published in engineering (e.g., Aase, 1998), in technology management (e.g., Azzone & Maccarrone, 1997; Blachandra, 1996; Carayannis, 1999; Tyre, 1991), international business (e.g., Bonache & Brewster, 2001; Bresman, Birkinshaw, & Nobel, 1999; Chen, Chen, & Ku, 2004), knowledge management (e.g., Perrin, Rolland, & Stanley, 2007; Søndergaard, Kerr, & Clegg, 2007), or project management (e.g., Bresnen, Edelman, Newell, Scarbrough, & Swan, 2003) journals. The fact that case studies continue to be published from such a wide array of disciplines illustrates that there are still many aspects that cannot be coherently explained by the systematic evidence established so far.

On the other hand, the number of quantitative studies has also been increasing over the last years. The field was opened by Teece's (1977a) seminal study and has attracted even more researcher since the publication of Gupta and Govindarajan's (2000) important paper.

Some researchers have used technology transfer as a predictor variable. For example, Martin and Salomon (2003) looked at how transfer experience was related to the decision to invest in the home country or abroad. Bonache and Brewster (2001) investigated the impact of the characteristics of the knowledge to be transferred on the selection of expatriates within MNCs. On a more micro level, Zhao and Luo (2005) were interested in how the frequency of transfer led to making the knowledge more encapsulated (= codified). Kostova and Roth (2002) linked knowledge transfer to the degree of internationalization and implementation of an organizational practice. Within the strategic management literature, technology has also been related to performance, especially for innovation: Subramaniam & Venkatraman (2001) linked technology transfer to new product development capability, Tyler (2001) related it to the similar concept of competitive advantage in innovation, while Tsai (2001) showed its impact on innovation and business performance at the subsidiary level.

2.3.1 The Dependent Variable in Technology Transfer Studies

One of the classical lines of research about technology transfer looks at whether the knowledge is transferred within the MNC, to a joint venture, or to an external partner (e.g., Almeida, Song, & Grant, 2002; Kogut & Zander, 1993), which constitutes an application of transaction cost theory. On a lower level of aggregation, Foss and Pedersen (2002) have linked the amount of knowledge transferred to the position of MNC units within their network.

A number of studies (e.g., Björkman, Barner-Rasmuusen, & Li, 2004; Dhanaraj, Lyles, Steensma, & Tihanyi, 2004; Foss & Pedersen, 2002; Lord & Ranft, 2002) have looked at whether technology transfer between MNC units takes place at all.

Alternatively, these transfer processes have been labeled as subsidiary inflows or outflows (e.g., Gupta & Govindarajan, 2000; Holtbrügge & Berg, 2004; Schulz, 2003). Referring to the same concept, Tsai (2002) baptized his dependent variable "intraunit knowledge sharing".

The quantitative study of technology transfer began with a focus on costs. Teece established in his 1977 study that "[t]ransfer costs ranged from 2.25 percent to 59 percent of total project costs with a mean of 19.16 percent" (Teece, 1981: 84). According to his data, these costs were negatively correlated with the existence of firms with similar technology and to the transferee's manufacturing experience, while the results were less clear for the relationship between costs and the transferor's transfer experience as well as between transfer costs and the age of technology. The importance of transfer costs has been confirmed in the literature (e.g., Niosi, Hanel, & Fiset, 1995; Teigland, Fey, & Birkinshaw, 2000), but this fundamental measure seems to have disappeared from current management research, while economics treats it at a highly aggregate level (e.g. Norback, 2001; Takechi, 2004).

The other objective measure for transfer success is the time required to complete a process. In fact, Teece (1977b) had proposed that cost and time in technology transfer could be traded off against each other. However, transfer studies that use time as the dependent variable (Hansen, 1999; Zander & Kogut, 1995) are also rare. This scarcity of "hard" measures for the success of technology transfer projects could be one of the causes for the disparity of findings in the field.

A series of papers have presented measures for the effectiveness of technology transfer. Most of these measures had the form of new constructs, such as "degree of

knowledge transfer" (Minbaeva, 2005, 2007; Minbaeva & Michailova, 2004), "effectiveness of transfer projects" (Lin & Berg, 2001), "inward knowledge transfer" (Li, 2005), "learning" (Lane & Lubatkin, 1998; Lane, Salk, & Lyles, 2005), "scope and diversity of intra-network knowledge sharing" (Cho & Lee, 2004), and "transfer success" (Kostova, 1999; Niosi, Hanel, & Fiset, 1995). These constructs are operationalized either as combinations of individual items or based on the subjective appreciations of managers involved in the transfer processes. On the other hand, there are also more objective measures for transfer effectiveness. For example, Galbraith (1990) looked at the productivity gap between the donor and the recipient sites, which he found to increase with the complexity of the transferred technology and decrease with its age, the recipient unit's transfer experience and the recipient unit's commitment to the new technology. Even more specifically, Szulanski, Cappetta, and Jensen (2004) used "accuracy of reproduction" as their dependent variable.

While the measures mentioned above focus on the results of technology transfer, others have looked at the process. For lack of a better name, Kogut and Zander (1993) dubbed their measure for the difficulty of transfer "tacitness". Simonin (1999a, 1999b) used the term "knowledge ambiguity" as his label for difficulty to transfer. The most widely used term (e.g., Jensen & Szulanski, 2004; Riusala & Smale, 2007; Szulanski, 1996, 2000; Szulanski & Jensen, 2004), however, is von Hippel's (1994) metaphor of "stickiness"[5], although the plain (reverse phrased) "ease of knowledge transfer" also has been applied (Reagans & McEvily, 2003). On the individual level of the expatriate

[5] For a detailed discussion of these concepts, see section 3.

manager, Minbaeva, Pedersen, Björkman, Fey, and Park (2003) used "ability and willingness to transfer" as their dependent variable.

These multiple research lenses have produced rather inconsistent results. Therefore, any attempt to move forward in the field of technology transfer should strive for making the underlying assumptions as clear as possible in order to construct a coherent framework. The approach chosen for this study is outlined in the following section.

3 Research Model

Based on the preceding analysis of the literature, the following sections describe the research model for the empirical study.

3.1 The Concept of Organizational Knowledge and Its Implications for Transfer

This paper proposes a refinement and application of the knowledge-based view of the firm, where "[f]urther progress is critically dependent upon closer observation of the processes through which tacit knowledge is transferred and integrated" (Grant, 1996a: 384). When speaking about "knowledge transfer", one should keep in mind that the concepts of both knowledge and transfer are reductionist and therefore inherently problematic. For this reason, I will start with a clarification of the concept of organizational knowledge.

The contemporary management literature portrays organizational knowledge as a complex matter. Davenport and Prusak, for example, offer the following, pragmatic definition:

> Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices and norms (1998: 5).

A similarly practical but more structured definition is the one given by Leonard-Barton (1992, quoted in Day, 1992) who presented four dimensions of organizational knowledge: employee knowledge and skills, knowledge embedded in technical systems, management systems, and values and norms.

On a more theoretical level, knowledge is usually distinguished from data and information. Data can be defined in a straightforward manner as "a set of discrete,

objective facts about events" (Davenport & Prusak, 1998: 2). When someone gives structure to the data, e.g. by categorizing or condensing it, it becomes meaningful; data becomes information. Knowledge, however, becomes evident in the successful application of information to specific situations. Tsoukas and Vladimirou summarize several philosophical conceptions of knowledge as "the individual capability to draw distinctions, within a domain of action, based on an appreciation of context or theory, or both" (2001: 983)

Knowledge has thus several characteristics that distinguish it from data and information: First, it is so complex that making it completely explicit, if not impossible, would require too much time and effort, so it always remains partially tacit (Polanyi, 1967). Second, to understand a certain portion of knowledge, one needs to take into account its specific context. Knowledge thus includes data and information but goes beyond these readily transferable elements because it is partially tacit and context dependent or "embedded", as Badaracco (1991) has called it in opposition to "migratory" knowledge.

An additional characteristic of organizational knowledge is that it is distributed among the members of the organization, where the know-who (as opposed to the know-what and the know-how) becomes an important element of the knowledge itself. The organization and its knowledge are path-dependent and historically constituted:

> Organizational knowledge is the capability [that] members of an organization have to *draw distinctions* in the process of carrying out their work, in particular *concrete contexts*, by enacting sets of generalizations (*propositional statements*) whose application depends on historically evolved *collective understandings* (Tsoukas & Vladimirou, 2001: 983, italics in original).

This enriched conceptualization of tacitness, context-embeddedness and distributedness means that technology transfer is a complex task for which organizations require specific mechanisms.

Notwithstanding this multidimensional concept of knowledge, previous studies of technology transfer within MNCs (e.g., Gupta & Govindarajan, 2000) have been based on a conceptualization derived from communication theory, where a sender transmits information through a channel to a receiver. This approach is problematic for several reasons: First, as knowledge is always partially tacit (Polanyi, 1958), what can be packaged and sent is only the explicit part of the overall knowledge, while "there will always be gaps and there will always be gap-filling" (Argyris, 1996: 1; quoted in Becker, 2001: 1042). Second, the fact that organizational knowledge is distributed or dispersed among the members of the organization (cf. Becker, 2001; Durnell Cramton, 2001; Tsoukas, 1996; Smith, 2000) means that it can be very difficult to identify senders and recipients of specific portions of knowledge for a point-to-point transfer, more so if the distribution patterns in the two different settings are not identical. Third, technological knowledge is socially embedded and partially dependent on the specific context where it has originally been produced and /or assembled. The fact that these last two aspects are interrelated further complicates the matter[6].

The distinction between explicit or codified information and knowledge –which encloses explicit information– and tacit components of knowledge is often not made. This distinction, however, becomes especially relevant for the transfer of an organization-

[6] As Salomon puts its: "… the 'components' [of distributed knowledge] interact with one another in a spiral-like fashion, whereby individuals' inputs, through their collaborative activities, affect the nature of the joint, distributed system, which in turn affects their cognitions such that their subsequent participation is altered, resulting in subsequent altered joint performances and products'" (1993: 122).

embedded technology (a “production model”, cf. Dörrenbächer, 2001), where the information that can be transmitted in tangible form is only the codified part of the overall knowledge required to accomplish the task, while other parts necessarily remain tacit and have to be transmitted orally or by showing.

An exhaustive analysis of the reasons why knowledge can be tacit has been given by Collins (2001), who distinguishes between five cases: (1) Concealed knowledge: A does not want to tell the ‘tricks of the trade’ to others, which raises the question of the sender’s motivation. People who are considered experts within an organization derive power from their specific knowledge, because the smooth functioning of the organization depends on them. They thus have an intrinsic motivation not to dilute their bases of power by sharing these “secrets” with others. A sender will only be willing to participate actively in knowledge transfer when he or she is rewarded for it or has a trustful relationship with the recipient. (2) Mismatched salience: A does not realize that B needs to be told to do things in certain ways, and B does not know the right questions to ask, due to a lack of emissive and absorptive capacity (Cohen & Levinthal, 1990), respectively. (3) Ostensive knowledge: Word, diagrams or photographs cannot convey information that can be understood by direct pointing, or demonstrating, or feeling. For Polanyi (1958), this is not the cognitive dimensions (codified vs. tacit) but the “activity” dimension (conceptual/abstract vs. physical) of knowledge., (4) unrecognized knowledge: A performs certain aspects in a certain way without realizing their importance; B will pick up the same habit during a visit while neither party realizes that anything important has been passed on. For Polanyi (1958), this is not the “cognitive” dimension (codified-tacit), but the “awareness” dimension (focal vs. subsidiary) of knowledge. Finally, (5) Collins

(2001) mentions the category of uncognized or uncognizable knowledge. However, in my (and Wittgenstein's) opinion, it is questionable whether there really is a difference between uncognized and unrecognized knowledge and whether it makes sense to talk about things that cannot be known.

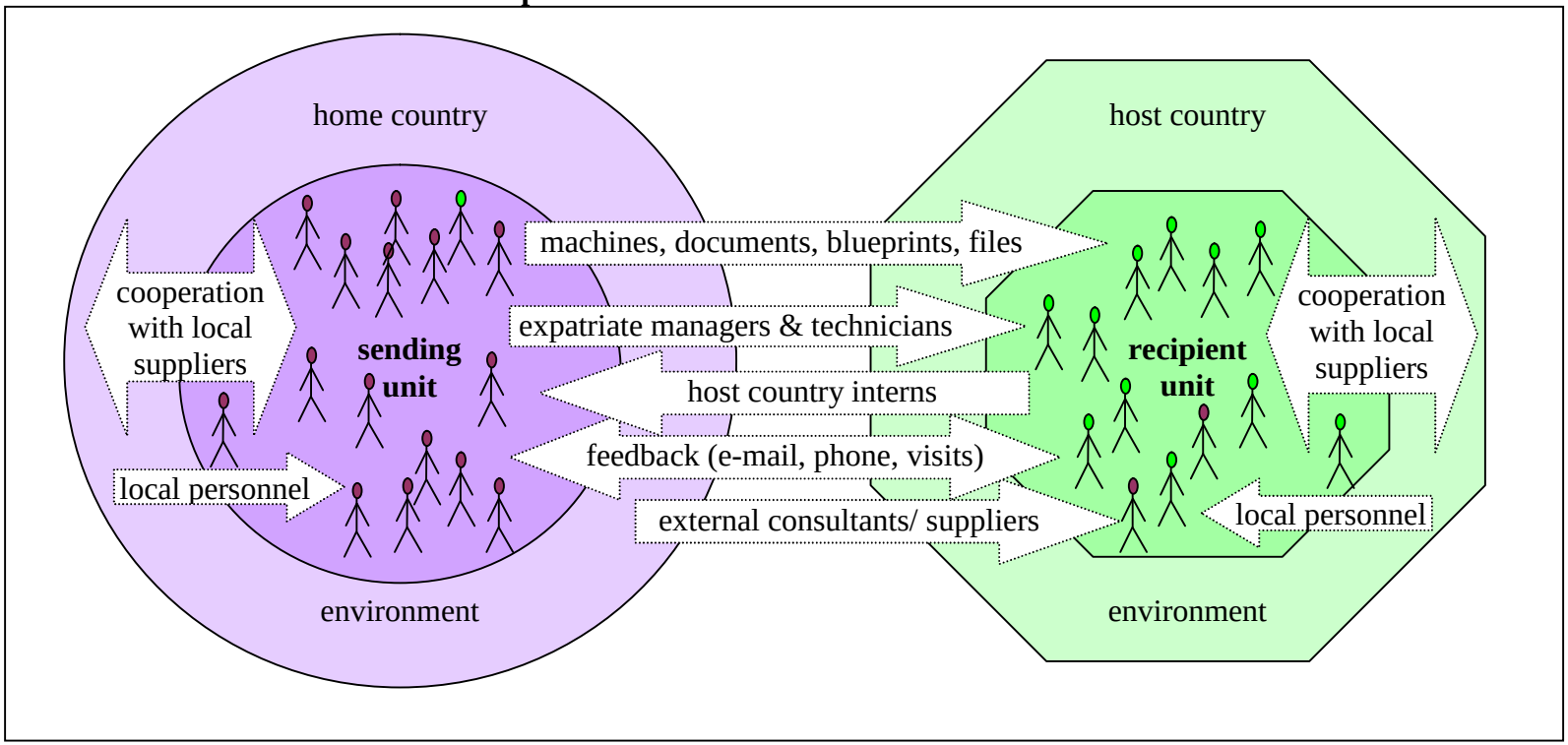
Cowan, David and Foray (2000) distinguish not only between tacit and codified knowledge but add the dimension of manifest-alluded to-latent (i.e., three different levels on Polanyi's (1958) "awareness" dimension). This distinction becomes important when planning for the transfer of knowledge, where "one does not know in advance which subset of ... information will be relevant" (von Hippel, 1994: 431), so the precise scope of what knowledge that needs to be transferred (Winter & Szulanski's (2001) "arrow core") can only be determined after the fact.

Moreover, a substantial part of the tacit component of the knowledge is conditioned by local constraints, which cannot be identically reproduced in the setting of the target for the knowledge transfer. Therefore, local knowledge must first be disembedded from its original social context, then transmitted to the new context, and finally reembedded into a new social context.

To accommodate the implications of knowledge's distributedness and context dependency or embeddedness, the original transfer model is extended to include persons, who can act both in their home unit and in the corresponding unit, multiple communication channels that differ in "media richness" (cf. Daft & Lengel, 1986; Sapsed, Gann, Marshall & Salter, 2003) and also include the possibility of feedback, and the social environments of the sending and the recipient unit. Through their influence on

the organizational members, these environments influence both the channels for communication and the transfer content (cf. Fig. 1).

FIGURE 1
International Technology Transfer as Constitution of an Organization with People and Resources from Two Different Countries



3.2 Technology Transfer and the Knowledge-Based View of the Firm

This paper is based on the knowledge-based view as a macro-perspective (Cowan, David, & Foray, 2000; Grant, 1996b; Hargadon, & Fanelli, 2002; Heiman, & Nickerson, 2002; Johnson, Lorenz, & Lundvall, 2002; Lam, 1998), especially "organizational capability as knowledge integration" (Grant, 1996a). Although the knowledge-based view is often presented as something relatively novel, it builds on three previous streams of research: The resource-based view (Wernerfelt, 1984), information-processing theory (Galbraith, 1973; Stinchcombe, 1990), which has also been applied to multinational corporations (Egelhoff, 1982, 1984, 1991; Ghoshal, Korine, & Szulanski, 1994), and the meso-perspective of organizational learning (March, 1991; Raelin, 1991), which Doz (1996), for example, has applied to knowledge transfer in international strategic alliances. In a wider sense, the learning perspective also includes the approach based on knowing as opposed to knowledge (Orlikowski, 2002; based on Giddens, 1984) and the theory of practice (Bourdieu, 1977; Brown & Duguid, 1991, 2001; Schatzki, Knorr-Cetina, & von Savigny, 2001; Turner, 1994).

Technology is applied knowledge. Therefore, this research proposal inscribes itself into the knowledge-based theory of organizational capability (Grant, 1996b), which considers knowledge to be the main resource of the firm. According to Grant (1996a), a firm's competitive advantage is seen as based upon the efficiency of knowledge integration, which is a function of: (a) the level of common knowledge among organizational members; (b) frequency and variability of the activity; (c) a structure that economizes on communication. This last aspect is the focus of the present study.

Specifically, the success of FDI projects depends on the establishment of new routines modeled after existing ones, but adapted to local conditions (cf. Hutchins, 1991), which is a special case of organizational learning. Although the foundations of this theory have been laid (Argyris & Schön, 1978; cf. also Huber, 1991), much research "remains to be done at both the empirical and the theoretical level, especially in relation to understanding the organizational processes through which knowledge is integrated" (Grant, 1996a: 384). A "meso-level analysis that treats organization structure, processes and transaction systems as explanatory systems" (Vaughan, 1999: 933) captures these aspects better than studies on either the individual (expatriates) or the macro (industries and economies) level.

In accordance with the view of the firm as a distributed knowledge system (Tsoukas, 1996), I conceive of the transfer of explicit knowledge as only the tip of the iceberg of an organizational process that relies on the communicative, interpretive and adaptive capacities of the people involved. As "firms tend to transfer tacit knowledge within the firm instead of through the market" (Kogut & Zander, 1996: 503), this issue is supposed to have a higher relevance in MNCs, as compared to international joint ventures, for example. The key people to accomplish the transfer task are the expatriate managers and technicians and their local counterparts, who have to apply their tacit knowledge to constitute an organizational practice of "knowing" in action (cf. Orlikowski, 2002). The expatriate experts have to be present for longer periods for building the new organizational structure (both formal and informal), but their transfer function can be supplemented by short-term stays of home-country specialists in the host country and internships of host-country employees in the home-country organization. All these

specialists act as boundary spanners (cf. Au & Fukuda, 2002; Kostova & Roth, 2003) between the two units and enable interactive communication. On some occasions, suppliers and outside consultants from the home country environment will also contribute to the technology transfer to the host country[7].

The present study taps the knowledge of the persons directly implied in the process of international technology transfer to capture the non-accounting elements influencing transfer capability. The general objective is to make transfer capability comparable across organizations and industries and to identify those organizational practices that most influence it. Making the performance of transfer projects comparable among each other will allow identifying the elements of best practice.

3.3 A Capability View of Knowledge Transfer

The foundation of the present approach is the competence or capability approach to strategy. Competences have been defined as "an information capital which tells its owner how to understand and use information to solve economic problems, how to take economic decisions, and how to further expand existing competence" (Pelikan, 1989, quoted in Foss, 1993). The similar concept of capabilities has been defined as the organization-level equivalent of individuals' skills (Cowan, David, & Foray, 2000; Nelson & Winter, 1982), or in a more elaborate form, as "complex bundles of skills and collective learning, exercised through organizational processes, that ensure superior coordination of functional activities" (Day, 1994: 38). Basically, these terms are interchangeable (Day, 1994); the same as the term "capacity", which in the literature has

[7] "This view of the firm as an institution for knowledge integration ... does not readily yield [a] precision definition of the firm and its boundaries. For this reason, Demsetz (1991) refers to 'firm-like organizations'" (Grant, 1996a: 377).

often been used for more specific forms of capabilities or competencies (e.g., Cohen & Levinthal's (1990) "absorptive capacity").

All the definitions quoted above refer to knowledge or the related concepts of skills and learning. This points to the inherent link between the capability-based and the knowledge-based views of the firm. However, while the resource-based view sees the control over knowledge as the decisive element of strategic advantage, the knowledge-based view considers that "the critical source of competitive advantage is knowledge integration rather than knowledge itself" (Grant, 1996a: 380). Where knowledge is held by specialists, its integration is reached through cooperation, so that "cooperative competencies [are regarded] as a potential source of competitive advantage" (Tyler, 2001: 11). A special case of these capabilities or competencies is the capability to effectively and efficiently transfer organizational knowledge, which is of strategic relevance for MNCs, where the home country unit must help set up and develop the host country unit, in spite of possible conflicts of interest. This paper focuses on the best organizational practices for this dyadic relationship.

One of the most important aspects of the use of knowledge in organizations is the question of how well a recipient unit integrates new knowledge. For getting a grip on this issue, Cohen and Levinthal defined the concept of "absorptive capability"[8] as the "ability to recognize the value of new information, assimilate it, and apply it to commercial ends" (1990: 128). Zahra and George (2002) characterized absorptive capacity as a form of dynamic, i.e., organization-transforming, capability (cf. Eisenhardt & Martin, 2000). Recently, Todorova and Durisin (2007) have shown that this capacity is indeed a complex

[8] The term "absorptive capacity" was originally used by UNCTAD, cf. Contractor and Sagafi-Nejad, 1981.

issue that involves many factors, some of which are integrated into my research model. Martin and Salomon also have extended Cohen and Levinthal's (1990) concept as "recipient transfer capability" (RTC), defined as "a transferee's ability to assimilate and retain knowledge from a willing source"[9] (2003a: 363). From a micro perspective, Minbaeva, Pedersen, Björkman, Fey, and Park (2003) have shown that when absorptive capacity is defined as a combination of employees' ability and motivation, neither element is sufficient by itself for knowledge transfer; both elements are required.

For the success of a technology transfer project, the role of the sending organization is also crucial, although the literature has so far mostly ignored this aspect, implicitly putting the entire burden of the learning effort on the recipient unit. Martin and Salomon (2003a) have proposed an extension of the above model by distinguishing between source transfer capacity (STC)[10] and recipient transfer capacity (RTC). They define STC as "the ability of a firm (or the relevant business unit within it) to articulate uses of its own knowledge, assess the needs and capabilities of the potential recipient thereof, and transmit knowledge so that it can be put to use in another location" (2003a: 363). I will adopt their definition of STC, but prefer to name it "emissive capacity" for two reasons: First, the name of "emissive capacity" is the conceptual counterpart to the established concept of (the recipient organization's) absorptive capacity, as introduced by Cohen and Levinthal (1990). Second, Martin and Salomon's (2003a) terms of RTC and STC are equivocal in the sense that both terms include "transfer capacity"; they suggest that recipient and

[9] Note that Martin & Salomon's (2003a) approach to define "capabilities" as "abilities" is tautological.
[10] Cf. Praest Knudsen & von Zedwitz's (2003) similar construct of "transferring capability", which they call the "flipside" of Cohen & Levinthal's (1990) absorptive capacity. On the other hand, Minbaeva & Michailova limit their construct of "disseminative capacity" to "the ability and willingness of organizational actors to transfer MNC knowledge where it is needed" (2004: 667), i.e., individual communication behavior, while excluding other activities that influence the sending unit's emissive capacity.

source capacities imply identical organizational skills, which is clearly not the case. Thus, a sending unit's emissive capacity includes all those activities that the MNC's home country unit carries out to support the establishment of the foreign manufacturing operation.

The sending unit's emissive capacity and the recipient unit's absorptive capacity make up an important portion of the transfer performance of the two units within the MNC. In this sense, Lane and Lubatkin (1998) have extended Cohen and Levinthal's (1990) original concept to *relative* absorptive capacity, which conceives of interorganizational learning as a dyadic relationship, although it fails to look at the specific interaction between "teacher" and the "student" organizations. However, it is precisely the partially tacit character of the knowledge that requires an effective interaction between the sending and the recipient unit, where the original transmission of knowledge has to be complemented by an ongoing feedback giving and seeking. I propose here the construct of interaction transfer capacity, which is a special case of Tyler's (2001) "cooperative capabilities" and similar to what Simonin (1997) called "collaborative know-how" in the context of strategic alliances, but is applied here to interunit activities in the MNC. Such an interactive capacity relies mainly on "social integration mechanisms" (Zahra & George, 2002) that facilitate the interunit exchange of knowledge.

An additional facet of the transfer of organizational knowledge is the fact that "to assimilate knowledge requires that a firm be able ... to modify or create organizational procedures to accommodate new knowledge" (Martin & Salomon, 2003a: 363), i.e., making the foreign knowledge work in the new local context. In a similar vein, Zahra and George (2002) distinguished between "potential" and "realized" absorptive capacities,

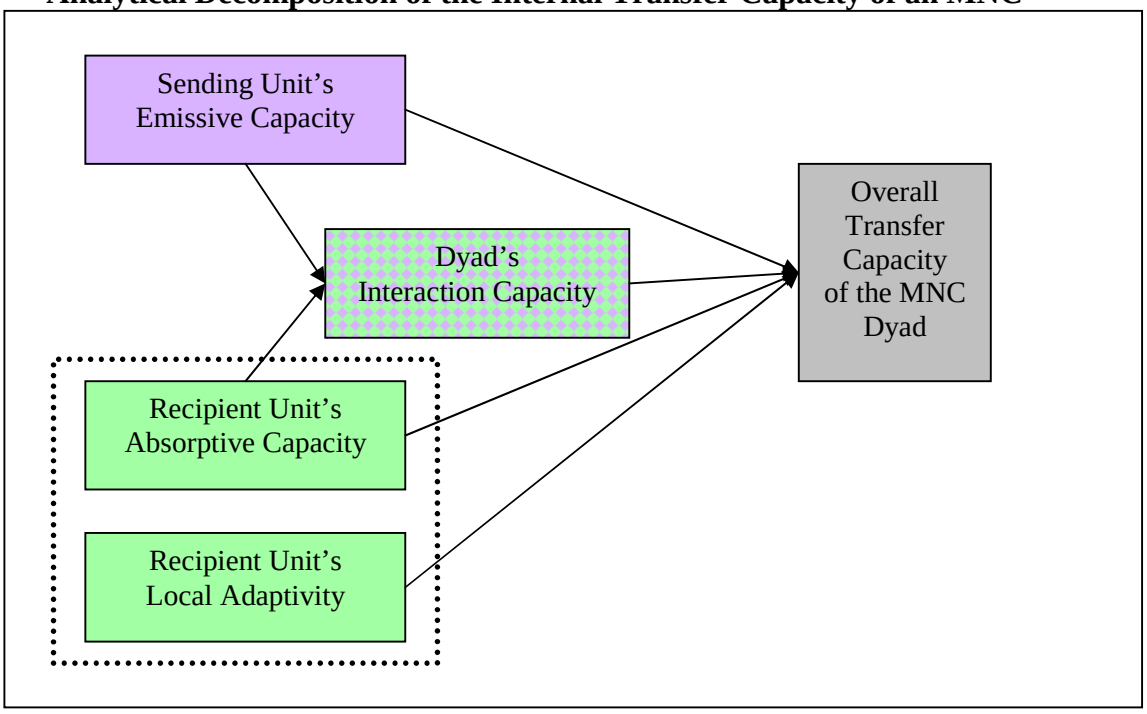
where the latter covers those activities that go beyond information exchange. This idea was also developed by Praest Knudsen, Dalum and Villumsen (2001), who pointed to the fact that in knowledge transfer, it is the utilization of knowledge that counts. This conception calls for an extension of the transfer model, especially if it is to be inserted into a capability view: the (organizational) adaptive ability of the host country unit, which Rebentisch and Ferretti defined as "the ability of an adopting organization to marshal resources to make adaptations either to itself or to a new technology" (1995: 13). In the terms of the knowledge-based view, it is the ability to modify the received knowledge in order to make it functional in the local context, characterized by its specific resources and constraints. Local adaptivity is thus a special case of combinative capabilities (Kogut & Zander, 1992; Van den Bosch, Volberda, & de Boer, 1999).

When a relatively new technology is transferred to a country where the pertaining level of technological expertise is not as high, the knowledge becomes more difficult to transfer -"sticky" in the terminology of von Hippel (1994)- inasmuch as the scientists, engineers or technicians involved on both sides of the transfer project do not necessarily share the same level of basic knowledge. This may be due to differences between the qualities of the educational systems but also to different emphases in what is taught both formally and informally in both countries. After all, international technology transfer only makes sense if the specific knowledge in one country is greater than the corresponding knowledge in the other country. In either case, the effect is that the experts' "community of practice" (Brown & Duguid, 1991), which is supposed to help with the transfer of tacit knowledge, is only an imperfect one. To a varying degree, this is a case of FDI to emerging economies, such as Mexico, where engineers and technicians

often have a lower degree of sophistication than their counterparts in industrially advanced countries. In the context of innovation, Grant (1996a) and Van den Bosch, Volberda and de Boer (1999) have stressed the importance of combinative capabilities (cf. Kogut & Zander, 1992). Similarly, these capacities are highly relevant for FDI projects, where foreign knowledge has to be integrated with factors (and knowledge) deriving from a local context.

In summary, the overall transfer capacity of a two-unit dyad within a MNC is determined by the home country unit's emissive capacity, the host country unit's absorptive capacity, the interaction capacity of the dyad, and the local adaptivity of the host country unit (cf. Fig. 2).

FIGURE 2
Analytical Decomposition of the Internal Transfer Capacity of an MNC



3.4 The Cost of Technology Transfer

While economists are usually concerned exclusively with the amount of capital invested and the number of jobs created through FDI, the MNCs have to focus on the costs and duration of the transfer process itself. According to Teece's definition, these include "the costs of transmitting and absorbing the relevant firm-, system-, and industry-specific knowledge to the extent that this is necessary for the effective transfer of the technology" (1976: 36). Teece's (1977a) operationalization was based on a supposed sequence of activities to be performed and included pre-engineering costs, engineering costs, R&D personnel costs for "solving unexpected problems and adapting or modifying the technology", and "pre-start-up training costs and 'excess manufacturing costs'" (1977a: 246). All in all, these transfer costs can amount to up to 59% (Teece, 1977a) of the sum invested.

More systematically, the overall cost of a FDI project is composed of installation costs, transfer costs, and opportunity costs:

- Installation costs:
  - Facilities and infrastructure;
  - Equipment (purchase, transportation, installation);
  - Government permits and taxes;
- Transfer costs:
  - Engineering and codification costs;
  - Training and salaries for not yet productive local personnel (both locally and as interns in the home country);
  - Expenditures for expatriate managers and internal or external specialists;

- Opportunity costs:
  - Absence of crucial personnel from home country location;
  - Delays in production start.

For setting up manufacturing facilities abroad, MNCs typically define a budget and a timeline for the completion of their FDIs. The relative success or failure of these projects is determined by comparison to what has been foreseen, either in strictly monetary terms or in relation to the date of completing the installation or reaching the break-even point. Unfortunately, there are some factors that are very difficult to estimate before the project is started, such as the relations with local employees, suppliers and government agencies, plus purely technical problems deriving from differences in climate and infrastructure. Internal budget and time-line comparisons usually fail to recognize the influence of the environment on overall costs. Therefore, this "goal approach" (Etzioni, 1964) of performance-versus-planning measures does not deliver very reliable indicators of organizational performance.

3.5 The Time Required for Technology Transfer

Another way of measuring transfer performance is to establish how long the transfer takes. For the specific case of new plants, the most important milestones are the first shipment, the full capacity (at least for the original stage), and a level of productivity that is equivalent to the MNC's standards.

3.6 The Difficulty of the Technology Transfer Task

The cost of technology transfer as described above is based on what firms register in their accounting systems, which provide data that are perfectly valid for scientific studies as long as the same technology is transferred to largely similar organizational units (e.g.

Szulanski, 1996). For a study that compares different projects across different organizations, however, this assumption of homogeneity cannot be upheld. On one hand, the amount of knowledge to be transferred can differ enormously depending on the volume and complexities of the processes to be established. On the other hand, the theoretical literature on knowledge management (Nonaka, 1994; Spender, 1996) makes it obvious that transfer processes and their outcomes are influenced by numerous other factors, such as the degree of codification and the characteristics of both the emitting and the recipient organization and their key personnel. In the literature, there have been four approaches to framing the difficulty of technology transfer: “tacitness”, “stickiness”, “ambiguity”, and “ease of knowledge transfer”.

The tacitness approach for technology transfer studies was first used by Kogut and Zander (1993). By measuring the technology's codifiability, teachability, complexity, age and number of times transferred, they pretended to get to “the latent construct of the tacitness of knowledge” (1993: 633), which they supposed to fully represent the difficulty of the transfer task. Interestingly, they found no support for the two variables of age and number of times transferred, which Teece (1977) had used in his historical study. Although Kogut and Zander’s (1993) study is widely cited, the author’s construct of “tacitness” does not really measure what they pretend it does: The items measuring (theoretical) “codifiability” really refer to (actual) codification, while “complexity” rests on a very rough classification of manufacturing processes that do not necessarily imply which one is more complex than the other. Only teachability as a subjective measure of the ease of teaching specific skills has good face value. In a later study, Zander and Kogut (1995) complemented their measure with “system dependence”, which adds some

face validity to their evaluation of complexity, although they found no support for this construct. "Complexity", which had been significant in the 1993 study, was insignificant in the 1995 study. This measure has been used (partially at least) by other authors (Subramanian & Venkatraman, 2001). Looking at the results, "codifiability" (i.e., codification) and "teachability" appear to be important indicators of the difficult of knowledge transfer, although it remains unclear to what extent these measures capture the aspect of complexity.

The second approach is based on the metaphor of "knowledge flows", which depicts knowledge as a liquid with specific properties. On this basis, von Hippel (1994) introduced the concept of "stickiness", which indicates that knowledge can be more or less difficult to separate from its original context and to transfer to a new one. Borrowing the concept of marginal cost from economics, von Hippel defined

> the stickiness of a given unit of information in a given instance as the incremental expenditure required to transfer that unit of information to a specified locus in a form usable by a given information seeker. …information stickiness involves not only attributes of the information itself, but attributes of and choices made by information seekers and information providers (1994: 430).

By tying stickiness to both the knowledge itself and the transfer process, von Hippel laid the ground for a series of confusions in the studies that use his concept. For example, Szulanski (1996), for his empirical studies of knowledge replication within a multi-unit firm, redefined stickiness as "eventfulness" within a communications framework, i.e., as an attribute of the transfer process. However, he then set out to demonstrate that stickiness depended on features of the knowledge (Lippman & Rumelt's (1982) "causal ambiguity") in addition to various traits of the sender, the recipient, and the relation between them. From his empirical data, only "lack of motivation of recipient", "lack of

absorptive capacity of recipient" and "arduous relationship between source and recipient" were supported. In a further variation of von Hippel's (1994) construct, Szulanski introduced a distinction between "stickiness outcome" and four phases of stickiness: "initiation", "implementation", "ramp-up", and "integration" (1996, 2000).

The third approach to the difficulty of knowledge transfer is based directly on Lippman and Rumelt's (1982) "causal ambiguity", which Simonin applied to knowledge transfer under the labels of "ambiguity in the transfer process" (1999b) and "knowledge ambiguity" (1999a). The construct includes both knowledge-specific (tacitness, asset specificity, complexity) and partner-specific (experience with partner's know-how, partner protectiveness, cultural distance, organizational distance) variables. In these two versions of his study of marketing knowledge transfer in strategic alliances, Simonin (1999a, 1999b) applied different statistical procedures to the same data, which concurred only in that tacitness was unambiguously supported as a significant impediment to knowledge transfer, although not directly but through the construct of "knowledge ambiguity".

Finally, Reagans and McEvily (2003) undertook to measure the difficulty of knowledge transfer by simple asking senders to assess the "ease of knowledge transfer" *ex ante*, using items that asked how easy it would be to perform the hypothetical transfer of a unit of knowledge. In fact, their measure is similar to Kogut and Zander's (1993) "teachability", but falls behind that study in that this is the only aspect considered for assessing the overall difficulty of transfer. Moreover, as pointed out above, the essence of tacitness is that one knows more than one can tell, so the difficulty or ease of knowledge transfer can only be realistically assessed *ex post*, i.e., after the transfer has taken place

and the necessity to elicit formerly tacit knowledge has emerged in practice. Therefore, this measure does not provide a reliable assessment of the difficulty of knowledge transfer.

On the other hand, the problem with both "stickiness" and "knowledge ambiguity" is that they fail to clearly distinguish between fixed characteristics of the knowledge and the organization on one hand and the activities of its members on the other hand. This makes it impossible to isolate those factors that the organization can change in order to increase transfer efficiency and to determine if firm A does a better job transferring than firm B. Therefore, it is necessary to take a closer look at the difficulty of the transfer task itself in terms of the complexity of the transferred technology, its similarity to an existing operation in the sending organization, and the societal, cultural and technological gap between the home country and the host country.

One of the key characteristics of any technology is its degree of complexity. It seems rather obvious that a simple technology is more easily transferred than a complex one (cf. Cohen & Levinthal, 1990), although some empirical studies have not found such a relationship (e.g., Zander & Kogut, 1995). The problem lies with the measurement of complexity. A classical measure of the complexity of a socio-technical system is task uncertainty, which Perrow (1967) defines as the number of exceptions from routine procedure, while Woodward (1965) used the degree of automation as a measure. Miller, Glick, and Huber (1991) found these and similar concepts to be essentially the same and showed "routineness" to be a consistently valid dimension of technology in organizations. Other aspects of technical complexity of a manufacturing system are the depth of production (value added to inputs), the number of different suppliers, and the newness of

the technology (either state of the art or dated)[11]. In this study, these different measures are tried out and compared to each other in order to identify one or several representative measures of complexity.

In principle, the replication (however approximate) of a social-technical structure should be easier than the constitution of a structure that includes many untried elements, a relationship already documented by Teece (1977a). Where many of the trial-and-error processes required to make a complex operation function effectively have already taken place, learning can be achieved by imitation. For the case of organizations that were not created from scratch but received the technology transfer when they already had an ongoing operation, the new technology often represents a "systemic shift" (Tyre & Hauptman, 1992) in relation to previous organizational practices, which can vary in degree. Galbraith (1990) found such an effect for the transfer of core manufacturing processes. Where organizations have a choice, they will try to learn from close and similar partners. Darr and Kurtzberg, for example, found that managers preferred to learn from partners that had a similar strategy and, specifically had "already faced that same problem" (2000: 41). Lane and Lubatkin (1998) found that a high degree of partner similarity helped with learning in strategic alliances, while Lane, Salk, and Lyles, (2001) found that international joint ventures showed improved learning when their parents operated in related businesses. The technological gap between the old and the new technology exists both at the organizational and the societal level, and is supposed to have a strong influence on the transfer task.

[11] This issue is not entirely clear: Grant & Gregory (1997b) suggest a U-form relationship between life cycle stage and ease of transfer.

Another factor that contributes to the difficulty of the transfer task is the cultural and technological distance between the home country and the host country. Building on Giddens' (1984) structuration theory, Orlikowski has proposed a model of "interpretive flexibility" (based on Bijker & Pinch, 1989) of technology, which she understands to diminish with "the temporal and spatial distance between the construction of a technology and its application" (1992: 421). When a new technology is brought in from a foreign country, it becomes more difficult to change in its new context as the contact to its developers is often difficult or even impossible to establish. On the other hand, the different social environment precisely requires such changes. International technology transfer is thus inherently difficult.

3.7 Dyadic Interaction Capacity

This study looks at how the interaction between the sending unit and the recipient unit influences the overall transfer capacity. It is thus a refinement of Reagans and McEvily's general conclusion that "it is easier to transfer all kinds of knowledge in a strong tie and more difficult to transfer all kinds of knowledge in a weak tie" (2003: 262) where the point is to find out what these strong ties really rely on.

The model proposes five main independent variables: communication, trust, commonality of interests, the MNC's experience, and the general manager's experience. Two more hypotheses – complexity of the knowledge transferred and similarity of the recipient unit to the sending unit- are presented as modifiers of the first five hypotheses. Additionally, control variables take into account several characteristics of the firm, the external influences, and the respondent.

3.8 Hypotheses 1 and 2: Interunit Communication

Several studies have established the importance of sender-recipient communication (e.g., Ghoshal & Bartlett, 1998) as well as the preponderance of informal communication modes (Keegan, 1974) in MNC technology transfer. The partially tacit nature of knowledge (Polanyi, 1967) explains why the sending unit may have elements of solution for many of the technical problems occurring in FDI projects but will not foresee the need to convey them to the recipient unit. Furthermore, the recipient organization may request more documented information if the original shipment is seen as incomplete or equivocal. This is frequently the case with heuristic knowledge (Tsoukas & Vladimirou, 2001) that is needed for improvising under unforeseen circumstances. Another reason for the need to supplement the knowledge sent originally is that its context embeddedness needs to be made explicit if the context at recipient site presents differences that affect the implementation of the technology.

These problems need to be addressed with the interactive support of the corresponding experts located at the sending unit. For this reason, technology transfer does normally not consist of a package of knowledge that the sender just ships to the recipient. Instead, it requires feedback through continuous communication, which can take the form of phone calls, e-mail, mailed documents, or personal visits. Communication to the originators (or at least to more experienced users) of the technology thus becomes crucial, especially when the knowledge is complex (Hansen, 1999). Bresman, Birkinshaw and Nobel (1999) found a positive relationship between the frequency of communication and the degree of articulation of the knowledge transferred after acquisitions, while interviewees from the

semiconductor industry stressed the importance of having multiple communication channels for technology transfer (Almeida, Song, & Grant, 2002). Therefore:

- Hypothesis 1: The more intense the communication between the sending and the recipient unit, the higher the firm's transfer capability.

In practice, one has to differentiate between the effectiveness of the means used for such communication, as face-to face communication allows for more eliciting and showing of normally tacit elements of knowledge. This fact has been established since the 1980's, when researchers still did not distinguish between knowledge and information: "Different channels of communication, such as face-to-face, telephone, written documents like memos and letters, or teleconferencing, have varying degrees of information richness (Daft & Lengel, 1984) and information capacity (Daft & Huber, 1986)" (West & Meyer, 1997: 33). Therefore:

- Hypothesis 2: Face-to-face communication (visits, personnel exchange) has a greater influence on transfer capability than mediated communication (internet, phone).

3.9 Hypothesis 3: Interunit Trust

The mere frequency of communication, however, will only be effective if it is based on a mutual understanding and a true desire to be helpful. Within organizations, such positive communication behavior can be based either on specific personal relationships or on an overall culture of knowledge sharing (De Long & Fahey, 2000), which is built on trust or organizational "pronoia" (Jassawalla & Sashittal, 1998), i.e., the opposite of the frequently encountered paranoia that makes communication dysfunctional or even impossible. From the economic perspective, trust reduces transaction costs between

organizational members when they believe that the other one "makes good-faith efforts to behave in accordance with any commitments both explicit and implicit" (Cummings & Bromiley, 1996: 303). Trust is thus a more effective organizing principle for interaction, as such behavior can hardly be controlled through authority (cf. McEvily, Perrone, & Zaheer, 2003). Additional reasons for the importance of trust in communication behavior are that potential senders only share knowledge if they are certain it will not be used against them and potential recipients only accept knowledge from others if the source is seen as reliable (cf. Kostova, 1999).

On the individual level, knowledge sharing relies on the informal ties of key personal with their counterparts in the corresponding unit, which Schulz (2003) found to be positively related to knowledge inflows into MNC subsidiaries. Of course, such relationships are valuable only if they are built on mutual trust (Koskinen, Pihlanto, & Vanharanta, 2003). Inside an organization, this aspect can also be framed as part of a culture of knowledge sharing (De Long & Fahey, 2000), as cooperative norms (Uzzi, 1997), or as one facet of (relational) social capital (Kostova & Roth, 2003; Leana & Van Buren, 1999; Nahapiet & Ghoshal, 1998). Therefore:

- Hypothesis 3: The higher the level of trust between the relevant managers in the sending and the recipient unit, the higher the firm's transfer capability.

3.10 Hypothesis 4: Commonality of Interests and Incentives

As the knowledge to be transferred is partially tacit and distributed, what was sent originally must be complemented by portions of knowledge which have to be made explicit by asking other knowledgeable members of the organization. The interaction and feedback that is required for such a complete transfer of technology does not happen by

itself. The people involved have their own interests and work within their own local environments, so any communication with other units is usually perceived as an extra effort. On the organizational level, MNC units in different countries are configured as cost centers, where transfer expenses do not contribute to the sending unit's bottom line.

Unless there are strong personal ties (which may wane over the years when expatriate managers are away from their home unit), feedback will not be easy. Therefore, there should be a specific motivation in both the sending and the recipient unit for knowledge transfer to take place (cf. De Meyer, 1991; Gottschalg, 2004; Kalling, 2003). In the words of a practitioner: "Unless you tell the managers of your business that part of their promotions, salaries and punishments will depend on technology transfer, nothing will happen" (John Hartley Jr., quoted in Leonard-Barton ,1995: 199). More specifically, it is expected[12] that the interunit communication behavior will improve with an individual incentive structure that is tied to the transfer project performance, which reinforces "social interaction mechanisms" (Zahra & George, 2002: 194). Shared incentives can take two forms: Profit sharing among managers of different units or a system of evaluation for the sending unit's managers that takes into account the assistance provided to the recipient unit.

Another factor that helps with the disposition to helpful communication is when parent and subsidiary are about to enter a supplier-buyer relationship with mutual dependency (cf. Pahlberg, 1997). In this case, working together is in the best interest of members of both organizational units, so individual incentives to collaborate may not be required. Foss and Pedersen (2002) found that -in quantitative terms- the transfer of

[12] On the individual level, however, a recent study by Lucas and Ogilvie (2007) found no evidence for a positive impact of incentive on knowledge sharing.

internally generated knowledge was positively moderated by the degree of interdependence between the transferring and the receiving MNC unit. Therefore:

- Hypothesis 4: The higher the perceived commonality of incentives and interests between the relevant managers in the sending and the recipient unit, the higher the firm's transfer capability.

3.11 Hypothesis 5: The MNC's Foreign Experience

The literature on "learning organizations" (Garvin, 1993) in general and specifically on learning curves (e.g. Argote, 1996) suggests that organizations benefit from previous experience. Zollo and Winter (2002) have explicitly linked the acquisition of experience to the development of capabilities. In the specific context of interunit technology transfer, Galbraith (1990) found that the *recipient* unit's previous transfer experience has a positive impact on technology transfer. Of course, the present study looks at a different situation where the recipient units are new, so any experience has to be on the sender's side, at least at the organizational level. However, Steenhuis and De Bruijn (2002) found that experience at the transfer source is not enough for predicting learning curves in transfer. Within the context of international joint ventures, the evidence is mixed: Barkema, Shenkar, Vermeulen and Bell (1997) found a positive effect of experience with foreign subsidiaries on joint venture survival, although only in the MNC's home country. On the other hand, Lin and Berg (2001a, 2001) as well as Pak and Park encountered that the transferor's experience had either a negative (2001a) or no significant (2001b) effect on technology transfer in international joint ventures, possibly as an effect of lack of motivation. For the case of MNCs, however, I propose here:

- Hypothesis 5: The greater the MNC's previous experience with foreign subsidiaries, the higher its transfer capability.

3.12 Hypothesis 6: The General Manager's Experience

The question whether transfer experience on the personal level has a significant impact on transfer performance has only received scant attention in international management research. Several studies have focused on the influence of experience on expatriate adjustment (e.g., Selmer, 2002; Shaffer, Harrison, & Gilley, 1999), but not on performance within a transfer context. However, both the general manager's general experience within the industry and the focal MNC and his specific experience with transfer processes could make a real difference for the success of the new subsidiary. In line with the previous hypothesis, I therefore propose here:

- Hypothesis 6: The greater the subsidiary's general manager's relevant experience, the higher the MNC's transfer capability.

3.13 Moderating Hypotheses: Difficulty of the Transfer Task

When comparing transfer projects across companies and industries, it is obvious that the transfer task can be more or less arduous depending on the characteristics of the knowledge that is to be transferred. This study takes into account four dimensions of the difficulty of knowledge transfer: codification, teachability, complexity, and similarity between the sending unit and the receiving unit.

Codification refers to the degree a technology has been documented. This item has been tested under the name of “codifiability” by Kogut and Zander (1993) and Zander and Kogut (1995).

The same authors also introduce the construct of “teachability”, which refers to how ease a manufacturing technology can be conveyed to new workers.

Complexity will be measured by four indicators, which are expected to be statistically related to each other:

- Product variety
- Depth of production (percentage of value added)
- Number of different suppliers of production materials
- Newness of the technology

The fourth dimension, similarity between the sending and the recipient units, deserves a little more explanation. The proposed study focuses on the “replication” of technology, although for larger production facilities, such “clones” will be difficult to find in practices, as technology evolves over time and adapts to local circumstances. In former times, MNCs used dated technologies in their transfer to less-developed countries (cf. Vernon, 1966), but in the age of local production for global markets, this seems to be less and less the case. In principle, a replication is easier than a recombination of existing competencies or even the acquisition of new ones, where the learning curve is expected to be much longer. The similarity between the sending and receiving organization exists on two levels: technology and organizational structure. As knowledge transfer is inseparable from both aspects, the easiest transfer task would be to a setting that would be identical in both technology and organization. In the same vein, Rebentisch and Ferretti (1995) proposed a relationship between interunit difference in knowledge architecture and the intensity of transfer methods. The only empirical study I could find on this matter was by

Darr and Kurtzberg (2000), who found that pizza store managers prefer to learn from similar stores.

In general terms, Rebentisch and Ferretti (1995) proposed a relationship between the scope of the transferred technology and the intensity of the transfer methods used. Based on a multiple-case study, Ranft and Lord (2002) proposed that "social complexity" (in terms of location within the organization, complexity and context dependence) increases the difficulty of knowledge transfer in M&A's.

In empirical research, Subramaniam and Venkrataman (2001) found that the difficulty of technology transfer (a version of Zander & Kogut's (1995) construct of "tacitness", cf. Section 3.5 above) was significant only as a moderator for the effect of multinationality of teams and frequency of communication on transnational new product development capability, while the main variables by themselves had no significant effect. Similarly, Szulanski, Capetta, and Jensen (2004) established a moderating effect of "causal ambiguity" on the transfer-trust relationship. This result is in agreement with my argumentation but represents a possible confound, as "causal ambiguity" is amenable to change due to both units' efforts at disambiguation. Therefore:

- H1a: The difficulty of the transfer task increases the influence of the communication between the sending and the recipient unit and the firm's transfer capability.
- H2a: The difficulty of the transfer task increases the difference between the influence of face-to-face communication (visits, personnel exchange) and mediated communication (internet, phone) on the firm's transfer capability.

- H3a: The difficulty of the transfer task increases the influence of trust between the relevant managers in the sending and the recipient unit on the firm’s transfer capability.
- H4a: The difficulty of the transfer task increases the influence of the perceived commonality of incentives and interests between the relevant managers in the sending and the recipient unit on the firm’s transfer capability.
- H5a: The difficulty of the transfer task increases the influence of the MNC's previous experience with foreign subsidiaries on its transfer capability.
- H6a: The difficulty of the transfer task increases the influence of the subsidiary's general manager's relevant experience on the firm's transfer capability.

3.14 Control Variables Related to the Firm

At the recipient unit level, the following variables will be included as controls:

- Industry
- Subsidiary size
- Own construction
- Partner's contribution
- Location of MNC headquarters and the setup unit

The inclusion of industry as a control variable is standard practice in strategy research. McGahan and Porter (1997) demonstrated the general importance of industry for performance, so it may be surmised that it also influences transfer capacity.

The size of the subsidiary is another standard control variable in strategy research.

For the specific case of new subsidiaries, MNCs that build their own facilities could also experience special advantages or disadvantages, so this feature is included here as a control variable.

Similarly, the presence of a local partner could also benefit or hurt the MNC's transfer performance. On the positive side, a local partner could help with the adaptation to the subsidiary's environment. On the negative side, it is possible that such a participation could introduce conflicting goals in the transfer project, a feature that would be absent for subsidiaries that are fully owned by the MNC.

Finally, controlling for the MNC's home country and the location of the setup unit (if different from the first) corresponds to an implementation of the cultural distance concept, which is also supposed to have an influence on technology transfer (cf. Kedia & Bhagat, 1988). In general terms, "the organization is embedded in a specific national context that accounts for important forces affecting organizational routines, behaviour and competence building" (Karnoe, 1996). The cultural and technological gap between the emitting and the recipient country as well as the infrastructure and governmental cooperation of the host country are possible influences on project performance. Kostova (1997), for example, used the construct of "Country Institutional Profile" to regroup some of these factors and was able to show their importance for the international transfer of strategic organizational practices. Based on case studies, Pahlberg (1998) proposed that with high HQ-subsidiary interdependence (in Thompson's (1967) terms), cultural distance (Hofstede, 1980) causes major problems, although in her own case study, she found "no support for the hypothesis that problems related to culture increase with cultural distance" (p. 459). On the other hand, Tyre (1991) presented case-study evidence that technology

transfer to different countries meets with different ways of managing technology and different levels of skills. It is also possible that transfer capacity is influenced by a difference in technological capability relative to the host country (difference in R&D expenditures, cf. Anand & Delios, 1997).

3.15 Control Variables Related to Outside Influences

The study includes a second set of control variables that have been regrouped under the umbrella term "outside influences":

- Local authorities
- Laws and regulations in Mexico
- Availability of qualified suppliers
- Availability of qualified personnel
- Perceived cultural differences
- Historical time

All of the above influences are part of the local environment, which is not included in the transfer capacity model. However, the legal framework, the supplier network, and the labor market could have a significant influence not only on the investment decision but also on the results of the FDI project.

Additional, the cultural-distance concept might or might not play a role for the firms in question. I therefore include an item to see how the subsidiary managers perceive this issue.

Historical time is included as the horizon for this study includes several years, during which many circumstances might have changed, especially regulations and infrastructure.

3.16 Control Variables Related to the Respondent

To account for systematic distortion of data due to possible personal biases, the obtained data should be related to the most important data of the respondents. The following control variables will be introduced at this level:

- Country of origin
- Experience in industry and company tenure
- Individual experience with technology transfer

The first control variable goes into the direction of the thesis proposed by Kedia and Bhagat (1988), who proposed that a greater cultural distance (in Hofstede's (1980) terms) would make technology transfer more difficult. Of course, to test such a proposition in a systematic fashion, one would need a sufficiently large and multinational sample of respondents. Additionally, this control variable allows checking if Mexican nationals or foreigners are more effective for setting up new foreign subsidiaries.

The variables that control for the respondent's experience are similar to the independent variables that go into H6, but will be retained for those cases where the respondent and the general manager are not the same person.

It must be noted that the reason for introducing this group of control variables is to check whether the type of respondents significantly influences the type of responses obtained. On the other hand, it would be counterproductive for the accuracy of responses to try and evaluate personal performance in this study. In fact, firms often have very limited choices for finding adequate candidates for the expatriate management function. An ideal expatriate manager should be intimately acquainted with the company, its operations and technology, have experience managing a fairly independent organizational

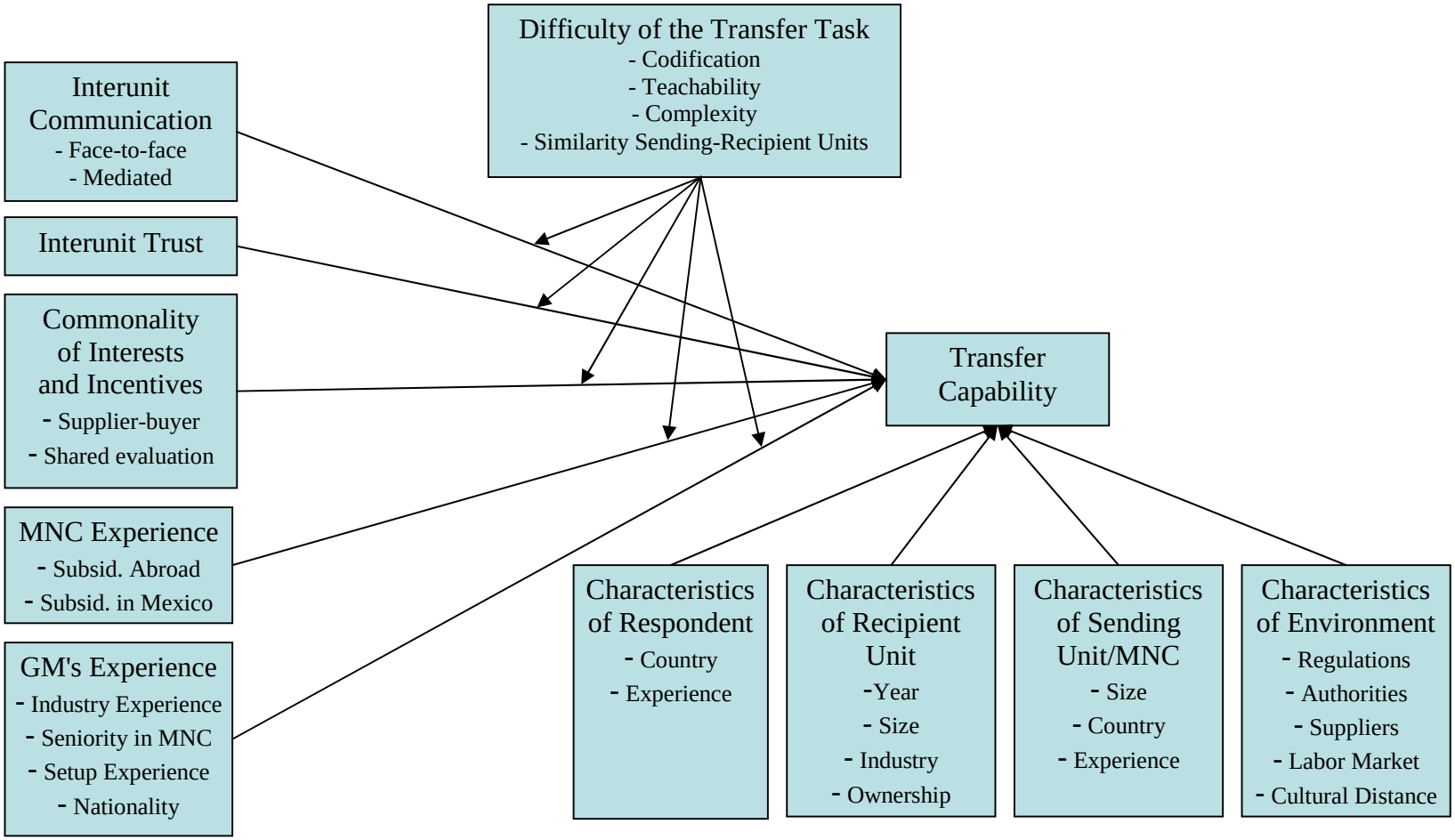
unit, be flexible and able to cope with high levels of stress, have some knowledge of the host country, its customs and its language, and be willing to relocate to another country for several years, which might be a problem for employees with family. The scarcity of finding suitable expatriate managers might even be an obstacle to internationalization, especially in small and medium-size firms.

3.17 Control Variables Related to the Interview

The final group of control variables concerns the language used and the identity of the interviewer, just to check if they introduce any systematic bias on the results.

Fig. 3 gives an overview of the research model with all hypotheses.

FIGURE 3
Path Diagram of Hypotheses



4 Methodology

This chapter starts with a justification for the research approach that was selected for this study. The subsequent sections describe the operationalization of the variables, the instrument, the establishment of the sample, and the data collection process.

4.1 Choice of Research Method

Technology transfer is a rich and highly complex topic that –in principle– would justify a qualitative research approach. The basic approach for this study, however, is a quantitative one. This choice has two rationales: First, the great number of studies that have already been published and the underlying conceptual models (see sections 2 and 3) clearly indicate a series of factors that should be included in the study, while a qualitative study would have been adequate to identify these factors in the first place. The field of technology transfer research has moved beyond this paradigmatic stage, although the specific case of establishing new manufacturing subsidiaries possibly could include some elements that are typically not included in technology transfer research. Second, Northeast Mexico has received a large amount of foreign direct investments in the manufacturing sector over the last ten years. The geographical concentration of newly established subsidiaries allows for a systematic comparison across firms in order to determine to what extent they differ in their transfer capabilities.

The second basic choice for this study is the mathematical model used for analyzing the data. The research model derived from theory and previous studies as well as the variety of factors that possibly could influence the outcomes resulted in a large numbers of variables to consider. At the outset, it was not clear how these variables are connected among each other nor how much they would overlap. The most adequate mathematical

representation for such a large number of variables is probably structural equation modeling or the similar method of partial least squares analysis. However, these methods have two important limitations: First, they usually require a greater number of cases than what could be collected by a single researcher using personal interviews at the respondents' sites. Second, both structural equation modeling and partial least squares analysis produce models of multiple interrelations, which are difficult to interpret both in terms of hypothesis testing and of translating them into practice. In contrast, multiple regression analysis deliberately leaves out many of these complexities in order to obtain clearer results. Additionally, multiple regression analysis allows for the separate testing of hypotheses, which can be compared individually to the results of other studies.

For this study, a moderated regression model has been selected, which is somewhere in between the above methods. Moderation is used for dealing with the complexity of the transfer task, a focal matter in this study, which has received a rather confusing treatment in the literature. Adding other complications, such as mediation and multiple interactions, would make the data analysis rather inconclusive. The mathematical model thus represents an epistemological choice of clarity over a highly detailed representation of the phenomena.

4.2 Operationalizations

4.2.1 Operationalization of the Dependent Variable

Following Teece's (1977) seminal paper, one choice for the dependent variable was to operationalize transfer capability in monetary terms, specifically as the ratio between the cost of transfer and the capital investment made for the manufacturing facility. The overall transfer cost was estimated as the sum of expenses of training, expatriate wages

(above the level for local managers and engineers), and travel expenses for both incoming and outgoing visits. However, as described in the data analysis section of this thesis, if the data on investment was already skimpy, in all but a few firms, there were absolutely no records about the transfer costs themselves. Therefore, this approach had to be abandoned.

Fortunately, the research design included alternative operationalizations[13] of the dependent variable, which were also included in the questionnaire. As a form of measuring opportunity costs, there were questions on the occurrence of different critical points during the setup of the subsidiary:

- Start of construction
- Arrival of first machines
- First shipment
- Full capacity
- Corporate-level productivity

4.2.2 Operationalization of the Independent Variables

The independent variables for hypothesis 1 and 2 related to communication were operationalized as follows:

- Mediated communication: Frequency x means (phone, e-mail/intranet) (discrete ranges, i.e.,, 0-5x/month; 6-10x/month, 11-15x/mont, 16-20x/month, >20x/month, for the first year and the second year)
- Incoming visits made by the sending unit's personnel at the recipient unit (frequency, for the first year and the second year)

[13] The alternative dependent variables of budget compliance and schedule compliance were included in the questionnaire but have not been analyzed for this thesis. In any event, they could be considered as possible

- Outgoing visits made by the recipient unit's personnel at sending unit (frequency, for the first year and the second year)
- Number of expatriates working at recipient unit (for the first year and the second year)
- Number of interns sent for training at sending unit (for the first year and the second year)

The independent variable for hypothesis 3 on trust was measured using a slightly modified form of Cummings & Bromiley's (1996) Organizational Trust Inventory – Short Form, which contains 12 items to be answered on a seven-point Likert scale.

The independent variable for measuring hypothesis 4 on commonality of interests and incentives was measured using three different items:

- Recipient unit's purchases from the sending unit (as percentage of total purchases
- Recipient unit's sales to the sending unit (as percentage of total sales)
- Shared evaluation of managers belonging to both units (as percentage of total evaluation)

4.2.3 Operationalization of the Moderating Variables

The research design included four moderating variables for measuring the difficulty of the transfer task:

- Codification was measured using the four items for "codifiability" from Zander & Kogut (1995), with a seven-point Likert scale.
- Teachability was measured with the five items developed by Zander & Kogut (1995), which also use a seven-point Likert scale.

Complexity was broken down into four items, which are listed here with their corresponding operationalizations:

- Number of different items manufactured
- Depth of production: Percentage of value added to inputs
- Number of different suppliers of production materials
- Age of the technology used (in years)

Finally, for the similarity between the sending unit and the recipient unit, a four-point Likert scale ranging from “not similar at all” to “identical” will be applied to both technology and organizational structure.

4.2.4 Operationalization of the Control Variables

Most control variables were discrete in nature, such as the respondent's nationality. For the items used for measuring the outside influence (local authorities, local rules and regulations, qualified suppliers, qualified labor, and cultural differences), a new scale was developed. This scale included three options: "made it easier", "had no influence", and "made it more difficult".

4.3 Questionnaire

The questionnaire was assembled from the above items in English language. Several management researchers and graduate students answered it and made suggestions for modifications. The questionnaire was then translated to Spanish and translated back to English by language specialists, following the method recommended by Brislin (1970). Both versions are available in the appendix. In addition to the ten pages with 69 questions, the questionnaire contains a cover letter with instructions for answering the survey independently and mailing it to the researcher's office. For the application of the

survey, an interview protocol form was devised for recording the time and place, the interviewee's and the interviewer's data, and other comments.

4.4 Sample

The basic sampling choice for this research project was to include only those transfer projects that could be labeled as "successful", although to a varying degree. One could argue that such a procedure is inherently problematic, as it means sampling on the dependent variable by excluding transfer failures, for which one possible reason is that transfer capability was so low that the firm decided to abandon the project. However, there are two arguments for choosing only successful transfer samples as the relevant sample. First, the full range of organizational activities reflected in the survey only developed in *completed* transfer projects, whereas in failed projects, the focal dependent variable, transfer capability, would be impossible to measure. Secondly, it would be nearly impossible to gather information about failed projects, especially when considering that many firms might have abandoned FDI projects in the early planning stages when they perceived them as too difficult to implement. A complete or representative sample in this sense would have to consist of *all* firms that could possibly be interested in setting up a manufacturing facility abroad, an endeavor that is clearly beyond the scope of this proposal.

In line with the above argument, the sample for the present study consisted of the foreign firms that had made greenfield FDIs in the manufacturing sector in the Mexican state of Nuevo León, setting 1998 as cut-off date for the inclusion. As a further restriction, at least one member of the original management team still had to be available for applying the questionnaire.

Unfortunately, the official register of foreign direct investments (Registro Nacional de Inversión Extranjera) is confidential by law. Even the supposedly compulsory register for all firms with operations in Mexico (SIEM) did not include more than a fraction of the relevant sample. Therefore, the sample needed to be established based on the following sources:

- "Industrial Community" (regional trade paper)
- American Chamber of Commerce in Mexico (internet)
- INEGI (National Institute of Statistics, Geography, and Informatics): List of 210 maquiladoras in the Monterrey area (Excel file)
- Infomaquila data base (internet)
- Maquiladirectory data base (internet)
- Solunet Twin Plant Guide (CD-ROM)

Three of the above registers focused exclusively on firms working under the maquiladora regime, which is open to both Mexican and foreign firms. It was often not possible to determine from the name alone whether the corresponding name was indeed foreign or not, so more information had to be sought. During the consolidation of the above data bases, it also became obvious that a lot of information was missing, outdated[14], or simply incorrect. For that reason, it was necessary to verify and complement the information on almost all firms by looking up their internet sites, consulting relevant newspaper articles, or by phoning up the corresponding firms in Mexico or their

[14] Some of the manufacturing plants had been sold to different owners. As an example, on the very morning of the survey interview, one of the managers had received notice that his plant had changed hands.

international headquarters[15]. Additionally, more firms were identified when making visits to the industrial parks in the state. Establishing this register was an arduous task that required several hundred phone calls and countless hours of internet research. The result was a register with 757 firms, out of which 155 corresponded to the following selection criteria:

- Greenfield investment by a foreign MNC (not acquisition or joint venture)
- Manufacturing activities
- Still operating at the moment
- First shipment made not earlier than 1998

It is believed that this register was as complete as possible.

4.5 Data Collection

The data was collected through a questionnaire contained in the appendix to this study. While most multiple-firm surveys in management research have been applied through mail, this approach would have led to unacceptably low response rates in the Mexican context, where people simply refuse to communicate with someone they have not met personally or who has not been recommended by a friend. This has been found to hold true also for managers of foreign firms working in Mexico (John Sargent of UT Texas Pan American, personal communication). Therefore, the questionnaire was taken personally to the interview sites and filled out either by the interviewee or the interviewer. This last option often proved to be quicker, but the interviewee always received his or her copy of the questionnaire in order to establish trust and facilitate the communication.

[15] The author had some help in this task by students who worked up to five hours a week on completing the register.

The original plan was to recruit undergraduate (ninth semester) students to do the survey interviews, similarly to a methodology applied by Butterfield, Trevino, and Ball (1996). Extra points were offered were offered to some 60 students from two classes of a course about MNC management. Those who volunteered for this activity had to participate in a training session where they received specific instructions. The training included the application of the survey to one another both in English and in Spanish. In addition, the students received written instructions and an official letter in case the interviewee asked for it. The results, however, were disappointing: Only around a dozen students showed up for the training sessions, delivering only 13 usable questionnaires over the course of six weeks.

The researcher therefore decided to apply the remaining over 100 survey interviews himself. This process usually required multiple phone calls to identify a member of the management team who had actively participated in the setup process, preferably the general manager of the plant. Two obstacles made this task especially arduous: First, the secretaries or assistants who answered the phone often seemed to follow instructions to not pass on any calls made by strangers, so establishing legitimacy became crucial. All calls were therefore supported by at least one follow-up e-mail that explained the modalities and purpose of the survey and, most importantly, contained the researcher's official address at the university. Second, most of the managers seemed to be very busy with meetings or other activities, either within the local plant or at other sites of the MNC, its suppliers, or its clients. On average, it took between five and ten phone calls and two to three weeks to get an appointment, sometimes as long as two months. Once the contact was established, however, most managers seemed to be glad to answer the questions; the

researcher was invited many times to visit the facilities. On three occasions, the interviewees mailed in the filled-out survey; on one occasion, the interviewee came to the researcher's office. In all other cases, the researchers visited the interviewee's facilities. This often allowed for a rich contextualization of the interviewee data.

5 Data Analysis

5.1 Raw Data

The survey was applied a total of 127 times, but 12 cases had to be excluded: Seven cases represented firms that made their first shipment prior to the cut-off year of 1998, one case was from a firm that did not have a manufacturing operation, and four cases turned out to be joint ventures with local firms or acquisitions of ongoing concerns. This left a total of 115 cases for analysis.

5.1.1 Response Rate and Non-Response Bias

The total sample of manufacturing plants set up by foreign corporations in the Mexican state of Nuevo León from 1998 to mid 2007 included 153 cases. In 13 of these cases (8.5%), the interview candidates either refused to participate or were unreachable in spite of at least ten contact attempts by phone. In another 25 cases (16.3%), none of the members of the original management team was still working at the plant. This left 115 responses, or a response rate of 75.2%. Unfortunately, it was not possible to establish whether non-response led to a systematic undersampling of problematic cases (cf. Denrell, 2003)[16].

Among the respondents, 85 were the general managers in charge of the plants, while 30 held other managerial positions.

[16] The firms were called in alphabetically order, with additions to and deletions from the sample as the data collection progressed. Unfortunately, there is no systematic record of how many calls were needed for making contact with the target person nor of how long it took from the first contact to the actual interview. This was further complicated by the fact that in some instances, headquarters or other subsidiaries needed to be contacted for obtaining the phone number of the focal person. Armstrong and Overton's (1977) method of distinguishing between early and late respondents is not applicable in this case because it refers to mail surveys, which are sent out the same day. In any event, the contact-to-interview time lag would sometimes say more of the attitude of the current secretarial staff, the interview candidate's current agenda, and the researcher's agenda as a full-time teacher than about the conditions at the moment of the setup.

5.1.1.1 Response Rate and Year of Setup

Contrary to what could be expected as a result of rotation among managers, the response rate did not go down with the time that had elapsed since the setup. Only the earliest year included, 1998, shows a significant decrease in the response rate. The figures are given in Table 1.

TABLE 1
Response Rates and Years of Setup

Year of setup	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	Total
Cases identified	1	13	19	16	14	16	21	14	15	24	153
Percentage of sample	.7%	8.5%	12.4%	10.5%	9.2%	10.5%	13.7%	9.2%	9.8%	15.7%	100%
Cases with responses	1	13	17	12	9	10	17	12	14	10	115
Response rate	100%	100%	89%	75%	64%	63%	81%	86%	93%	42%	75%

5.1.1.2 Response Rate and Location of Headquarters

As could be expected from geographical proximity and as an effect of NAFTA, the headquarters of most firms identified (62.1 % of the sample) are located in the USA. Table 2 shows the relationship between nationality and response rate, in alphabetical order of the three-letter country abbreviations. Companies with headquarters in two countries or where general headquarters are located in one country and divisional headquarters in another are counted as half a case each.

TABLE 2
Response Rates and Headquarters Countries

Country of HQ	AUS	BEL	BRA	CAN	FIN	FRA	GB	GER	ITA	JAP	KOR	PER	POR	SPA	SWI	USA	TOTAL
Cases identified	1.5	2	2	3	1	2.5	3.5	8.5	4	18	7	1	1	2	1	95	153
Percentage of sample	.7	1.3	1.3	1.9	.7	1.6	2.3	5.6	2.6	11.8	4.6	.7	.7	1.3	.7	62.1	100
Cases with responses	1.5	2	2	2	0	2	2	8.5	2	10.5	3	1	1	2	1	74.5	115
Response rate (%)	100	100	100	67	0	80	57	100	50	58	43	100	100	100	100	78	75

As can be seen from Table 2, most countries contributed with so few cases that it would not be justified to draw any conclusions from these numbers. Therefore, the home countries were grouped into three geographical-cultural regions: Firms from Australia, Brazil, Canada, Peru and the USA make up the region of the Americas plus Australia (the New World); firms from Japan and South Korea are classified as East Asia; while Belgium, Finland, France, Great Britain, Germany, Italy, Portugal, Spain, and Switzerland represent Europe. These groupings have also been applied to the statistical analysis.

TABLE 3
Response Rates and Headquarters Regions

Region of HQ	Americas + Australia	East Asia	Europe	TOTAL
Cases identified	102.5	25	25.5	153
Cases with responses	81	13.5	20.5	115
Response rate	79%	54%	80%	75

Table 3 shows a relatively low response rate (54%) by firms from East Asian, when compared to the response rate for the two regions with Western cultures (79% by firms from the Americas and Australia and 80% by European firms). This finding could be interpreted in several complementary ways: Some East Asian managers might not perceive a meaningful connection between their activities and management research in general. This attitude surfaced in some of the explanations for non-response given by the managers' assistants. In other cases, the contact persons reported that their superiors were constantly too busy to receive any visitors, which would be explained by Japan's and Korea's Confucian work ethic. Another explanation for the low response rate would be that the managers perceive themselves so much as outsiders in Mexico that they might not acknowledge a professor from a

major local university to be a stakeholder who would be worthy of their attention. This contrasted with several respondents who gladly took time for the survey interview because they were either Tec de Monterrey graduates, wanted to maintain contacts with their old school, or had hired or worked with other people from Tec de Monterrey. All these explanations point to the considerable cultural distance between Japanese/Koreans and Westerners, although this factor was only a borderline significant discriminator (p = .084) for East Asian companies in the current sample. However, the total number of East Asian firms answering the questionnaire was only 13, so the above comments cannot be considered to be generally applicable findings.

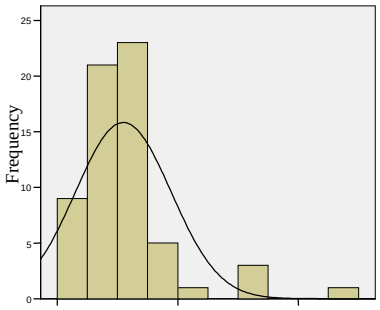
5.1.2 Setup Times

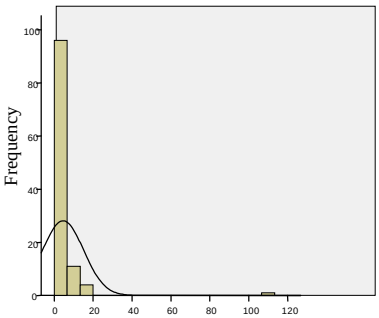
Table 4 shows the descriptive statistics for the different forms of the dependent variable. Setup times are indicated in months. The large standard deviations show the great heterogeneity within the sample. Only DV3 (Arrival of Machines to Corporate-Level Productivity) and DV5 (First Shipment to Corporate-Level Productivity) had standard deviations that were smaller than the difference between the smallest value and the mean, which explains why these variables produced more statistically significant models than other versions of the dependent variable. In other words, the influence of random factors was high in the first phases of the setup, while these factors lost importance as the plants were on their path to corporate-level productivity. Figure 4 shows the frequency distributions for the dependent variables.

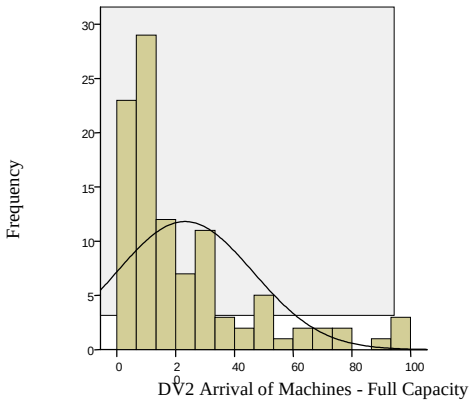
TABLE 4
Descriptive Statistics of Raw Data (in Months)

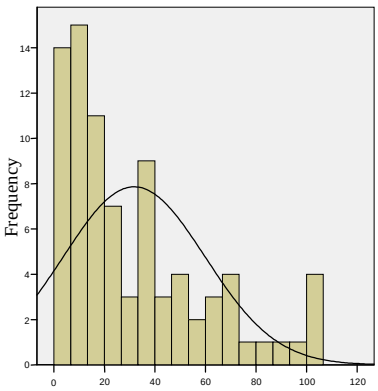
	DV0 Start of Construction - First Shipment	DV1 Arrival Machines - First Shipment	DV2 Arrival Machines - Full Capacity	DV3 Arrival Machines - Corporate-Level Productivity	DV4 First Shipment - Full Capacity	DV5 First Shipment - Corporate-Level Productivity
n	63	112	103	83	105	87
Mean	10.95	4.54	23.17	31.76	21.21	28.97
Standard Deviation	7.938	10.581	23.201	28.082	24.277	28.367
Minimum	0	0	0	1	0	0
Maximum	48	109	100	105	102	100

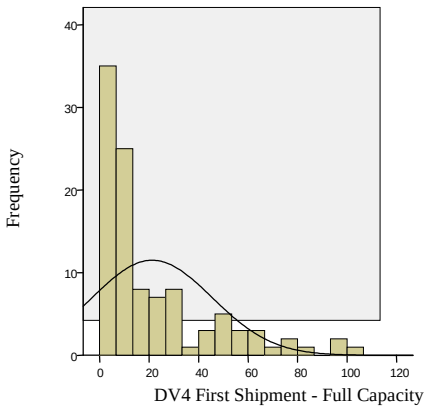
FIGURE 4
Frequency Distributions of Setup Times

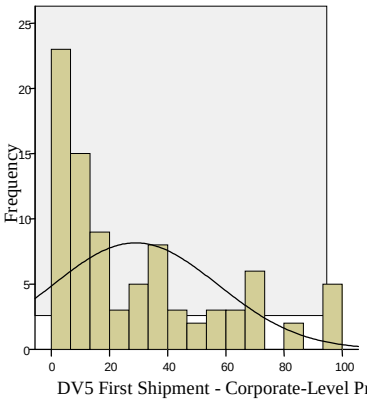












5.1.3 Comparing Subsets of the Sample

Several ANOVA analyses were tried out to see if subsets of the sample had significantly different setup times. Unfortunately, most of these ANOVA analyses turned out to be non-significant.

However, it was evident that on average, East Asian companies took 20 months longer from the arrival of machines to corporate-level productivity (mean = 49.14 months) than their American and European counterparts (mean = 28.85 months). A similar difference showed in the time from first shipment to corporate-level productivity (45.86 months vs. 26.17 months). Of course, one has to take into account that there were only seven East Asian MNCs in the corresponding subsamples.

Another question was whether the fact that an MNC already had a subsidiary in Mexico helped significantly with setup times. In fact, the difference was enormous: MNCs with FDI experience in Mexico only required 13.29 months (vs. 23.29) on average from the arrival of machines to corporate-level productivity. For the time between the first shipment and corporate-level productivity, the difference was even greater: MNCs with previously established subsidiaries in Mexico required only 9.38 months on average vs. 27.81 for those that had just opened their first Mexican subsidiary.

5.2 Preparing the Data for Regression Analysis

5.2.1 Converting Questionnaire Data into Analyzable Data

Before beginning the statistical analysis, some of the answers collected from the questionnaires had to be converted to numbers or computed. These conversions are explained below, in the order they apply to the questionnaire questions.

From the data collected outside the questionnaire, the company home country was coded by dummy variables as belonging to one out of three regions: Americas and Australia, East Asia, and Europe. The same procedure was applied to the location of the unit setting up (Q57).

The interviewee's position within the organization was coded as General Manager (or an equivalent title, such as "Plant Manager", etc.) or not. Similarly, the interviewer's identity (whether the researcher conducted the interview personally or not) and the interview language (Spanish or English) were also coded as dummy variables, to be used as controls.

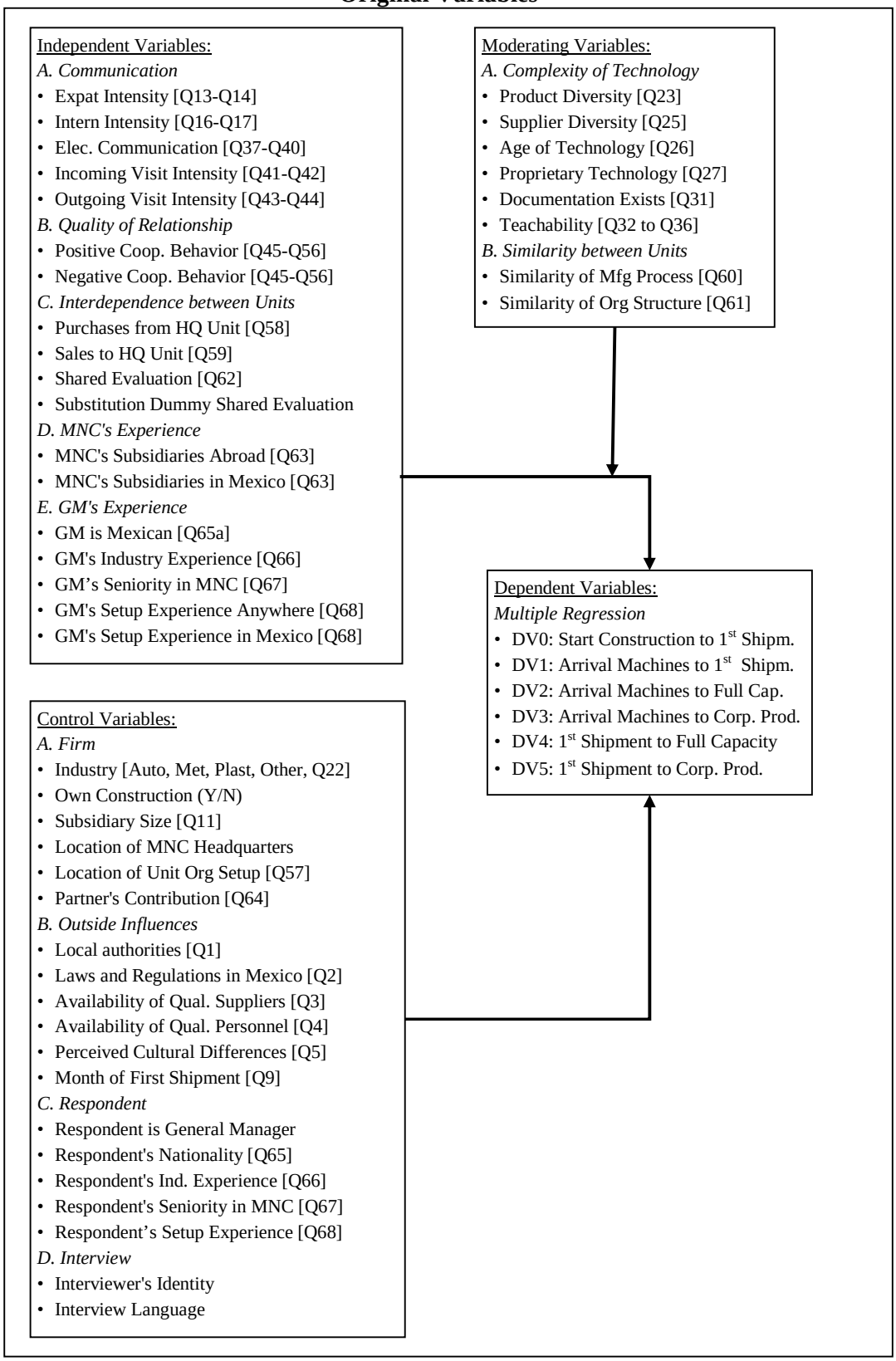
Questions Q6 through Q9 asked for the month and year of different stages of the setup process. However, the month was found to be missing in five cases (#5, #46, #67, #81, and #85). In order to salvage these cases, the month was defined as June, which includes the middle value for the year. As only 56% of all firms built or had built their own facility, a dummy variable named “Own Construction” was created. Dates where then converted into months passed since August 1997, which was the earliest the first machines arrived at any plant. The differences elapsed from that date to the first regular shipment (question Q9) was used as the control variable for historical time. The temporal data were used for calculating five versions of dependent variable: DV1 = Arrival of First Machines to First Regular Shipment, DV2 = Arrival of First Machines to Full Capacity, DV3 = Arrival of First Machines to

Corporate-Level Productivity, DV4 = First Shipment to Full Capacity, and DV5 = First Shipment to Corporate-Level Productivity.

To correct for firm size, the numbers of expatriates (questions Q13 and Q14) and interns (questions Q16 and Q17) had to be corrected for the total number of employees. These new measures were generated by dividing by the number of employees and called "Expatriate Intensity" and "Intern Intensity", respectively. Using the same procedure, "Product Diversity" was calculated from the number of different items produced (question Q23), "Supplier Diversity" from the number of key suppliers (question Q25), "Incoming Visits Intensity" from the numbers of visits received from the corresponding unit (questions Q41 and Q42), and "Outgoing Visits Intensity" from the number visits made (questions Q43 and Q44) to the corresponding unit. In contrast, no adjustment was made to the numbers of phone contacts (questions Q37 and Q38) and e-mail contacts (questions Q39 and Q40), as the underlying measures were based on a scale ranging from 1 to 5.

In question Q22 referring to industry classification, respondents were asked to apply their own categorization. This approach seemed more appropriate than the more common use of official classifications such as NAICS/SCIAN, which refer to whole firms and not to specific plants. As an (admittedly extreme) example, the sample included a plant that manufactured medical equipment, while the headquarters belonged to the aerospace industry. However, even after homogenizing the terminology used by respondents, there remained 21 different categories, out of which only three (Auto, Metal/Mechanical, Plastics) accounted each for more than 10% of the firms included in the sample. These three categories were maintained as independent dummy variables. The remaining categories were lumped together as "Other". Figure 5 shows the variables originally considered for this study.

FIGURE 5
Original Variables



5.2.2 Data Screening

Before proceeding to the analyses, the data were screened following the recommendations given by Tabachnik and Fidell (2007: 91-92). The first step was a point-by-point re-check comparing original data entries to the survey data on paper. Both manually and using the FREQ function within SPSS, several inconsistencies were identified and corrected that would have appeared as outliers in the data. Two cases stood out for different problems with data completeness and accuracy: Case #29 lacked all data for calculating the different versions of the dependent variable, making it virtually useless. For case #78, all Likert-scale scores for questions 28 through 36 (referring to codifiability and teachability) and for questions 45 through 56 (referring to trust) were answered with a "1". These scores can only be interpreted as non-answers; so case #78 lacked reliable data for one independent variable and one moderating variable. Therefore, these two cases were dropped.

5.2.3 Univariate Outliers

SPSS DESCRIPTIVES was used for identifying univariate outlier in all variables that were not dummies or Likert-scale responses. Among the 31 continuous variables (including multi-item aggregates calculated from Likert-scale data) in the study, there were 29 outliers (.83%) for the total number of 113 cases, when applying the rule that "cases with standardized *z* scores in excess of 3.29 ($p < .001$, two-tailed test) are potential outliers" (Tabachnik & Fidell, 2007: 73).

5.2.3.1 Univariate Outliers among Control Variables

Regarding the number of employees, case #110 was by far the largest plant with 1,300 employees. This outlier was corrected by the logarithmic transformation reported in section 2.1.1. Similarly, the three outliers for Q67 where respondents had 35 years or more experience within the MNC were found to be accurate. The square

root transformation applied in section 2.6.1 left one outlier with a *z* score of 3.378, which was left untouched as it was only slightly above the limit and corresponded to an authentic value.

5.2.3.2 Univariate Outliers among Independent Variables

For Expatriate Intensity, there were three outliers, which were corrected through the truncation and logarithmic transformation described in section 2.6.2. Intern Intensity contained only one outlier with a *z* score of 9.87, where the same truncation and logarithmic transformation produced three outliers, although their *z* scores were just below 3.35. With a *z* score so close to the threshold of 3.29, it seemed reasonable to leave these items as they were.

Incoming Visit Intensity had two outliers in cases #96 and #110, which the truncation and logarithmization described in section 2.6.2 made disappear. However, a new outlier appeared: Case #68 now had a *z* score of 4.09. The corresponding scatter gram showed that this outlier was not extreme, so it was left unchanged. Outgoing Visit Intensity had one outlier, which disappeared when applying the truncation and logarithmization described in section 2.6.2.

The two outliers for the number of the MNC's subsidiaries abroad did not matter for the statistical analysis, as this variable was dichotomized in a later step (see section 2.6.2).

The General Manager's Industry Experience also presented three outliers, which disappeared through the square root transformation described in section 2.6.2.

5.2.3.3 Univariate Outliers among Moderating Variables

Among the moderating variables, there were two outliers for Product Diversity, which disappeared when the truncation and logarithmization was applied. The four outliers for Supplier Diversity were likewise eliminated through the reciprocate

transformation. The one outlier for age of the technology disappeared in the logarithmized version of the variable (see section 2.6.3).

5.2.3.4 Univariate Outliers among Dependent Variables

DV0 (Construction to First Shipment) contained one outlier, which disappeared through the truncation and square root transformation described in section 2.6.4.

DV1 (Arrival of Machines to First Shipment) contained three outliers, while DV2 (Arrival of Machines to Full Capacity) and DV4 (First Shipment to Full Capacity) each contained one outlier. The logarithmic transformations applied to these dependent variables (see section 2.6.4) eliminated this outlier problem.

5.2.4 Missing Data

As was to be expected for such a long questionnaire applied to widely different settings, some of the data were missing. This issue was considered when designing the questionnaire, where numerous questions refer to related concepts, so some missing data did not necessarily mean a total loss of information. Wherever possible, this redundant information was used to calculate the value of missing items, as a deletion of incomplete cases would have threatened statistical validity.

The following section explains the specific choices for dealing with these missing data, in the order of questions in the questionnaire. The items not mentioned in this section were complete.

Questions Q1 and Q2 on influence of local authorities and regulations on the setup lacked an answer for case #32. For the statistical analysis, these missing values were replaced with the neutral answer (value = 2).

Questions Q6 through Q10 refer to the months and years when firms reached specific phases of the setup process, which were used for calculating different versions of the dependent variables. Of course, dependent variables should not be estimated, so

there were different numbers of cases for each of the dependent variables, depending on data completeness.

Questions Q11 and Q12 referred to the size of the plant. While the data for number of employees were complete for all cases, a staggering 26% of data was missing for capital investment. This problem was compounded by the possible distortion of data caused by the fact that some firms owned their facilities while others rented theirs. It was therefore decided to drop capital investment (question Q12) and measure subsidiary size by staff number (question Q11) only. This choice also seems appropriate in the light of the underlying theory of knowledge transfer, which focuses on humans and not on money or machines.

Questions Q13 through Q18 referred to personnel exchange through expatriates and interns. While the date for the first year were complete (except for case #34, see below), those for the second year lacked for 13 cases (11.5%) concerning expatriates (question 14) and 12 cases (10.6%) concerning interns (question Q16). For salvaging the available data, the missing values were calculated from a linear regression for predicting first-year to second-year personnel exchange numbers[17]. Case #34 represented an oversight where the intern figure for the first year (question Q16) was missing while the one for the second year (question Q17) was available. In this case, the regression[18] method was applied in the opposite direction in order to complete the data. These estimated data were also used for calculating Expatriate Intensity and Intern Intensity.

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[17] The resulting equation for expatriates was: Q14ExpatsYear2 = .480 + .506 * Q13ExpatsYear1; with R^2 = .685. The resulting equation for interns was: Q17InternsYear2 = -3.010 + .912 * Q16InternsYear1; with R^2 = .705. However, this solution produced negative numbers for Q17 when Q16 < 3. This problem was fixed by a quadratic transformation without constant, which allowed Q16 to take a value of "0" (mode with 26/113 =23.0% of the original cases). This procedure yielded the following equation: Q17 = .062 * Q16 + .008 * $(Q16)^2$; with R^2 = .892.

[18] Resulting equation: Q16InternsYear1 = 4.846 + .772 * Q17InternsYear2; with R^2 = .705

Question Q15 on expatriate cost was only answered in 23% of all cases, while question Q18 on intern cost was answered in 67% of the cases. Moreover, only 8% of respondents answered question Q19 on total transfer cost. In summary, Teece's (1977) approach of measuring transfer performance by cost estimates proved to be not workable for this study. Therefore, the three pertaining items were omitted from the analyses.

Questions Q23 through Q27 referred to different characteristics of the technology used. Question Q24 referring to the percentage of value added had a completion rate of only 86%. As above, the financial data were most difficult to obtain, so it was decided again to drop this variable. The five missing values (4.4%) for product diversity (calculated from question 23) were substituted for with the sample average. No data were missing for the supplier diversity measure (calculated from question Q25). The nine missing values (8.0%) for the age of technology (question Q26) were substituted for with the sample average. The sole missing value for the use of proprietary technology (question Q27) was substituted for with the modal dummy variable.

Questions Q28 through Q36 used a Likert scale to assess the degree of documentation and teachability of the technology. Completion rates for the individual questions were situated between 99% and 100%. The missing value for question 28 ("A manual can be written") in case #67 was calculated based on a regression linking this item to question Q31 ("Documentation exists")[19]. Case #107 missed two answers (questions Q35 and Q36) out of the five relating to the teachability construct; these

[19] The equation resulting from a linear regression yielded an $R^2 = .103$. A quadratic transformation yielded the best fit among various models:
Q28ManualFeasible = 7.276 - .553 * (Q31DocumentationExists) + .072 * (Q31DocumentationExists)^2, with $R^2 = .225$. For case #57, the rounded result was "7", which is the same as the mode (81/113 = 71.7%).

were also filled in using two separate regression analyses involving the other three items (questions 32 through 34)[20].

Questions Q37 through Q44 referred to the frequency of communication by different means between the focal subsidiary and the corresponding unit. While the data for the first year were complete, the newest units obviously had no answers for the second-year items, which were computed based on a regression analysis linking the first year to the second year[21]. For the 5-point Likert scales of questions Q38 and Q40, this procedure produced results that were identical as setting Year 2 equal to Year 1. The rounded results were used to calculate Incoming and Outgoing Visit Intensities.

Questions Q45 through Q56 referred to the interorganizational trust variable adapted from Cummings and Bromiley (1996). Case #16 did not include any data on these items because the respondent was the general manager of both the sending and the receiving unit. In the interview, the subject did not show signs of schizophrenia, so it was decided to fill in the positively phrase items with a "7" (complete agreement) and the negatively phrased ones with a "1" (complete disagreement). Besides, the answers were complete with the exception of case #47, which lacked the answer for question Q46, and of case #80, which lacked the answer for question Q56. In both

[20] Resulting equations:

Q35 = 2.346 – .134 * Q32 – .058 * Q33 + .701 * Q34; with R^2 = .333

Q36 = 3.468 – .036 * Q32 + .092 * Q33 + .391 * Q34; with R^2 = .255

[21] Resulting equations:

Q38PhoneContactYear2 = -0.367 + 1.029 * Q37PhoneContactYear1; with R^2 = .595

Q40E-mailYear2 = .327 + .932 * Q39E-mailYear1; with R^2 = .868

Q42VisitsReceivedYear2 = 1.226 + .699 * Q41VisitsReceived1; with R^2 = .739

For estimating Q44VisitsMadeYear2, the linear regression produced implausible results for Q43 =< 3, and a fit of only R^2 = .476, so the constant was removed for allowing Q44 to take a value of "0", obtaining: Q44VisitsMadeYear2 = .407* Q43 VisitsMadeYear1, with R^2 = .605

cases, the missing values were substituted with the values calculated from a regression analysis involving the 12 items related to trust[22].

Questions Q58 (Purchases from Setup Unit), Q59 (Sales to Setup Unit), Q60 (Similarity of Manufacturing Process), Q61 (Similarity of Organizational Structure), and Q62 (Shared Evaluation of Managers) stand for single-item variables, which could not be estimated from other items. The one missing case for question Q58 and the two missing cases for question Q59 were therefore substituted with the corresponding means. The five missing cases for question Q60 and the four missing cases for question Q61 were substituted with the mode on their four-point scales, which turned out to be "1" for both items. Ten cases lacked an answer to question Q62. However, most respondents (61 out of 103, equal to 59.2%) answered that there was no shared evaluation of managers between the sending and the receiving unit. Going with this majority, it was decided to substitute "0" in the missing ten cases.

Q65a referred to the question whether the General Manager (GM) was Mexican. Because some interviews had been carried out with other managers, this item was missing in three cases, where the modal value (1 = "yes") was substituted.

One answer was missing for question Q67 (Respondent's Seniority in MNC). In the absence of a good estimator, mean substitution was used to fill this gap.

As a result of the above substitutions, all items for independent and control variables were complete. Six items with completion rates below 10% (Q12, Q15, Q18, Q19, Q20, and Q24) were dropped from the analysis. These deletions did not make it impossible to test the underlying theory, as there were other items related to

[22] Resulting equations:

Q46 = .007 + .163*Q45 + .296*Q47 - .053*Q48 + .065*Q49 - .077*Q50 - .203*Q51 + .200*Q52 + .237*Q53 + .023*Q54 + .282*Q55 + .045*Q56; with R^2 = .714

Q56 = 5.688 + .083*Q45 + .123*Q46 - .255*Q47 + .153*Q48 + .009*Q49 + .055*Q50 - .194*Q51 + .036*Q52 - .409*Q53 + .016*Q54 - .082*Q55; with R^2 = .439

the same concepts. From the remaining 45 items used for independent and control variables, 135 data (2.7%[23]) were substituted. This procedure allowed to retain 113/115 = 98.3% of all cases. The disadvantage of the method used is that variance and correlations were reduced.

Another method for detecting any undesirable influence of substituted values is to check for systematic interaction effects between the absence of variables and other variables. There are no clear rules for which items to consider, but the Missing Values Analysis add-on for SPSS[24] applies a threshold of 5% of all cases (according to Tabachnik & Fidell, 2007: 63). In this study, only three groups of items fall under this criterion: Firstly, the six items referring to the second year of operations, which account for a total of 79 (= 61.7%) of all substitutions. Their relationship to the dependent variables is obvious: These were the newest cases, and a possible test would be to run the analyses with the first-year data only. Secondly, for question 26 on the age of the technology, nine out of 113 data (8.0%) were substituted. Finally, question Q62 on shared evaluation missed ten out of 113 (8.8%), which were also substituted. For these last two variables, a substitution dummy has been introduced to check for possible substitution effects (cf. Cohen, Cohen, West, & Aiken, 2003: 436).

5.2.5 Dimension Reduction

The survey used for this study included over 60 items, which were included to find out which could be meaningfully related to the dependent variables. Of course, this meant that the number of variables had to be reduced to a manageable size. The first

[23] From 58 items in total, six were dropped and seven pertained to dependent variables, leaving 45 items to be used for dependent and control variables. Substitution rate: 135 / (45 * 113) = 2.7%
[24] Unfortunately, the Tec de Monterrey's license for the SPSS software package does not include the add-on for missing values analysis (MVA), so all calculations had to be done manually. Additionally, more sophisticated methods such as expectation-maximization were not available.

method used was principal component analysis (PCA)[25] with varimax rotation and Kaiser's normalization, which SPSS automatically bases on the correlation matrix, i.e., unit standard deviation (cf. Landau & Everitt, 2004). For this purpose, the sample size of this study (n = 113) is rather poor (Tabachnik & Fidell, 2007: 613), so when individual factors were used instead of factor scores, the factors should have high loadings. The following paragraphs describe the efforts for reducing the data of control variables, independent variables, and moderating variables. The result of dimension reduction is shown in Figure 2.

5.2.5.1 Dimension Reduction for Control Variables

For the outside influences (Q1 through Q5), a PCA led to a two-component solution: Influence of Local Authorities (Q1) and Influence of Local Regulations (Q2) converged into one variable, but their Cronbach's alpha was only .518. Similarly, Availability of Qualified Suppliers (Q3) and Availability of Qualified Labor (Q4) converged into one variable, but their Cronbach's alpha was only .495. Cultural Difference (Q5) seemed conceptually too distinct to be included into a common variable with the other items. It was therefore decided to leave the items referring to external influences as separate variables.

Questions Q66, Q67, and Q68 referred to the respondent's personal characteristics, which could possibly introduce a systematic bias in the data. PCA delivered a two-component solution: Reliability analysis of the respondent's industry experience (Q66) and seniority in the focal MNC (Q67) revealed a Cronbach's alpha = .650, so they needed to be used as separate variables. Question Q68 referred to two aspects of setup experience, anywhere and in Mexico, with Cronbach's alpha = .903, so these

[25] Cook (2007) claims that inverse regression is statistically superior to PCA. Unfortunately, these new methods have not been implemented in any software package yet. Thanks to Chandler Stolp from UT Texas for this tip.

measures could be used jointly as "Respondent's Setup Experience". All three variables were originally intended as controls to check if they had any systematic impact on the respondents' answers. However, as 83 out of the 113 respondents (73.5%) were the general managers of the respective operations, the values of Q66, Q67, and Q68 for the respondents would be highly collinear with the corresponding values for the general managers. In order to avoid a multicollinearity problem, it was decided to drop the corresponding control variables.

5.2.5.2 Dimension Reduction for Independent Variables

The first group of independent variables considered personnel exchange. Using the expatriate (Q13 and Q14) and intern numbers (Q16 and Q17) divided by the number of employees (Q11) led to a solution with two components: Expatriate Intensity for Year 1 and for Year 2, with a Cronbach's alpha of .916, and Intern Intensity for Year 1 and for Year 2, with a Cronbach's alpha of .778. The regression analysis therefore included two variables called "Expatriate Intensity 2 Years" and "Intern Intensity 2 Years", respectively.

For interunit communication and visits, principal component analysis produced a three-component solution for interunit communication, which corresponded to the setup of this study: The four measures for phone (Q37 and Q38) and e-mail (Q39 and Q40) communication came out as one component with Cronbach's alpha = .875. The number of visits divided by the number of employees gave one component for visits received from the unit setting up the focal subsidiary (calculated from Q41 and Q42) and another one for the visits made by the focal subsidiary to the unit setting up (calculated from Q43 and Q44). Cronbach's alpha values were .790 for "Incoming Visit Intensity" and .794 for "Outgoing Visit Intensity".

Interunit trust was measured using the 12 items (Q45 through Q56) from Cummings and Bromiley's (1996) organizational trust inventory. PCA gave two components, where the positively formulated items loaded on one component and the negatively formulated items loaded on another one. This did not change when the negatively formulated items were reverse coded. However, the items "MNC Took Advantage of Vulnerable People" (Q56) and "MNC Backed out of Its Commitments" (Q54) loaded on the wrong component, which might be due to their extreme aggressiveness, as suggested by the reactions of some interviewees. It was therefore decided to drop these items for the moment. A new analysis using only ten out of the 12 items led to a conceptually coherent result: Q45, Q46, Q47, Q51, Q52, Q53 and Q55 formed the variable "Positive Cooperative Behavior" with Cronbach's alpha = .916, while Q48, Q49 and Q50 formed the variable "Negative Cooperative Behavior" with Cronbach's alpha = .647. However, these items together with the previously omitted ones (Q54 and Q56) did load on one factor with a Cronbach's alpha of .707. This led to repeating the principal component analysis with the seven positive items and the five negative items separately. Positively formulated items loaded on a single factor with Cronbach's alpha = .931. Negatively formulated items also loaded on a single factor with Cronbach's alpha = .707. These scores were kept as variables for "Positive Cooperative Behavior" and "Negative Cooperative Behavior".[26]

Among the questions measuring the degree of interdependence between units, the items Purchases from HQ Unit (Q58), Sales to HQ Unit (Q59) and Shared Evaluation among Managers from Both Units (Q62) loaded on a single factor, but Cronbach's alpha was only .372. In spite of their conceptual proximity, Q58 and Q59 only were

[26] This falling apart of the "trust" construct into "trust" as one dimension and "distrust" as a second dimension is in line with the observations made by Tomlinson and Lewicki (2003).

related with a Cronbach's alpha of .463[27]. Consequently, it was decided to treat the three items as separate variables.

For the two items measuring the MNC's experience abroad (two aspects of Q63), the Cronbach's alpha value of only .029 did not warrant transforming them into a single variable.

Independently of the possible bias introduced by the respondent's experience (see the above section on control variables), the general manager's experience was also part of the theoretical model, as he or she was supposed to have a significant influence on the outcome of the setup. In fact, many respondents stated that their previous setup experience was a major factor in the hiring decision. Unfortunately, in 28 out of the 113 cases (24.8%), the general managers who had been in charge during the setup period were not available at the moment of the interview, so the questionnaires were answered by second-level managers. For these cases, the values for setup experience given by the second-level managers were substituted with the mean values or modes provided for the general managers in the sample. For Industry Experience (Q66) and Seniority in MNC (Q67), the substitution means were 16.1 years and 8.0 years, respectively. For Setup Experience Anywhere (first part of Q68), the substituted mode was "1" (yes), while for Setup Experience in Mexico (second part of Q68), it was "0" (no). PCA turned out a two-factor solution, but Cronbach's alphas were below the threshold value (.633 for Q66 and Q67[28], .654 for Q65a and the two aspects of Q68, .663 for the two aspects of Q68 alone), suggesting a treatment as independent variables.

[27] When using the transformed variables, results were even worse: RECIPQ58, RECIPQ59 and Q62 had a Cronbach's alpha of -.013, while RECIP58 and RECIP59 had a Cronbach's alpha of .267.
[28] The value was .603 for the transformed variables.

5.2.5.3 Dimension Reduction for Moderating Variables

The questionnaire included 15 items for measuring the degree of complexity of the technology employed. Nine of these variables belonged to two subgroups called "codifiability" and "teachability".

Codifiability was a 4-item construct adopted from Kogut and Zander (1993). PCA split Kogut and Zander's (1993) construct into a documentation (Q28 and Q31) and a software component (Q29 and Q30), but the corresponding Cronbach's alpha values were only .356[29] and .443, respectively. Working with four independent items would have made the ensuing analysis overly complicated and hard to interpret. Therefore "Documentation Exists" (Q31) was selected as the only indicator, because it has the best face value as a predictor for the difficulty of technology transfer.

In contrast, Kogut and Zander's (1993) teachability construct (questions Q32 through Q36) turned out to be much less of a problem. Using varimax rotation, the items loaded on a single factor with a Cronbach's alpha of .822.

Thus, the Complexity of Technology construct included the following items:

- "Product Diversity" (Number of Products Divided by LOG(Number of Employers), calculated from Q23 and Q11)
- "Supplier Diversity" (Number of Key Suppliers divided by LOG(Number of Employees), calculated from Q25 and Q11)
- Age of Technology (in years, Q26)
- Proprietary Technology (Y/N, Q27)
- Documentation Exists (Q31)
- Teachability (derived from Q32 to Q36, see above)

PCA of the above items yielded three components: Product Diversity (based on Q23) loaded on one factor, Supplier Diversity (based on Q25), Proprietary Technology

[29] Among the four items, only Q28 had a limited distribution containing only the values "5", "6", and "7" on the 7-point Likert scale. Even when spreading the distribution by substituting "1" for "5" and "4" for "6", Cronbach's alpha for the Q28-Q29 combination only improved to .480.

(Q27), and Documentation Exists (Q31) loaded on another factor, while Age of Technology (Q26) and Teachability (Q32-Q36) loaded on a third factor. The transformed variables also yielded a three-component solution: Product Diversity (based on Q23), Supplier Diversity (based on Q25), and Documentation Exists (Q31) loaded on another factor, Proprietary Technology (Q27) and Age of Technology (Q26) on a second factor, while Teachability (Q32-Q36) occupied a factor by itself. However, the scree graphic did not show a clear break and none of the solutions had acceptable Cronbach's alpha values, so they had to be kept separate.

5.2.6 Normality

5.2.6.1 Normality of Control Variables

Most control variables were dichotomous, so it makes no sense to check them for normality. The remaining ones were analyzed within the following groups: firm-related items, outside influences, and respondent-related items.

The only non-dichotomous control variable at the firm level was Number of Employees (question Q11), which was used as sole indicator of plant size. The data showed substantial skewness (z = 11.8773) and kurtosis (z = 23.8610). A logarithmic transformation brought them into a reasonably normalized form with z = -.4317 for skewness and z = -1.3680 for kurtosis.

Among the variables for outside influences, Availability of Qualified Personnel (Q4) was moderately skewed (z = 6.326), while Local Regulations (Q2) and Qualified Suppliers (Q3) presented a slightly flattened distribution (kurtosis values of z = -3.0435 and z = -2.7394, respectively). Questions Q1 through Q5 used the same three-point scale. For maintaining the interpretability and comparability of these five items, any data transformation would have to be applied to all of them. On average, the square-root transformed data were less skewed than the original data (z = 1.4390 vs. z

= 2.0584), but the average (of the absolute values) of skewness worsened (z = 2.2757 vs. z = 1.8307). The transformation to be selected was taking the square root, where the largest single deviation from normality among all five items was the smallest in absolute terms (skewness for Q4: z = 5.9209). The item for historical time, Month of First Shipment (question Q9) presented a slightly flattened distribution (z = -2.4712), but any transformation would have significantly skewed the data (z < -2), so it was decided to use the item in its original form.

Among the continuous control variables for the respondent, Industry Experience (Q66) was almost normally distributed, while Seniority in the MNC (Q67) was substantially skewed (z = 8.5827) and peaked (z = 9.1637). In order to maintain comparability among both items, the same transformation was applied to both items. Within the ladder of re-expression, the square root transformation produced the smallest average deviation from normality for the 2 x 2 = 4 indicators (skewness for Q67: z = 3.2346), while a logarithmization would have overcorrected skewness for Q66 (z = -3.9629).

5.2.6.2 Normality of Independent Variables

Independent variables included the following five groups: Communication, quality of relationship, interdependence between units, the MNC's experience, and the GM's experience.

Among the communication items, both Expatriate Intensity (based on Q13-Q14) and Intern Intensity (based on Q16-Q17) presented strong positive skewness and kurtosis. After applying a started reciprocal transformation, the skewness for Expatriate Intensity improved from z = 11.0568 to z = -2.1864, with kurtosis being reduced from z = 16.1535 to z = -1.8303. For the Intern Intensity variable, skewness was overcorrected from z = 39.7563 to z = -13.0348, while the kurtosis value changed

from z = 193.7718 to z = 27.5731. The histograms of the transformed variables looked a bit better, but were still far away from a normal distribution. Nevertheless, this was the transformation that achieved the most significant improvements while still being interpretable (unlike transformations with fraction powers). Another possibility would have been to exclude cases with extreme values, for example where up to 100% of the initial staff had been sent abroad for training. That option was discarded because it would have meant sacrificing one of the most interesting aspects of the study, i.e., whether massive personnel exchange made a significant difference in setup times. Instead, the distributions were truncated by moving the outliers closer to the other cases. In the Expatriate Intensity data, the maximum value was set to ".15" for Year 1 and to ".1" for Year 2. This truncation affected four cases: #35, #66, #67, and #86. In a similar way, Intern Intensity was limited to ".4" for Year 1 and ".3" for Year 2, which applied to three cases: #34, #77, and #88. With the truncated data, a new principal component analysis for the 2-year Expatriate Intensity and Intern Intensity scores yielded Cronbach's alpha values of .836 and .733, respectively. Skewness and kurtosis were now less severe. Reciprocal transformation brought the data closer to normality than logarithmization, although with a slight overcorrection. The new variable RECIP Expatriate Intensity[30] had a skewness of z = -2.8844 and a kurtosis of z = -1.5595. The new RECIP Intern Intensity had a skewness of z = -2.3738 and a kurtosis of z = -1.0357.

Electronic Communication (Q37-Q40) presented substantial negative skewness and severe kurtosis. While logarithmization did not correct either of the problems sufficiently, the reciprocal transformation overcorrected skewness (z = -5.5554). The scatter graph showed that cases #24 and #111 were distant outliers, where the Mexican

[30] The name of the variables integrates the abbreviation RECIP to make interpretation easier.

subsidiaries communicated rarely with the unit setting up. In fact, these cases were the only ones that reported a "1" on the 5-point scale. For improving the distribution, these values were truncated to "2" and entered into a new principal component analysis. The new Electronic Communication variable had a Cronbach's alpha of .850 (vs. .875 without truncation). Its distribution still presented substantial negative skewness (z = -11.7507) and positive kurtosis (z = 15.7560). Neither the logarithmic nor the reciprocate transformation reduced skewness to an acceptable level (z = 8.1173 and z = -6.1289, respectively). This was due to the fact that 85.3% of the data in the underlying items represented a "5", which meant more than 20 phone or e-mail contacts per month. The best way to salvage the information contained in the data was dichotomization: Values from "1" to "4" were re-expressed as infrequent ("0"), while the value of "5" was converted into a "1", meaning that communication between units took place at least once per day. To avoid dealing with four independent variables, only the first-year variables for phone contact and e-mails were used.

Incoming Visit Intensity (based on Q41-Q42) and Outgoing Visit Intensity (based on Q43-Q44) presented both severe positive skewness and kurtosis. These deviations from normality could not be convincingly corrected by neither logarithmic nor reciprocal transformations. An inspection of the scatter graphs of the original first-year values (Q41 and Q43) revealed that the cause were some severe outliers: Incoming visits more than doubled the corresponding staff numbers for cases #3 and #49 in Year 1 and for cases #49 and #68 in Year 2. The numbers of outgoing visits (Q43 and Q44) were more than half of the corresponding staff numbers for cases #14 in Year 1 and #77 in Year 2. Rechecking the data for accuracy revealed that, in fact, the corresponding firms mostly worked with sophisticated technology. Instead of suppressing these interesting data, it was decided to impose upper limits on the

corresponding numbers to facilitate a near-normal distribution of the data: For both years, Incoming Visit Intensity was limited to a value of 2 and Outgoing Visit Intensity was limited to a value of .5. These modifications affected the six cases mentioned above and still lay beyond the values of all other cases. With these truncated distributions, the two-year intensities were recalculated. Interestingly, all four items loaded on a single factor, although internal consistency was not sufficient for using a common two-way visit indicator (Cronbach's alpha = .668). The newly calculated Incoming Visit Intensity exhibited an alpha value of .802, while the new Outgoing Visit Intensity presented a Cronbach's alpha of .825 (versus .790 and .794, respectively, without truncation). The best data transformation was achieved by taking the started reciprocal values of the data, which left a moderate left skew for both the RECIP Incoming Visit Intensity^{15} (z = -2.9992) and RECIP Outgoing Visit Intensity^{15} (z = -2.0965), an almost normalized kurtosis for RECIP Incoming Visit Intensity (z = -1.0399), and a moderately flattened distribution for RECIP Outgoing Visit Intensity (z = -2.0775).

Among the items measuring the quality of the relationship between both units, Positive Cooperation Behavior was severely negatively skewed and peaked, while Negative Cooperation Behavior was substantially positively skewed and presented no problem with kurtosis. In order to maintain both variables comparable, the selected transformation had to be a compromise: Logarithmization left most deviations from normality within the $z < 2$ range; only Positive Cooperation Behavior remained skewed with z = 3.0351. Interestingly, a consistency analysis of the two logarithmized values showed a Cronbach's alpha of .831. Therefore, the previously separated forms of cooperation behavior were reunited trough principal component analysis, which gave the new variable "LOG Interunit Trust". As this item was well behaved, it was

retained for further analysis. However, the distribution of this new item included negative values; after adding a constant, the smallest value was just above zero.

The two continuous items that measured the interdependence between units, Purchases from HQ Unit (Q58) and Sales to HQ Unit (Q59), were both severely skewed and peaked. This was due to the fact that in 37.2% of the cases, there were no purchases from the HQ unit and in 59.3%, there were no sales to that unit. Fortunately, both skewness and kurtosis could be fixed (all *z* number less than one) through a reciprocate transformation. The new variables were called RECIP Purchases form HQ Unit and RECIP Sales to HQ Unit[31].

The experience with the setup of foreign subsidiaries was measured at both the organizational and the personal level. The first part of question Q63 asked for the number of subsidiaries that the MNC had set up abroad over the ten years previous to the focal subsidiary. However, as 58.4% of all cases had no previous experience, the distribution was severely skewed and peaked. Logarithmization was not sufficient for normalization, while the reciprocal transformation overcorrected both issues. Going with the smallest absolute *z* values, the latter solution was selected, which left skewness at $z = -2.4007$ and kurtosis at $z = -3.3231$. For the previously established subsidiaries in Mexico, the maximum number captured in the survey was "1", so the variable dichotomized itself. Therefore, normality analysis did not apply.

The general manager's experience was measured through three items: Industry Experience (Q66), Seniority in the MNC (Q67), and Setup Experience anywhere and specifically in Mexico (two parts of Q68). This last item was formulated as a yes-no question, so normality analysis did not apply. Q67 had a slightly skewed distribution, while Q68 was severely skewed and peaked. To maintain interpretability, a square

[31] The name of the variables integrates the abbreviation RECIP to make interpretation easier.

root transformation was applied to both items. This compromise made Q67's distribution almost normal, while Q68 remained somewhat skewed (z = 3.1356) and peaked (z = 3.3701).

5.2.6.3 Normality of Moderating Variables

The moderating variables belonged to two groups: Complexity of Technology and Similarity between Units. The item of Product Diversity (calculated from Q23) included three extreme outliers, namely cases #43, #55, and #110. The distribution was truncated by setting a maximum of 600 products per employee, which was still above the nearest case (#93) with 526 products per employee. Even after this transformation, both Product Diversity and Supplier Diversity (calculated from Q25) showed substantial skewness and kurtosis. The best transformation for Product Diversity was logarithmization, although skewness remained at z = 2.7927. For Supplier Diversity, the best transformation was the reciprocate value, which left skewness and kurtosis data within $z < 2$. The new variable was called RECIP Supplier Diversity[32].

In 41.6% of all cases, the technology used was less than one year old. Consequently, the distribution of Q26 was severely skewed and peaked. A logarithmic transformation left the item almost normally distributed, with little skewness (z = 2.5821) and negative kurtosis (z = -2.5793)

Documentation Exists (Q31) was negatively skewed (z = -9.2157) and presented kurtosis (z = 10.2340). Logarithmization of the reflected scores was the best transformation for correcting kurtosis (z = -.2002), although skewness remained at z = 3.6090. The reciprocal value of the reflected data worked best for centering the data (skewness: z = -.7922), but left the curve too flat (kurtosis: z = -3.5579). The best

[32] The name of the variables integrates the abbreviation RECIP to make interpretation easier.

transformation was logarithmization, which offered the lowest overall *z* value for both deviations from normality and was easier to interpret.

Teachability [calculated from Q32 to Q36] presented some negative skewness (*z* = -1.9170) and negative kurtosis (*z* = .3565). A square root transformation centered the distribution almost perfectly (*z* = .3565), although it increased the absolute kurtosis value (*z* = -1.7851).

As could be expected for the setting up of a new manufacturing facility, the value for similarity of the manufacturing process between the two units (Q60) tended to be high, while organizational structures (Q61) varied much more. Mathematically, this meant a high degree of skewness (*z* = 8.4478) and kurtosis (*z* =5.7198) for Q60 and less skewness (*z* = 2.1871) with negative kurtosis (*z* = -2.3156) for Q61. Any data transformation that maintained comparability between both items would thus have to be a compromise. Within the ladder of re-expression, the reciprocal transformation produced both the lowest average deviation from normality and the lowest extreme value (skewness for Q60: *z* = -5.4084). This was still a significant deviation from the normal distribution, but due to the 4-point scale, a better result was not possible. The variables maintained their names as Similar Manufacturing and Similar Organization, as the reciprocation actually inverted the original reverse coding.

5.2.6.4 Normality of Dependent Variables

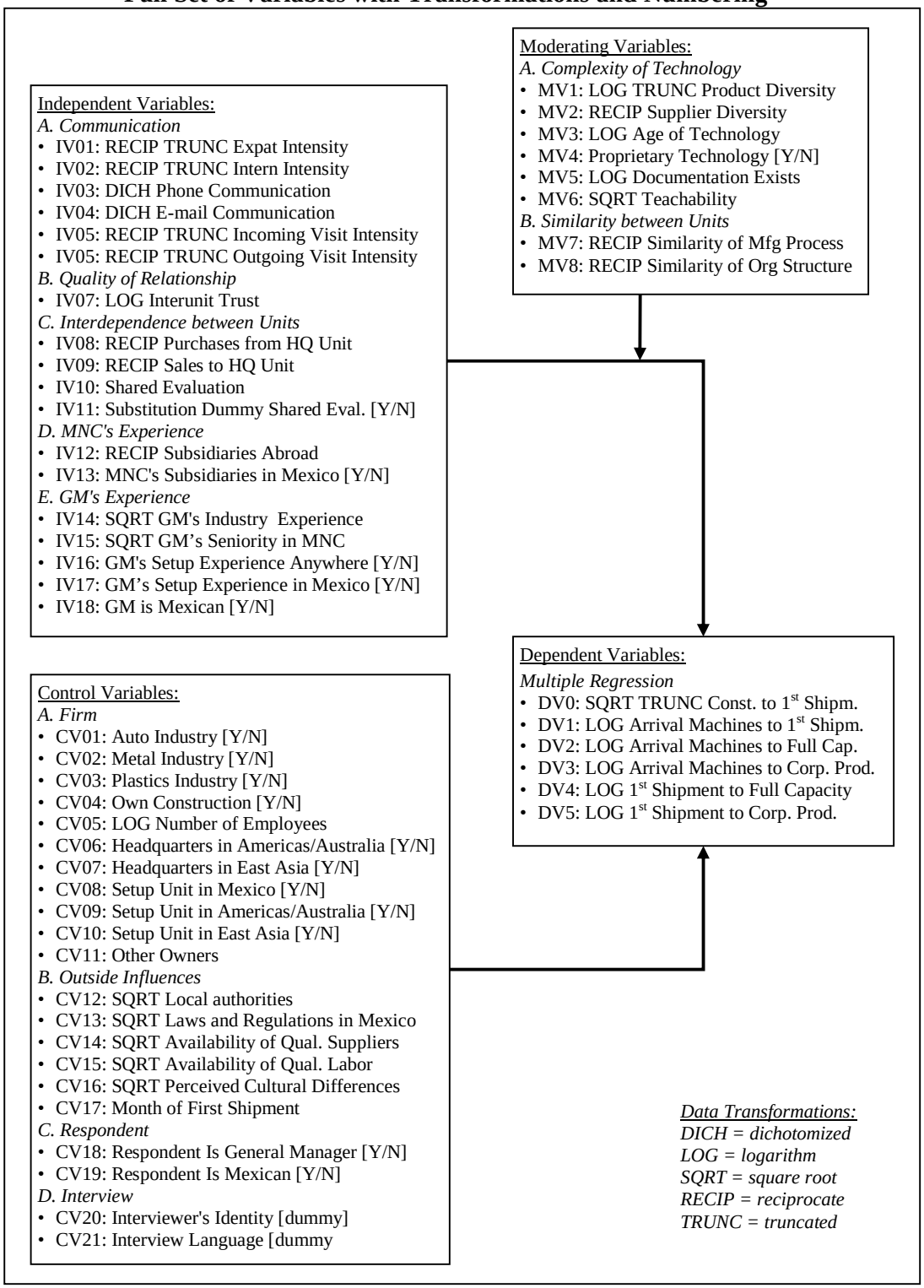
All dependent variables had a skewed and peaked distribution. DV1 (Arrival of Machines to First Shipment), DV2 (Arrival of Machines to Full Capacity), DV3 (Arrival of Machines to Corporate-Level Productivity), DV4 (First Shipment to Full Capacity), and DV5 (First Shipment to Corporate-Level Productivity) could have been normalized by using either the square root or the logarithmic transformation. The best choice was to use the one transformation for all variables. Logarithmization left all *z*

values under the 2 absolute, with only skewness for DV3 (Arrival of Machines to Corporate-Level Productivity) slightly beyond this value (z = -2.0369).

A special case was DV0 (Start of Construction to First Shipment), where the distribution presented severe kurtosis (z = 13.1943). For this variable, cases #2, #6, #46, and #65 could be considered as outliers, with over 30 months from Start of Construction to First Shipment. The corrective measure applied was to truncate the distribution of DV0 (Start of Construction to First Shipment) to a maximum of 25. Even with this modification, however, DV0 (Start of Construction to First Shipment) remained different from the other dependent variables: The best data transformation was taking the square root, although kurtosis remained at z = 2.1459. A possible explanation for this behavior is that the construction process is typically the phase where investing companies have the least control.

Figure 6 shows the transformed variables with the numbering used for statistical analysis.

FIGURE 6
Full Set of Variables with Transformations and Numbering



5.3 Correlation Analysis

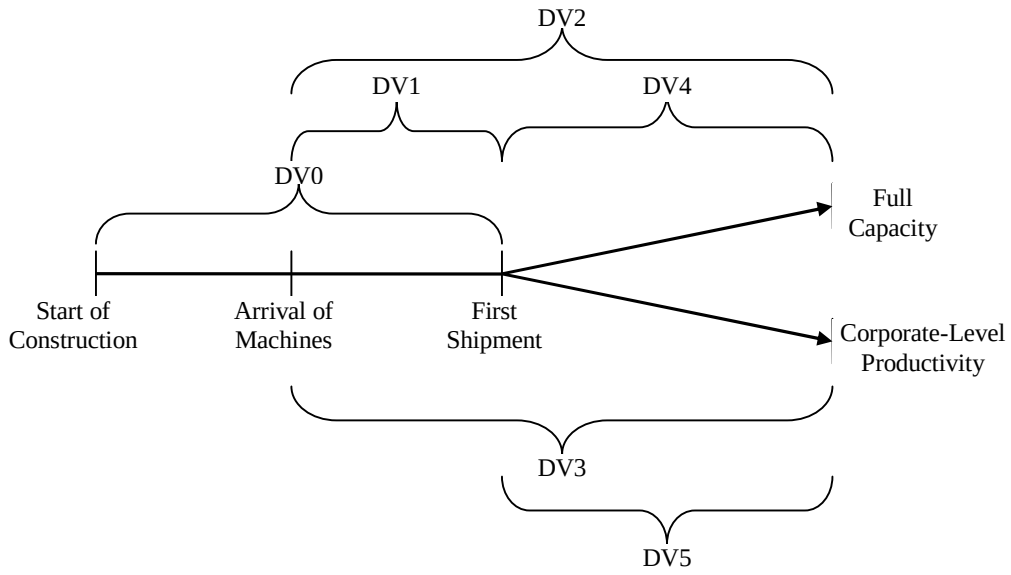
Table 5 shows the means, standard variations, and bivariate correlations between the full sets of dependent variables, control variables, independent variables, and moderating variables without interaction terms.

5.3.1 Correlations among Dependent Variables

The dependent variables measured different phases within the initial months and years of the manufacturing plants' existence. A consistently positive correlation between these dependent variables would have meant that all the progress on the path from construction to arrival of machines to first shipment to full capacity or corporate-level productivity (cf. Fig. 7) was rather uniform, with plants where progress was either consistently slow or consistently fast. However, for the first two phases, this was not always the case: The only significant positive correlations were between DV0 (Start of Construction to First Shipment) and DV1 (Arrival of Machines to First Shipment) ($p < .01$) on one hand and between DV0 (Start of Construction to First Shipment) and DV3 (Arrival of Machines to Corporate-Level Productivity) ($p < .05$) on the other hand. Additionally, there was even a negative significant correlation ($p < .05$) between DV1 (Arrival of Machines to First Shipment) and DV4 (First Shipment to Full Capacity), which do not overlap. This means that firms that started production quickly took longer for ramp-up and vice versa.

The variables that concerned the later phases of the setup, namely DV2 (Arrival of Machines to Full Capacity), DV3 (Arrival of Machines to Corporate-Level Productivity), DV4 (First Shipment to Full Capacity), and DV5 (First Shipment to Corporate-Level Productivity), were all positively correlated among each other ($p < .01$).

FIGURE 7
Phases in Plant Setup and Dependent Variables[33]



5.3.2 Correlations between Dependent Variables and Control Variables

DV0 (Start of Construction to First Shipment), DV1 (Arrival of Machines to First Shipment), and DV4 (First Shipment to Full Capacity) were not significantly correlated with any control variables.

The only significant (positive) correlation for DV2 (Arrival of Machines to Full Capacity) was with CV06 (Headquarters in the Americas/Australia) at the $p < .05$ level, meaning that American and Australian firms actually needed more time for this phase than European and East Asian MNCs.

DV3 (Arrival of Machines to Corporate-Level Productivity) showed the highest number of significant correlations with control variables: DV3 was positively correlated ($p < .05$) with CV05 (Number of Employees), meaning that larger firms required longer for this phase. DV3 was also positively correlated ($p < .05$) with the

[33] Full capacity and corporate-level productivity were not always reached in the same sequence: Out of the 76 cases that provided data for both targets, 43 (56.6%) reached full capacity before corporate-level productivity, 9 (11.8%) reached both targets simultaneously, and 24 (31.6%) reached first corporate-level productivity and then full capacity.

problems to find Qualified Suppliers (CV14) and Qualified Labor (CV15). DV3's negative correlation ($p < .05$) with the problems caused by perceived Cultural Differences (CV16) supposes an anomaly[34]. The negative correlation ($p < .05$) between DV3 and CV17 (Month of First Shipment) indicates that on average, the setup processes became speedier over time. Finally, DV3 had a significant negative correlation ($p < .01$) with CV19 (Respondent is Mexican), which contrasts with the absence of a significant correlation between DV3 and IV18 (GM is Mexican): The difference between CV19 (69.9% Mexicans) and IV18 (63.7% Mexicans) is due to those second-level managers from Mexico who stayed on since the beginning while their foreign superiors left. It is possible that through their permanence in the subsidiary, these second-level managers had a strongly positive influence on its setup performance.

Similarly to DV3 (Arrival of Machines to Corporate-Level Productivity), DV5 (First Shipment to Corporate-Level Productivity) was positively correlated ($p < .05$) with CV05 (Number of Employees) and negatively correlated ($p < .05$) with CV17 (Month of First Shipment) and CV19 (Respondent is Mexican).

From the point of view of the control variables, only CV05 (Number of Employees), CV06 (Headquarters in the Americas or Australia), CV14 (Availability of Qualified Suppliers), CV15 (Availability of Qualified Labor), CV16 (Perceived Cultural Differences), CV17 (Month of First Shipment), CV18 (Respondent is GM), and CV19 (Respondent is Mexican) were significantly correlated with one or several variations of the dependent variable. All other control variables were not significantly correlated with any dependent variable.

[34] Section 3.5 provides a tentative explanation for this finding.

5.3.3 Correlations between Dependent Variables and Independent Variables

DV0 (Start of Construction to First Shipment) had a positive correlation ($p < .05$) with IV02 (RECIP Intern Intensity), i.e., firms that sent fewer Mexican employees abroad for training tended to take longer for the construction and initial phases.

DV1 (Arrival of Machines to First Shipment) was positively correlated ($p < .01$) with IV05 (RECIP Incoming Visit Intensity). This relationship is in line with the theory put forth in this study, because less contact was related to a slower setup process. Contrary to theory, DV1 was also positively correlated ($p < .05$) with IV08 (RECIP Purchases from Headquarters), meaning that the less the new subsidiary bought from its MNC, the faster it started production, a case where dependency had a negative impact. Interestingly, the inverse supply relationship did not present a significant correlation.

DV2 (Arrival of Machines to Full Capacity) was correlated ($p < .05$) with the same independent variables as DV1 (Arrival of Machines to First Shipment), but in this case, the correlations had the opposite direction. The negative correlation of DV2 with IV05 (RECIP Incoming Visit Intensity) indicates that once the first shipment had been made, the less personnel was sent by the setup unit, the slower the focal subsidiary's ramp-up progress. Of course, this relationship only makes sense if one assumes a reverse causality, where incoming visits were triggered by problems at the Mexican subsidiary. The negative correlation ($p < .05$) between DV2 and IV08 (RECIP Purchases from Headquarters) conformed to theory, as a secure supply from headquarters should help the subsidiary to ramp up its production quicker, compared to a higher dependency on outside suppliers.

DV3 (Arrival of Machines to Corporate-Level Productivity) had a negative correlation ($p < .05$) with both IV12 (RECIP Subsidiaries Abroad) and IV13

(Subsidiaries in Mexico). Due to variable transformation, these two variables are inverse coded, so the first correlation presents an anomaly while the second one supports the hypothesized learning effect that for firms with prior experience in Mexico.

Like DV2 (Arrival of Machines to Full Capacity), DV4 (First Shipment to Full Capacity) was also negatively correlated with IV05 (RECIP Incoming Visit Intensity, $p < .01$) and IV08 (RECIP Purchases from Headquarters, $p < .05$).

Similarly to DV3 (Arrival of Machines to Corporate-Level Productivity), DV5 (First Shipment to Corporate-Level Productivity) also had a negative correlation ($p < .01$) with IV13 (RECIP Subsidiaries in Mexico).

From the point of view of the independent variables, only IV02 (RECIP Intern Intensity), IV05 (RECIP Incoming Visit Intensity), IV08 (RECIP Purchases from Headquarters), IV12 (RECIP Subsidiaries Abroad), and IV13 (Subsidiaries in Mexico) had significant correlations with one or several versions of the dependent variable. All other independent variables were not significantly correlated with the dependent variables.

5.3.4 Correlations between Dependent Variables and Moderating Variables

The correlations between dependent and moderating variables were mostly non-significant and far from systematic.

DV2 (Arrival of Machines to Full Capacity) was positively correlated ($p < .05$) with MV2 (RECIP Supplier Diversity). Contrary to theory, the less different suppliers the subsidiary worked with, the longer it needed for this phase of the setup process.

DV3 (Arrival of Machines to Corporate-Level Productivity) and DV5 (First Shipment to Corporate-Level Productivity) were both negatively ($p < .05$) correlated

with MV6 (Teachability). These were two other instances where the complexity of the technology prolonged setup times, as predicted by theory.

5.3.5 Correlations among Control Variables

Some of the significant correlations among control variables were due to the fact that discrete phenomena were broken down into dummy variables. This was the case for the multiple significant correlations between the industry control variables CV01 (Auto Industry), CV02 (Metal Industry), and CV03 (Plastics Industry) on one hand and the regional control variables CV06 (Headquarters in the Americas or Australia), CV07 (Headquarters in East Asia), CV08 (Setup Unit in Mexico), CV09 (Setup Unit in the Americas or Australia), and CV10 (Setup Unit in East Asia) on the other hand.

For firms belonging to the Auto Industry (CV01), the Availability of Qualified Suppliers (CV14) was a major problem ($p < .01$).

The negative correlation ($p < .05$) between CV02 (Metal Industry) and CV05 (Number of Employees) shows that within the sample, the metal industry included the smallest firms on average.

The positive correlation ($p < .05$) between CV04 (Own Construction) and CV05 (Number of Employees) shows that the largest plants were built by the operators themselves, as typically, industrial parks offer only small to medium-size facilities. East Asian firms also tended to build more own plants than others, as evidenced by the positive correlation ($p < .05$) between CV04 (Own Construction) and CV07 (Headquarters in East Asia). The positive correlation between CV04 (Own Construction) and CV15 (Availability of Qualified Labor) could be interpreted as a warning for MNCs not to do it all by themselves: When not relying on a local

construction company, accessing the labor market can be difficult[35]. In contrast, industrial park operators offer package deals for foreign companies that include the facility plus accounting, HR, and other functions. Own Construction (CV04) was also negatively correlated ($p < .05$) with historical time (CV17), which shows that more and more foreign MNCs chose to establish themselves in industrial parks, where the park operators built the facilities for them.

As explained above, CV05 (Number of Employees) was negatively correlated with CV02 (Metal Industry) and CV04 (Own Construction). Furthermore, CV05 (number of Employees) had a positive correlation ($p < .05$) with CV21 (Interview Language), meaning that the largest subsidiaries tended to be run by foreign managers who preferred to speak English rather than Spanish.

CV06 (Setup Unit in the Americas or Australia) was negatively correlated ($p < .05$) with CV14 (Problems with Availability of Qualified Suppliers). This shows that firms from the New World had more opportunities to use their existing supplier network than had European or East Asian firms. CV06 (Setup Unit in the Americas or Australia) was also positively ($p < .01$) correlated with CV19 (Respondent is Mexican), as MNCs from the Americas and Australia tended to hire more local managers. Both correlations show the positive effects of a shorter physical distance and an increased network of contacts within NAFTA.

The correlation between CV07 (Headquarters in East Asia) and CV04 (Own Construction) has been explained above. In contrast to the MNCs from the Americas and Australia, CV07 (Headquarters in East Asia) was positively correlated ($p < .05$) with the difficulty of finding adequate suppliers (CV14). The Japanese and Korean

[35] Another interpretation would be a three-way interaction between CV04 (Own Construction), CV05 (Number of Employees), and CV15 (Availability of Qualified Labor), in the sense that the liability of foreignness would be especially taxing for large firms.

firms seemed to experience difficulties due to their isolation from their home-country keiretsus and chaebols.

CV08 (Setup Unit in Mexico) was not significantly correlated with any other control variable, maybe due to the small number of corresponding cases (5 out of 113, i.e., only 4.4%).

CV09 (Setup Unit in the Americas or Australia) was negatively correlated with three of the external control variables: CV13 (Problems with Local Regulations, $p < .01$), CV14 (Problems with the Availability of Qualified Suppliers, $p < .05$), and CV15 (Problems with the Availability of Qualified Labor, $p < .05$). Again, this seems to be the effect of relative proximity and increased familiarity through free-trade agreements. CV09 (Setup Unit in the Americas or Australia) was also positively correlated ($p < .01$) with CV19 (Respondent is Mexican), the same correlation that was found for CV06 (Headquarters in the Americas or Australia).

The negative correlation ($p < .05$) between CV10 (Setup Unit in East Asia) and CV16 (Problems with Cultural Differences) apparently contradicts culture-trait theory. In the interviews, however, Japanese managers showed a general reluctance to criticize the host country's culture, a tendency which is typical of a culture that prefers harmony over frankness.

The presence of Other Owners (CV11) was negatively correlated ($p < .05$) with the difficulties attributed to Local Authorities (CV12) and Local Regulations (CV13), which shows that dealing with the Mexican bureaucracy is a lesser problem if one of the partners is a local.

CV12 (Local Authorities) and CV13 (Local Regulations) were positively correlated ($p < .01$) among each other, which shows that the government's and the law's influence of MNC subsidiaries were perceived similarly.

In addition to the above correlation, CV13 (Problems with Local Regulations) was positively correlated ($p < .05$) with both CV14 (Problems with the Availability of Qualified Suppliers) and CV15 (Problems with the Availability of Qualified Labor). It seems that when foreign MNCs struggle with the conditions in Mexico, they do so on several levels – or not at all. In the same vein, CV13 (Problems with Local Regulations) was also negatively correlated ($p < .01$) with CV19 (Respondent is Mexican), as it is easier for Mexican managers to deal with their home country's legal framework and its implications.

The correlations between CV14 (Problems with the Availability of Qualified Suppliers) on one hand and CV01 (Auto Industry), CV06 (Headquarters in the Americas or Australia), CV07 (Headquarters in East Asia), and CV13 (Local Regulations) on the other hand have been explained above. Additionally, CV14 (Problems with the Availability of Qualified Suppliers) was positively correlated ($p < .05$) with CV15 (Problems with the Availability of Qualified Labor), which could be seen as two related indicators of the degree of sophistication of the Mexican market, on the firm level and on the worker level. CV14 (Problems with the Availability of Qualified Suppliers) was also negatively correlated ($p < .01$) with CV19 (Respondent is Mexican), indicating that Mexicans tended to have a better access to the local supplier network.

The correlations between CV15 (Problems with the Availability of Qualified Labor) on one hand and CV04 (Own Construction), CV09 (Setup Unit in the Americas or Australia), CV13 (Problems with Local Regulations), and CV14 (Problems with the Availability of Qualified Suppliers) on the other hand have been explained above. Additionally, CV15 (Problems with the Availability of Qualified Labor) was

negatively correlated ($p < .01$) with CV19 (Respondent is Mexican), as Mexican managers tended to know better how to use the local work force.

CV16 (Problems with Cultural Differences) was negatively correlated ($p < .05$) with CV10 (Setup Unit in East Asia), as explained above. CV16 (Problems with Cultural Differences) also had a positive correlation ($p < .01$) with CV19 (Respondent is Mexican), i.e., Mexican managers saw cultural differences as more critical than their foreign counterparts.

The negative correlation ($p < .05$) between CV17 (Month of First Shipment) and CV04 (Own Construction) was explained above.

CV18 (Respondent is GM) was positively correlated ($p < .05$) with CV19 (Respondent is Mexican). These two items were coded in opposite directions, so this correlation actually means that when the respondents were second-level managers, they tended to be Mexican nationals.

CV19 (Respondent is Mexican) was correlated to CV06 (Headquarters in the Americas or Australia), CV09 (Setup Unit in the Americas or Australia), CV13 (Local Regulations), CV14 (Qualified Suppliers), CV15 (Qualified Labor), CV16 (Cultural Differences), and CV18 (Respondent is GM), as explained above. Additionally, there is a rather obvious negative correlation ($p < .01$) between CV19 (Respondent is Mexican) and CV21 (Interview Language), in the sense that Mexican managers preferred to speak Spanish.

Unfortunately, the interviewer's identity (CV20) did have a significant positive correlation ($p < .01$) with the interviewee's perception of Cultural Differences (CV16). When the interviewers were Mexicans, respondents would emphasize these differences in comparison to being interviewed by a foreigner. This could be

interpreted as a social desirability bias, where respondents (mostly Mexicans) tried to downplay their perceived differences with the person they were talking to.

The interview language (CV21) had significant correlations with CV05 (Number of Employees) and CV19 (Respondent is Mexican), as explained above.

5.3.6 Correlations between Control Variables and Independent Variables

CV02 (Metal Industry) was negatively correlated ($p < .05$) with Shared Evaluation (IV10), maybe due to the slower introduction of modern management techniques in this traditional industry. CV02 (Metal Industry) was positively correlated ($p < .01$) with IV12 (RECIP Subsidiaries Abroad), showing that in this sample, MNCs belonging to the Metal Industry had more international experience than firms from other industries.

CV04 (Own Construction) was negatively correlated ($p < .05$) with IV12 (RECIP Subsidiaries Abroad). This means that firms with more foreign experience preferred to build the facilities themselves, instead of relying on an industrial park operator. CV04 (Own Construction) was also positively correlated ($p < .05$) with IV15 (GM's Seniority in MNC), meaning that when firms built their own facilities, they entrusted the setup task to a manager with a longer track record in the organization.

CV05 (Number of Employees) was negatively correlated ($p < .01$) with all communication intensity measures: IV01 (RECIP Expatriate Intensity), IV02 (RECIP Intern Intensity), IV05 (RECIP Incoming Visit Intensity), and IV06 (RECIP Outgoing Visit Intensity). Probably, these relationships were due to the fact that the intensity measures were calculated as ratios where CV05 (Number of Employees) was the denominator. CV05 (Number of Employees) was also positively correlated ($p < .05$) with IV03 (Phone Communication), which simply means that larger subsidiaries tended to have more intense phone communication with headquarters. CV05's

(Number of Employees) positive correlation ($p < .01$) with Interunit Trust (IV07) could be interpreted as an anomaly, because a smaller unit should allow for more intense personal contacts, which in turn would make it easier to build trust[36].

CV05 (Number of Employees) was also negatively correlated ($p < .01$) with the Substitution Dummy for Shared Evaluation (IV11). However, in the absence of a significant correlation between CV05 and IV10 (Shared Evaluation), this relationship appears to be spurious.

Both CV06 (Headquarters in the Americas or Australia) and CV09 (Setup Unit in the Americas or Australia) were negatively correlated ($p < .01$) with IV01 (RECIP Expatriate Intensity), which shows that American and Australian MNCs sent more home-country personnel to their Mexican subsidiaries, compared to European and East Asian MNCs. Both CV06 and CV09 were also positively correlated ($p < .01$ and $p < .05$, respectively) with IV12 (RECIP Subsidiaries Abroad), showing that the American and Australian firms in the sample had less FDI experience than their European or East Asian counterparts. The American and Australian MNCs' high expatriate intensity stood in contrast to the positive correlation ($p < .01$) between IV18 (GM is Mexican) and both CV06 and CV09.

CV07 (Headquarters in East Asia) and CV10 (Setup Unit in East Asia) were positively correlated ($p < .05$ and $p < .01$, respectively) with IV01 (RECIP Expatriate Intensity), which contradicts the established theory (cf. Bartlett, Ghoshal, & Beamish, 2008) that Japanese MNCs tend to get heavily involved in their subsidiaries' management. Additionally, CV10 (Setup Unit in East Asia) was negatively correlated

[36] Other studies that deal with the influence of trust on knowledge transfer (e.g., Li (2005); Szulanski, Cappetta, and Jensen (2004)) fail to include firm size as a control variable. The only empirical support found in the literature for the argumentation about an anomaly was Reagans and McEvily's (2003) finding that some of their models show a significant negative relationship between *network* size and ease of knowledge transfer. Unfortunately, they do not discuss this finding; so this aspect remains to be explored in further studies.

($p < .05$) with IV08 (RECIP Purchases from Headquarters, $p < .05$), which confirms the higher degree of vertical integration in East Asian MNCs. Both CV07 (Headquarters in East Asia) and CV10 (Setup Unit in East Asia) were negatively correlated with IV12 (RECIP Subsidiaries Abroad, $p < .05$), showing that those East Asian firms that came to Mexico already had other subsidiaries in different countries. The negative correlation between IV18 (GM is Mexican) and both CV07 and CV10 ($p < .01$ and $p < .05$, respectively) does support the established theory of East Asian MNCs' ethnocentricity and need for direct control of subsidiaries.

Rather obviously, CV08 (Setup Unit in Mexico) was positively correlated ($p < .01$) with IV13 (Subsidiaries in Mexico).

CV12 (Problems with Local Authorities) was negatively correlated ($p < .05$) with IV16 (GM's Setup Experience Anywhere). When general managers had worked in other countries, they tended to see the Mexican authorities as less of a problem to deal with.

CV13 (Problems Local Regulations) was negatively correlated ($p < .01$) with IV18 (GM is Mexican), showing that Mexican managers had less difficulties dealing with the local rules than their foreign counterparts.

CV14 (Problems with Availability of Qualified Suppliers) was positively correlated ($p < .05$) with IV14 (GM's Industry Experience), indicating that a greater knowledge of the industry led to higher expectations concerning supplier quality. In contrast, CV14 (Problems with Availability of Qualified Suppliers) was negatively correlated ($p < .05$) with IV18 (GM is Mexican), showing that Mexican managers had less difficulties finding adequate suppliers in Mexico.

CV15 (Problems with Availability of Qualified Labor) was negatively correlated ($p < .01$) with IV12 (RECIP Subsidiaries Abroad), which means that respondents saw

the conditions on the Mexican labor market in a more critical light when their MNCs had more foreign experience. The positive correlation ($p < .05$) between CV15 (Problems with Availability of Qualified Labor) and IV13 (Subsidiaries in Mexico) confirmed this assessment, the same as the positive correlation ($p < .05$) between CV15 (Problems with Availability of Qualified Labor) and IV15 (GM's Seniority in MNC). On the other hand, CV15 (Problems with Availability of Qualified Labor) was negatively correlated ($p < .05$) with the fact that the GM was a Mexican (IV18). Thus Mexican managers did not agree with their foreign colleagues in their appreciation of the Mexican labor market.

CV16 (Problems with Cultural Differences) was negatively correlated ($p < .01$) with IV03 (Phone Communication), as cultural differences and obstacles to communication are intimately related. Similarly, CV16 (Problems with Cultural Differences) was negatively correlated ($p < .01$) with IV07 (Interunit Trust), i.e., the Mexican subsidiaries tended to have a more trustful relationship with units that were perceived as culturally close. In the same vein, CV16 (Problems with Cultural Differences) was positively correlated ($p < .05$) with IV08 (RECIP Purchases from Headquarters), i.e., an intense working relationship made cross-cultural differences less salient. The positive correlation ($p < .05$) between CV16 (Problems with Cultural Differences) and IV18 (GM is Mexican) shows that Mexican GMs viewed intercultural distances as more critical than their foreign counterparts.

The control variable for historical time, CV17 (Month of First Shipment) was positively correlated with IV05 (RECIP Incoming Visit Intensity) ($p < .01$) and IV06 (RECIP Outgoing Visit Intensity) ($p < .05$). These correlations show the tendency to decrease face-to-face contacts between home and host country units. There was also a negative correlation ($p < .01$) between CV17 (Month of First Shipment) and IV15

(GM's Seniority in the MNC): Firms increasingly entrusted their subsidiaries to managers with shorter track records within their own companies. (The corresponding relationship with the GM's overall Industry Experience (IV14) was not significant).

CV18 (Respondent is GM) was negatively correlated ($p < .05$) with IV10 (Shared Evaluation), which is probably the effect of non-GM respondents not being subjected to a shared evaluation system. CV18 (Respondent is GM) was also positively correlated ($p < .01$) with IV16 (GM's Setup Experience Anywhere), and negatively correlated ($p < .01$) with IV17 (GM's Setup Experience in Mexico). The researcher always tried to interview the GM if he or she had been the same person as during the setup phase, so the above correlations seem to indicate that GMs that had previously established subsidiaries in other countries had a tendency to stay, while those who had only participated in setups within Mexico moved on to other jobs. In fact, the sample included several setup specialists who moved from MNC to MNC to set up new subsidiaries.

CV19 (Respondent is Mexican) was negatively correlated ($p < .05$) with IV01 (RECIP Expatriate Intensity), which is probably due to a three-way interaction with other factors. CV19 (Respondent is Mexican) was also negatively correlated ($p < .01$) with IV15 (GM's Seniority in MNC), which means that often MNCs hired Mexican managers specifically for the job of setting up a facility in Mexico. For these hirings, MNCs preferred managers with previous setup experience, as evidenced by the positive correlations ($p < .05$) between CV19 (Respondent is Mexican) on one hand and IV16 (GM's Setup Experience Anywhere) and IV17 (GM's Setup Experience in Mexico) on the other hand. The relationship between CV19 (Respondent is Mexican) and IV18 (GM is Mexican) was highly significant ($p < .01$), although not perfect (.71).

CV20 (Interviewer's Identity) was negatively correlated ($p < .05$) with IV01 (RECIP Expatriate Intensity) and also ($p < .01$) with IV15 (GM's Seniority in MNC). CV20 (Interviewer's Identity) was also positively correlated ($p < .05$) with IV16 (GM's Setup Experience Anywhere), IV17 (GM's Setup Experience in Mexico), and IV18 (GM is Mexican). These relationships show that the assistants interviewed a set of firms with other average characteristics, but the differences did not impact the results of the study.

CV21 (Interview Language) was negatively correlated ($p < .05$) with IV06 (RECIP Outgoing Visit Intensity), which lacks an adequate explanation. CV21 (Interview Language) was positively correlated ($p < .01$) with IV10 (Shared Evaluation), as English-speaking managers were also those who were tied into their MNC's shared evaluation systems. The positive correlation ($p < .05$) between CV21 (Interview Language) and IV15 (GM's Seniority in MNC) can be explained by the fact that English-speaking managers only took up an assignment in Mexico when they were deeply committed to their MNCs, while the typical Spanish-speaking managers from Mexico had less stable employment relationships. There was also an obvious negative correlation ($p < .01$) between the interview language (CV21) and the fact that the GM was Mexican (IV18), i.e., Mexicans preferred to use their own language.

5.3.7 Correlations between Control Variables and Moderating Variables

CV02 (Metal Industry) was negatively correlated ($p < .01$) with MV5 (Documentation Exists). As mentioned above, the metal industry in this sample seems to be using less advanced organizational mechanisms than other industries.

CV05 (Number of Employees) was positively correlated ($p < .01$) with MV1 (Product Diversity) and negatively correlated ($p < .05$) with MV2 (RECIP Supplier Diversity), which simply means that larger firms manufacture both more complex

products and a greater range of products. Similarly, CV05 (Number of Employees) was negatively correlated ($p < .05$) with MV6 (Teachability), another aspect of manufacturing complexity increasing with size.

CV10 (Setup Unit in East Asia) was negatively correlated ($p < .05$) with MV7 (Similar Manufacturing). East Asian MNCs had thus a tendency to bring to Mexico a different kind of manufacturing as in their home countries.

Both CV12 (Problems with Local Authorities) and CV16 (Problems with Cultural Differences) were negatively correlated ($p < .05$ and $p < .01$, respectively) with MV2 (RECIP Supplier Diversity). It seemed that problems with the local environment prevented MNCs from extending their supplier network.

CV19 (Respondent is Mexican) was positively correlated ($p < .01$) with MV6 (Teachability). Thus, teaching manufacturing skills to the locals seems to be an ability that highly depends on knowing the local language and mentality.

CV20 (Interviewer's Identity) was negatively correlated with MV2 (RECIP Supplier Diversity) ($p < .01$) and with MV4 (Proprietary Technology) ($p < .05$), while it was positively correlated ($p < .05$) with MV6 (Teachability). As above, these correlations seem to be spurious. MV4 (Proprietary Technology), for example, does not have a significant correlation with any other dependent or control variable.

CV21 (Interview Language) was negatively correlated ($p < .05$) with MV6 (Teachability), which confirms the above interpretations that managers who prefer to speak English see the transfer of manufacturing skills to worker as more difficult than those respondents who answered the questionnaire in Spanish.

5.3.8 Correlations among Independent Variables

IV01 (RECIP Expatriate Intensity) was negatively correlated ($p < .05$) with IV18 (GM is Mexican), probably due to an interaction with the MNC's home country, as

American and Australian firms did both have more expatriates and more Mexican managers (see above).

IV02 (RECIP Intern Intensity) was positively correlated with IV05 (RECIP Incoming Visit Intensity) ($p < .05$) and IV06 (RECIP Outgoing Visit Intensity) ($p < .01$), probably due to the fact that these variables were calculated using a common denominator. IV02 (RECIP Intern Intensity) was also negatively correlated ($p < .05$) with IV07 (Interunit Trust), which means that sending Mexican interns to the setup unit increased trust between units.

IV03 (Phone Communication) was positively correlated with IV04 (E-Mail Communication), which is rather obvious. This last variable was also positively correlated ($p < .05$) with IV07 (Interunit Trust), pointing to the importance of frequent communication for maintaining a trustful relationship.

In addition to the correlation with IV03 (Phone Communication), IV04 (E-Mail Communication) also had a positive correlation ($p < .05$) with IV15 (GM's Seniority in MNC), which means that a longer tenure with more intense personal contacts translates into more frequent communication.

There was also a positive correlation ($p < .01$) between IV05 (RECIP Incoming Visit Intensity) and IV06 (RECIP Outgoing Visit Intensity), pointing to the fact that face-to-face contacts worked in both directions. The positive correlation ($p < .05$) between IV05 (RECIP Incoming Visit Intensity) and IV14 (GM's Industry Experience) could be explained by the setup unit's perceived lesser need to check on more seasoned subsidiary managers.

In addition to its correlation with IV02 and IV05 (see the preceding paragraph), IV06 (RECIP Outgoing Visit Intensity) was positively correlated ($p < .05$) with IV18

(GM is Mexican), i.e., Mexican GMs tended to visit foreign setup units less often than their foreign counterparts.

IV07 (Interunit Trust) was negatively correlated ($p < .05$) with IV02 (RECIP Intern Intensity) and positively correlated ($p < .05$) with IV04 (E-mail Communication), as explained above.

IV08 (Purchases from Headquarters) was not significantly correlated with any other independent variable.

There was a negative correlation ($p < .05$) between IV09 (RECIP Sales to Headquarters) and IV10 (Shared Evaluation). Thus firms tended to incentivate collaboration between managers when their units were interdependent.

As could be expected, IV12 (RECIP Subsidiaries Abroad) and IV13 (Subsidiaries in Mexico) had a significant negative correlation ($p < .01$).

Besides its obvious correlation with IV12 (RECIP Subsidiaries Abroad), IV13 (Subsidiaries in Mexico) was also positively correlated ($p < .01$) with IV15 (GM's Seniority in MNC). Thus, general managers stayed longer in MNCs that already had other subsidiaries in Mexico.

IV14 (GM's Industry Experience) was negatively correlated ($p < .05$) with IV05 (RECIP Incoming Visit Intensity), as explained above. There was also a rather obvious positive correlation ($p < .01$) between IV14 (GM's Industry Experience) and IV15 (GM's Seniority in MNC).

As described above, IV15 (GM's Seniority in MNC) was positively correlated with IV04 (E-Mail Communication), IV13 (Subsidiaries in Mexico), and IV14 (GM's Industry Experience). Additionally, IV15 (GM's Seniority in MNC) was negatively correlated ($p < .01$) with IV16 (GM's Setup Experience Anywhere), and IV17 (GM's Setup Experience in Mexico). In other words, the setup specialists were not those

managers that had stayed the longest with their current employers. The negative correlation ($p < .01$) between IV15 (GM's Seniority in MNC) and IV18 (GM is Mexican) shows that foreign managers tended to stay in their MNCs for longer periods than Mexicans.

The correlation between IV16 (GM's Setup Experience Anywhere), and IV17 (GM's Setup Experience in Mexico) was positive ($p < .01$), as expected. Additionally, IV17 GM's Setup Experience in Mexico) was positively correlated ($p < .05$) with IV18 (GM is Mexican), i.e., Mexican managers specialized in setting up subsidiaries in their own country.

5.3.9 Correlations between Independent Variables and Moderating Variables

The posited moderation effects would call for a high correlation between independent and moderating variables. The data, however, show that these relationships were not consistent at all.

At first, IV01's (RECIP Expatriate Intensity) negative correlation ($p < .01$) with MV1 (Product Diversity) shows that a higher degree of complexity was related with higher numbers of MNC specialists to help with the setup process. In contrast, IV01's (RECIP Expatriate Intensity) negative correlation ($p < .01$) with MV6 (Teachability) does not correspond to theory, unless one assumes an inverse causality, where an easily taught technology does not require many expatriates.

IV03 (Phone Communication) had a positive correlation ($p < .05$) with MV2 (RECIP Supplier Diversity). Maybe the MNC was less important for those focal subsidiaries that had to deal with a large supplier network. The positive correlation ($p < .05$) between IV04 (E-mail Communication) and MV3 (Age of Technology) does not have an evident explanation; in fact, it might be spurious, as MV3 (Age of Technology) was not significantly correlated to any other variable. Both IV03 (Phone

Communication) and IV04 (E-Mail Communication) had a positive correlation ($p <$ .05 and $p < .01$, respectively) with MV7 (Similar Manufacturing), which could be interpreted as the subsidiary looking for technical assistance when the setup unit was working with a similar technology.

IV08 (RECIP Purchases from Headquarters) was negatively correlated ($p < .05$) with MV2 (RECIP Supplier Diversity). When headquarters supplied the main ingredients for manufacturing in Mexico, other suppliers became less important.

IV11 (Substitution Dummy for Shared Evaluation) was negatively correlated ($p <$ .05) with MV5 (Documentation Exists). However, in the absence of a significant correlation with IV10 (Shared Evaluation), this correlation appears to be spurious.

IV13 (Subsidiaries in Mexico) was positively correlated ($p < .05$) with MV7 (Similar Manufacturing). When MNCs had several subsidiaries in the country, manufacturing activities tended to be alike.

IV16 (GM's Setup Experience Anywhere) was positively correlated ($p < .05$) with MV4 (Proprietary Technology), which indicates that firms that used their own technology in different subsidiaries tended to employ the same setup experts in several FDI projects.

IV17 (GM's Setup Experience in Mexico) was negatively correlated ($p < .05$) with MV2 (RECIP Supplier Diversity). More experienced managers dealt with more diversified supplier networks.

IV18 (GM is Mexican) was positively correlated ($p < .01$) with MV6 (Teachability), confirming the fact that teaching a technology depends on knowing the learners' culture and language.

5.3.10 Correlations among Moderating Variables

A high degree of correlation among the two subsets of moderating variables (Complexity of Technology and Interunit Similarity) would have provided a convincing rationale for bundling the different items. Unfortunately, the data showed a high degree of heterogeneity with uneven degrees of significant correlations.

MV1 (Product Diversity) was positively correlated ($p < .05$) with MV2 (RECIP Supplier Diversity), which at the very least shows that the two concepts, although similar, were not related in practice. The negative correlation ($p < .05$) between MV3 (Age of Technology) and MV6 (Teachability) corresponds to theory: Older technologies are easier to teach.

Besides the above correlation, MV3 (Age of Technology) was also negatively correlated ($p < .05$) with MV4 (Proprietary Technology), which points to MNCs' tendency to keep working with their home-grown technologies.

There were no other significant correlations among the moderating variables.

TABLE 5
Means, Standard Deviations, and Correlations for Full Set of Variables (without Interaction Terms)

	Mean	S.D.	DV0	DV1	DV2	DV3	DV4	DV5	CV01	CV02	CV03	CV04	CV05	CV06	CV07	CV08	CV09	CV10	CV11	CV12	CV13	CV14	CV15	CV16	CV17	CV18	CV19	CV20	CV21
DV0 Constr. - 1st Shipm.	3.07	.95																											
DV1 Mach. – 1st Shipm.	.54	.32	.63**																										
DV2 Mach. - Full Cap.	1.19	.40	.15	-.01																									
DV3 Mach. - Productiv.	1.30	.45	.31*	.18	.40**																								
DV4 1st Shipm - Full Cap.	1.04	.56	.00	-.26*	.92**	.35**																							
DV5 1st Shipm. - Prod.	1.22	.52	.15	-.03	.42**	.95**	.46**																						
CV01 Auto Industry	.15	.36	.06	.04	.03	.14	-.03	.13																					
CV02 Metal Industry	.25	.43	.06	-.01	.03	-.07	.08	-.01	-.24**																				
CV03 Plastics Industry	.12	.33	.13	-.05	-.05	-.18	.01	-.13	-.16	-.22*																			
CV04 Own Construction	.56	.50	1[a]	-.04	-.05	.20	-.04	.21	.03	.06	-.15																		
CV05 No. of Employees	2.00	.47	-.17	-.09	.16	.27*	.15	.26*	.09	-.22*	-.18	.23*																	
CV06 HQ in Americas	.74	.44	.05	.01	.20*	-.17	.13	-.14	-.15	.01	.04	-.16	.09																
CV07 HQ in East Asia	.12	.32	.04	.01	-.12	.17	-.11	.15	.08	-.08	.03	.21*	.10	-.55**															
CV08 Setup Unit in Mex.	.04	.21	.09	.07	-.10	.01	.04	-.17	.03	-.12	-.08	.02	.01	.03	-.08														
CV09 Setup Unit in Amer.	.81	.39	.03	-.07	.12	-.12	.17	-.08	-.18	.06	.04	-.15	.04	.71**	-.33**	.10													
CV10 Setup Unit in Asia	.08	.27	.06	-.06	.01	.15	.02	.13	.06	-.02	-.01	.13	.05	-.50**	.82**	-.06	-.45**												
CV11 Other Owners	.07	.26	.13	.02	-.09	-.06	-.04	.00	.17	-.08	.00	.04	.11	.08	.01	-.06	.04	-.08											
CV12 Local Authorities	1.28	.24	-.08	.03	.03	.01	.11	.07	-.12	-.05	.12	-.05	-.17	.04	-.01	-.03	.09	-.07	-.20*										
CV13 Local Regulations	1.35	.29	-.06	.08	.02	.12	-.07	.07	.11	-.09	.06	.18	-.05	-.12	.14	.03	-.25**	.11	-.23*	.35**									
CV14 Qualified Suppliers	1.32	.29	-.05	.11	-.06	.22*	-.10	.18	.25**	-.15	-.08	.12	.18	-.21*	.19*	.01	-.22*	.15	.02	.03	.23*								
CV15 Qualified Labor	1.16	.28	.07	.11	-.08	.27*	-.14	.16	.04	-.18	-.07	.20*	.11	-.15	.11	.17	-.23*	.06	-.05	.14	.20*	.32**							
CV16 Cultural Differences	1.29	.23	-.03	-.06	.04	-.26*	.13	-.19	.02	-.11	.08	-.05	-.18	.13	-.17	.04	.13	-.20*	.18	.14	-.12	-.12	-.16						
CV17 Month of 1st Shipm.	63.94	31.93	-.01	.11	-.08	-.25*	-.14	-.27*	-.09	.09	.17	-.22*	-.15	-.03	-.03	-.08	-.02	-.03	-.13	.04	.17	-.04	.09	-.06					
CV18 Respondent is GM	.27	.44	.06	.08	.02	.07	.01	.00	-.14	.12	-.10	.01	.11	.08	.10	.07	.08	.05	-.09	-.06	-.07	.00	-.06	.05	-.12				
CV19 Resp. is Mexican	.70	.46	.09	-.07	.10	-.30**	.12	-.26*	-.05	.15	.01	-.08	-.18	.28**	-.13	-.05	.28**	-.16	.03	-.10	-.37**	-.29**	-.36**	.29**	-.06	.22*			
CV20 Interviewer's ID	.10	.30	.07	.01	.09	-.04	.12	.03	-.06	.02	-.12	.17	-.13	.06	-.12	-.07	.00	-.10	.14	.05	-.04	-.07	-.05	.30**	-.18	-.06	.09		
CV21 Interview Language	.12	.33	-.12	.07	.01	.04	-.07	.00	-.16	-.15	.02	.07	.20*	-.03	-.05	-.08	-.03	-.01	.00	.10	.19	.15	.08	-.05	.12	-.17	-.52**	.06	

(*) $p < .05$
(**) $p < .01$
(a) The correlation is one because CV04 is the control variable for Own Construction, i.e., whether there is a DV0 (Construction to First Shipment) or not for the case.

TABLE 5 (continued)
Means, Standard Deviations, and Correlations for Full Set of Variables (without Interaction Terms)

	Mean	S.D.	DV0	DV1	DV2	DV3	DV4	DV5	CV01	CV02	CV03	CV04	CV05	CV06	CV07	CV08	CV09	CV10	CV11	CV12	CV13	CV14	CV15	CV16	CV17	CV18	CV19	CV20	CV21
IV01 RECIP Expat Int.	.17	.19	.11	.15	-.15	.11	-.17	.07	.04	-.07	-.06	.07	-.28**	-.37**	.21*	-.04	-.37**	.27**	.03	.01	.05	-.01	.12	-.04	.00	-.01	-.21*	.02	.02
IV02 RECIP Intern Int.	.19	.18	.29*	.16	-.04	-.09	-.17	-.09	.05	.16	-.12	-.07	-.24*	-.06	-.12	.03	-.13	-.07	-.01	-.18	-.02	.03	-.04	.01	.05	.06	.07	.02	-.12
IV03 Phone Comm.	.84	.37	.00	.01	.16	.19	.16	.16	.12	-.09	-.06	-.14	.28**	.08	-.15	.09	.17	-.14	-.07	-.09	-.09	.10	-.03	-.28**	.01	.04	-.08	-.35**	.02
IV04 E-mail Comm.	.88	.32	.04	.05	-.01	-.02	.02	-.03	.07	.01	-.03	-.04	.17	.04	-.04	.08	.04	-.10	-.01	.10	.03	-.01	.02	-.03	.06	.15	-.06	-.26**	.05
IV05 RECIP Incom. Visits	.18	.18	.09	.25**	-.21*	-.12	-.28**	-.18	-.09	.04	.08	-.17	-.45**	-.02	-.09	.06	.10	-.08	-.08	.12	.04	-.04	-.06	-.05	.26**	-.11	.02	-.23*	.03
IV06 RECIP Outg. Visits	.21	.19	.11	.12	-.15	-.14	-.16	-.19	.04	.04	.04	-.12	-.41**	-.07	-.06	.06	-.04	-.05	.01	-.05	.02	-.14	-.09	-.02	.23*	-.11	.11	-.14	-.19*
IV07 Interunit Trust	1.77	1.00	-.07	.02	-.05	.04	-.08	.01	.06	.02	.02	.11	.27**	.11	.11	-.04	.15	-.01	-.02	.11	.00	.08	-.06	-.26**	-.04	.00	.03	-.09	.06
IV08 RECIP Purch. fr. HQ	.42	.46	-.12	.19*	-.21*	-.17	-.21*	-.19	-.02	-.10	.02	-.07	-.12	.10	-.08	.00	.18	-.19*	-.05	.00	-.11	.13	-.03	.24*	-.08	.15	.05	-.02	-.01
IV09 RECIP Sales to HQ	.63	.46	-.09	.03	-.12	.00	-.13	.01	.03	.01	.02	-.07	-.15	-.02	.03	.01	-.02	.07	.16	.01	.02	.03	.02	-.07	.00	.07	-.09	-.11	-.04
IV10 Shared Evaluation	16.44	28.59	-.06	.08	.10	.03	.01	-.01	.10	-.20*	-.03	.06	.18	.06	-.04	-.11	-.05	-.02	-.04	-.03	.07	.06	.03	.06	-.03	-.21*	-.13	.14	.3**
IV11 Subst. Dummy S. E.	.09	.29	-.01	-.05	-.05	-.12	-.08	-.08	.04	.18	-.12	.09	-.26**	-.10	.08	-.07	-.09	.02	-.09	-.09	.03	.07	.03	-.12	.02	.10	.07	.11	-.12
IV12 RECIP Subs. Abroad	.70	.37	-.04	-.05	-.05	-.24*	-.04	-.16	-.12	.30**	-.07	-.20*	-.11	.26**	-.13	-.08	.26**	-.20*	-.02	.02	-.05	-.09	-.30**	-.05	.06	.03	.19*	.10	-.05
IV13 Subsidiaries Mexico	.13	.34	-.14	-.05	-.07	-.23*	-.01	-.31**	-.02	-.04	-.15	.09	.05	.05	-.06	.30**	.12	-.02	-.11	-.06	-.09	.05	.20*	.16	-.12	.12	.03	-.13	-.07
IV14 GM's Ind. Experien.	3.85	1.15	-.07	.06	-.05	.01	-.07	-.02	.10	.05	-.09	.16	.17	.01	-.09	.05	-.10	-.06	-.03	.00	.09	.20*	.07	.16	-.12	.10	-.05	.11	.12
IV15 GM' Seniority	2.62	1.10	-.17	.05	-.08	.18	-.04	.18	.07	.01	-.14	.23*	.15	-.03	.03	.17	-.12	.07	.11	.06	.18	.17	.21*	.08	-.27**	.06	-.36**	.02	.30**
IV16 GM's Setup Any.	.68	.47	-.03	.14	-.05	.08	-.05	-.02	.02	.00	.03	-.07	.10	-.05	-.05	.06	.02	-.08	-.03	-.21*	-.05	-.01	-.16	-.12	.11	.41**	.21*	-.10	-.15
IV17 GM's Setup in Mex.	.35	.48	-.02	.05	-.08	-.09	-.03	-.10	.11	-.07	.07	-.03	-.02	-.09	-.03	.03	.01	-.01	.02	-.14	-.04	.02	-.13	-.11	.09	-.35**	.19*	-.05	-.16
IV18 GM is Mexican	.64	.483	.15	-.06	.12	-.19	.13	-.15	-.04	.18	-.05	-.12	-.15	.32**	-.25**	-.02	.26**	-.19*	.07	-.02	-.36**	-.22*	-.22*	.22*	-.13	-.01	.71**	.19*	-.44**
MV1 Product Diversity	1.02	.72	-.24	-.03	.09	.11	.10	.12	.02	-.06	-.06	.00	.34**	.15	-.03	-.02	.10	-.04	.08	-.08	-.11	.05	-.10	.01	-.15	.14	-.05	-.09	.17
MV2 RECIP Suppl. Div.	.60	.19	-.18	-.13	.21*	.03	.15	-.08	.09	.02	-.06	.06	.19*	.02	-.04	.13	.00	-.01	-.02	-.22*	-.09	-.05	.02	-.28**	.03	.07	-.05	-.32**	-.02
MV3 Age of Tech.	.57	.62	.06	.12	-.05	-.14	-.09	-.13	-.06	.00	.03	.08	-.15	-.01	.07	-.11	-.05	.09	-.13	.00	.10	-.10	-.03	.01	.08	-.18	-.01	-.01	.04
MV4 Proprietary Tech.	.61	.54	-.22	-.06	.03	.08	.03	.09	.07	-.16	-.03	-.15	.15	-.01	-.05	.00	-.05	-.09	-.06	.00	.01	-.06	-.08	-.07	.16	.03	-.01	-.21*	.07
MV5 Documentation	.77	.15	-.08	.02	.03	.07	.01	.02	.14	-.30**	.14	.12	.12	.00	-.08	.08	.05	-.13	-.01	.04	.16	.04	-.06	.11	-.05	.11	-.03	-.17	.04
MV6 Teachability	.71	.32	-.02	-.12	-.07	-.27*	-.09	-.23*	.03	-.05	.15	-.13	-.19*	.10	-.05	.03	.09	-.10	-.01	-.01	-.08	-.08	-.09	.06	-.02	.18	.30**	.20*	-.22*
MV7 Similar Mfg.	.84	.27	.01	.01	.13	.15	.13	.14	-.04	.12	-.07	-.06	.13	.12	-.16	.01	.09	-.21*	.10	-.10	-.02	-.14	-.01	.09	-.06	.10	-.10	-.18	.00
MV8 Similar Org.	.63	.31	-.02	-.02	.00	.00	.02	-.03	-.01	-.05	.00	-.05	-.04	.02	-.04	.05	-.03	-.02	.06	.09	.09	.01	.18	-.01	.16	.00	-.17	-.02	.01

(*) $p < .05$
(**) $p < .01$

TABLE 5 (continued)
Means, Standard Deviations, and Correlations for Full Set of Variables (without Interaction Terms)

	Mean	S.D.	IV01	IV02	IV03	IV04	IV05	IV06	IV07	IV08	IV09	IV10	IV11	IV12	IV13	IV14	IV15	IV16	IV17	IV18	MV1	MV2	MV3	MV4	MV5	MV6	MV7
IV01 Expatriate Int.	.17	.19																									
IV02 Intern Intens.	.19	.18	-.03																								
IV03 Phone Comm.	.84	.37	-.12	.08																							
IV04 E-mail Comm.	.88	.32	-.15	.12	.45**																						
IV05 Incom. Visits	.18	.18	.14	.22*	.13	.17																					
IV06 Outg. Visits	.21	.19	.14	.46**	.03	.04	.55**																				
IV07 Interunit Trust	1.77	1.00	-.06	-.23*	.11	.19*	.07	-.09																			
IV08 Purch. fr. HQ	.42	.46	-.06	-.01	-.02	-.06	.07	.01	.00																		
IV09 Sales to HQ	.63	.46	.09	-.06	-.07	-.09	.18	.06	.05	.15																	
IV10 Shared Evaluation	16.44	28.59	-.03	.02	.02	.03	.03	.14	.01	-.06	-.22*																
IV11 Sub. Dummy S.E.	.09	.29	.17	.06	-.12	-.08	.00	-.07	-.02	-.06	.05	-.18															
IV12 Subsid. Abroad	.70	.37	-.16	-.05	-.14	-.05	.01	.02	.06	.04	-.01	-.15	.15														
IV13 Subsid. Mexico	.13	.34	-.05	.06	.10	.14	.02	-.06	-.09	.08	-.01	-.01	-.12	-.47**													
IV14 GM's Ind. Exp.	3.85	1.15	-.07	.09	.10	.17	-.20*	-.03	-.09	.12	.05	-.01	-.07	-.01	.11												
IV15 GM' Seniority	2.62	1.10	.14	-.10	.06	.19*	-.15	-.18	-.17	.00	.09	-.06	-.03	-.16	.19*	.43**											
IV16 GM's Exp. Any.	.68	.47	-.11	.12	.17	.05	.05	.10	.12	.11	-.01	-.06	-.12	-.11	-.01	.05	-.31**										
IV17 GM's Exp. Mex.	.35	.48	-.14	.03	.06	-.15	.11	.16	.06	-.07	-.09	.09	-.16	-.07	-.07	-.03	-.41**	.50**									
IV18 GM is Mexican	.64	.483	-.23*	.20	.02	-.10	.05	.20*	-.04	-.04	-.18	.03	-.09	.14	.02	.00	-.31**	.04	.20*								
MV1 Product Diversity	1.02	.72	-.36**	.05	.14	.05	-.14	-.11	.12	-.01	.00	.09	-.13	.06	.03	-.02	.03	.04	-.04	-.02							
MV2 RECIP Suppl. Div.	.60	.19	.06	.05	.20*	.16	.01	.11	.06	-.20*	.00	-.07	.02	.01	.12	-.08	.07	-.07	-.19*	-.06	.20*						
MV3 Age of Tech.	.57	.62	.16	.00	.11	.19*	.17	.01	.04	.09	.04	.12	.11	-.06	-.05	.05	.06	-.07	.07	-.02	-.09	-.02					
MV4 Proprietary Tech.	.61	.54	.08	-.07	.04	.05	.06	.05	-.03	-.11	.02	-.03	-.06	-.08	-.06	-.11	-.10	.11	.01	-.17	.09	.16	-.20*				
MV5 Documentation	.77	.15	-.07	.13	.13	.12	.15	.08	.05	.15	-.07	.08	-.24*	-.05	.01	.04	-.02	.20*	.11	-.09	.16	.12	-.12	.10			
MV6 Teachability	.71	.32	-.25**	.09	-.12	-.06	-.02	.00	-.10	-.03	.02	-.07	.14	.08	.08	-.10	-.17	.04	.01	.27**	.15	-.06	-.20*	-.06	.05		
MV7 Similar Mfg.	.84	.27	-.05	.05	.21*	.33**	-.05	-.06	-.11	-.08	.04	.06	-.10	-.15	.23*	.03	.18	.04	-.14	-.08	.06	.13	.08	-.04	-.04	-.05	
MV8 Similar Org.	.63	.31	.08	.07	.02	.11	.18	.09	-.12	.01	.02	.05	.11	-.14	.07	-.08	.06	.02	-.14	-.09	-.13	.09	.16	-.05	-.15	.04	.14

(*) $p < .05$
(**) $p < .01$

5.4 Dimension Reduction for Regression Analyses

The full set of variables that theoretically could be included in the different regression models consists of the following subsets:

- 1 intercept
- 21 control variables
- 18 independent variables
- 8 moderating variables
- 8 x 17 = 144 interaction terms between independent and moderating variables

The total of 192 variables exceeds the number of cases (n = 113), which is still lower for some versions of the dependent variables. This situation clearly violates the rules for the standard-type multivariate regression analysis. To deal with this problem, correlation analysis was used for selecting those predictor variables that had a significant relationship with either the moderating or the dependent variables, trying to avoid multicollinearity between related variables. Figure 8 shows the reduced set of variables.

5.4.1 Reducing the Number of Control Variables

Industry is one of the standard control variables used in strategy research. From the original set of control variables, CV02 (Metal Industry) was retained because of its correlation with IV10 (Shared Evaluation, $p < .05$), IV12 (Subsidiaries Abroad, $p < .01$), and MV5 (Documentation Exists, $p < .01$). The other two control variables for industry (Auto Industry (CV01) and Plastics Industry (CV03)) did not have any significant correlations with any independent or control variables and were left out.

From a theoretical standpoint, it was not clear whether CV04 (Own Construction) would have an impact on the setup process beyond the construction phase. Moreover, CV04 was significantly correlated to two other control variables (CV05, CV17) to be

retained, so it was eliminated it from the list of control variables in order to avoid multicollinearity in the regression analysis.

Another standard control variable in strategy research is size. In fact, CV05 (Number of Employees), was significantly correlated with several dependent, independent, and moderating variables, so it was retained.

The theory of the MNC would justify controlling for the home country of the MNC. The pertaining variables (CV06, CV07, CV09, and CV10) were significantly correlated among each other. To avoid multicollinearity, CV06 (Headquarters in the Americas or Australia) was chosen, because it was the only one to have a significant correlation with any of the dependent variables.

CV08 (Setup Unit in Mexico) only had a significant correlation with IV 13 (Subsidiaries in Mexico), a relationship that does not add any explanation but could result in multicollinearity. Consequently, CV08 was omitted.

CV11 (Other Owners) did not show any significant correlations with dependent variables, independent variables, or moderating variables, so it was not used for the regression analysis.

Two conceptually close control variables were CV12 (Influence of Local Authorities) and CV13 (Influence of Local Regulations), which were very highly correlated ($p < .01$) among each other. CV12 (Influence of Local Authorities) was also significantly correlated with IV16 (GM's Setup Experience Anywhere) and MV2 (Supplier Diversity), while CV13 (Influence of Local Regulations) was significantly correlated with IV18 (GM Is Mexican). Only CV13 (Influence of Local Regulations) was retained in order to avoid multicollinearity in the regression.

Similarly, CV14 (Availability of Qualified Suppliers) and CV15 (Availability of Qualified Labor) were both conceptually related and statistically correlated among

each other ($p < .05$). In order to avoid multicollinearity, the variable selected was CV14 (Availability of Qualified Suppliers), which was significantly correlated with only one dependent variable and two independent variables.

CV16 (Influence of Cultural Differences), CV17 (Month of First Shipment), and CV18 (Respondent is GM) all had significant correlations with at least one version of the dependent variable, while they were not significantly correlated among each other. Therefore, all three variables were retained for the regression analysis.

CV19 (Respondent Is Mexican) was eliminated because of its high degree of correlation with IV 18 (GM is Mexican).

As explained above, the statistically significant correlations between CV20 (Interviewer's Identity) and CV21 (Interview Language) and several independent and moderating variables were either spurious or not interesting, so these variables were eliminated from the regression analysis.

As a result, the following eight control variables were used for the regression analyses: CV02 (Metal Industry), CV05 (Number of Employees), CV06 (Headquarters in the Americas or Australia), CV13 (Influence of Local Regulations), CV14 (Availability of Qualified Suppliers), CV16 (Influence of Cultural Differences), C17 (Month of First Shipment), and CV18 (Respondent Is General Manager).

5.4.2 Reducing the Number of Independent Variables

The independent variables represented the five main hypotheses: Interunit Communication, Interunit Trust, Interdependence between Units, the MNC's Experience, and the GM's Experience.

Among the variables representing Interunit Communication, only IV02 (RECIP Intern Intensity) and IV05 (RECIP Incoming Visit Intensity) had significant correlations with the dependent variables. IV01 (RECIP Expatriate Intensity), IV03

(Phone Communication), and IV04 (E-mail Communication) were significantly correlated with two moderating variables each. Only IV06 (RECIP Outgoing Visit Intensity) was not significantly correlated with any dependent or moderating variables, so it was eliminated. Among the remaining five Interunit Communication variables, the significant correlations between IV02 (RECIP Intern Intensity) on one hand and IV05 (RECIP Incoming Visit Intensity), IV06 (RECIP Outgoing Visit Intensity), and IV07 (Interunit Trust) on the other hand could have created a problem with multicollinearity, so IV02 (Intern Intensity) was omitted. Similarly, the significant correlation ($p < .01$) between IV03 (Phone Communication) and IV04 (E-mail Communication) could have caused multicollinearity, so IV04 (E-mail Communication) was dropped because one of the moderating variables it was significantly correlated with was not retained. This procedure left three variables representing Interunit Communication: IV01 (RECIP Expatriate Intensity), IV03 (Phone Communication), and IV05 (RECIP Incoming Visit Intensity).

IV07 was the only variable representing the construct of Interunit Trust, so it was retained.

Four variables represented the construct of Interdependence between Units: IV08 (RECIP Purchases from Headquarters), IV09 (RECIP Sales to Headquarters), IV10 (Shared Evaluation), and IV11 (Substitution Dummy for Shared Evaluation). Only IV08 (RECIP Purchases from Headquarters) was significantly correlated with both dependent and moderating variables, so it was retained. IV09 (RECIP Sales to Headquarters) did not show such significant correlations, so it was dropped, too. As IV10 (Shared Evaluation) and IV11 (Substitution Dummy for Shared Evaluation) did not have any significant correlations with any dependent or moderating variables

either, so both were eliminated. Thus the Interdependence construct was represented by IV08 (RECIP Purchases from Headquarters) only.

The two variables representing the MNC's Setup Experience were IV12 (RECIP Subsidiaries Abroad) and IV13 (Subsidiaries in Mexico). IV12 was significantly correlated to one dependent variable, while IV13 was significantly correlated to two dependent variables and one moderating variable. Furthermore, IV12 and IV13 were significantly correlated among each other. For simplification and for avoiding multicollinearity, IV12 (RECIP Subsidiaries Abroad) was dropped, leaving IV13 (Subsidiaries in Mexico) as the sole indicator of the MNC's Setup Experience.

Five variables represented the GM's Experience: IV14 (GM's Industry Experience), IV15 (GM's Seniority in the MNC), IV16 (GM's Setup Experience Anywhere), IV17 (GM's Setup Experience in Mexico), and IV18 (GM Is Mexican). None of the five was significantly correlated with any dependent variable, which led to the elimination of IV14 and IV15. However, IV16, IV17, and IV18 were each significantly correlated with one of the moderating variables. As IV17 (GM's Setup Experience in Mexico) was also significantly correlated with both IV16 (GM's Setup Experience Anywhere) and IV18 (GM Is Mexican), IV17 was dropped to avoid multicollinearity. Thus, the selection process retained IV16 (GM's Setup Experience Anywhere) and IV18 (GM Is Mexican) as variables representing the GM's Experience.

5.4.3 Reducing the Number of Moderating Variables

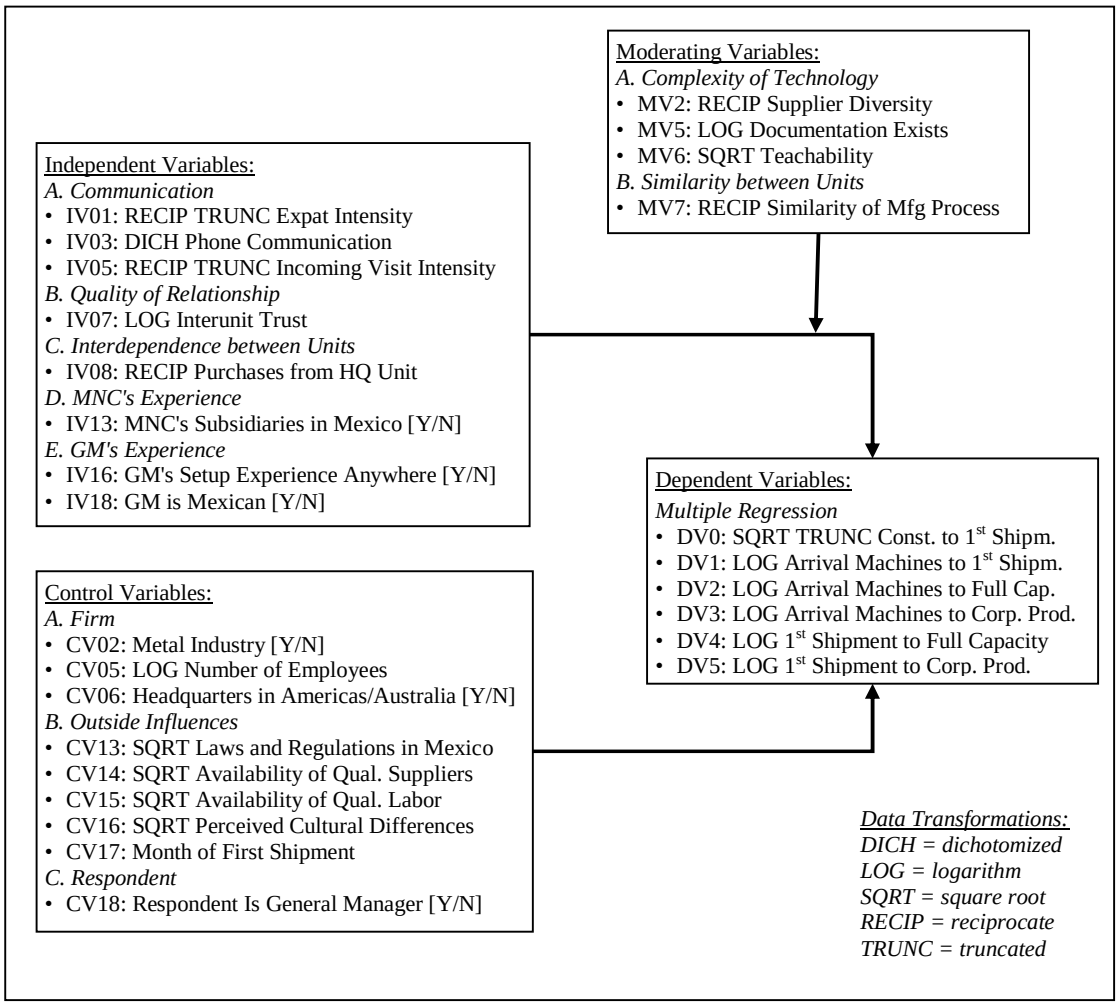
The eight moderating variables included in the survey represented two theoretical constructs: Complexity of Technology and Interunit Similarity.

From the first group, three moderating variables were retaining for presenting a significant correlation with at least one version of the dependent variable: MV2

(Supplier Diversity), MV5 (Documentation Exists), and MV6 (Teachability). The other moderating variables that represented other aspects of Complexity of Technology were omitted in the regression analyses.

Using the same criterion, it would not have been possible to test the hypotheses concerning the moderating effect of Interunit Similarity, because neither MV7 (Similar Manufacturing) nor MV8 (Similar Organization) was significantly correlated with any version of the dependent variable. However, MV7 (Similar Manufacturing) was significantly correlated with two independent variables, while MV8 (Similar Organization) had no significant correlation with any independent variable. Consequently, MV7 (Similar Manufacturing) was included in the regression analysis while MV8 (Similar Organization) was left out.

FIGURE 8
Reduced Set of Variables with Transformations and Numbering



5.5 Regression Analyses

The following sections contain the results of the regression analyses based on the reduced sets of control variables, independent variables, and moderating variables. The different models were run similarly to hierarchical regression analysis, in the following order (cf. Table 6):

- Model 01: Control variables only
- Model 02: Control variables and independent variables
- Models 03 to 06: Control variables, independent variables, and one moderation[37]
- Models 07 to 12: Control variables, independent variables, and two moderations
- Models 13 to 16: Control variables, independent variables, and three moderations
- Model 17: Control, variables, independent variables, and four moderations
- Models 18 to 21: Control variables and one moderation (without independent variables)
- Models 22 to 27: Control variables and two moderations (without independent variables)
- Models 28 to 31: Control variables and three moderations (without independent variables)
- Model 32: Control variables and four moderations (without independent variables)

The objective of this procedure was to identify the most significant model or models for each dependent variable. As a first step in the selection process, multiple regressions were run for all models ignoring possible problems with multivariate outliers, heteroskedasticity and multicollinearity just to see if they could be significant, using Prob(F) < .10 as selection criterion. In a second step, the preselected regression models were corrected for possible problems with multivariate outliers, heteroskedasticity, multicollinearity, and singularity. Only the corrected models that were significant at the $p < .10$ after correction are reported here.

[37] In all models that included both the unmoderated variables and their interaction terms with MV7 (Similar Manufacturing), IV13 (Subsidiaries in Mexico) was collinear with its interaction term with MV7. Therefore IV13*MV7 had to be removed from models 06, 09, 11, 12, 14, 15, 16, and 17.

An additional analysis for each of the dependent variables was a stepwise regression that included all possible predictor variables. This procedure produces inflated goodness-of-fit and variable significance indicators, as it does not control for violations of the assumptions underlying the multiple regression model. To overcome this limitation, the variables selected by stepwise regression were used as predictors in multiple regression analyses applying the usual corrections. The resulting models were then compared to the ones listed above.

TABLE 6

Models for Regression Analyses

Models with Independent Variables

No. of Variables	CVs only	CVs + IVs	CVs + IVs + 1 MV				CVs + IVs + 2 MVs						CVs + IVs + 3 MVs				CVs + IVs + 4 MVs
	Model 01	Model 02	Model 03	Model 04	Model 05	Model 06	Model 07	Model 08	Model 09	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16	Model 17
8	CVs	CVs	CVs	CVs	CVs	CVs	CVs	CVs	CVs	CVs	CVs	CVs	CVs	CVs	CVs	CVs	CVs
8		IVs	IVs	IVs	IVs	IVs	IVs	IVs	IVs	IVs	IVs	IVs	IVs	IVs	IVs	IVs	IVs
9			IVs*MV2				IVs*MV2	IVs*MV2	IVs*MV2				IVs*MV2	IVs*MV2	IVs*MV2		IVs*MV2
9				IVs*MV5			IVs*MV5			IVs*MV5	IVs*MV5		IVs*MV5	IVs*MV5		IVs*MV5	IVs*MV5
9					IVs*MV6			IVs*MV6		IVs*MV6		IVs*MV6	IVs*MV6		IVs*MV6	IVs*MV6	IVs*MV6
9						IVs*MV7			IVs*MV7		IVs*MV7	IVs*MV7		IVs*MV7	IVs*MV7	IVs*MV7	IVs*MV7
Total	9	17	26	26	26	26	35	35	35	35	35	35	44	44	44	44	53

(1 added for constant)

Models without Independent Variables

No. of Variables	CVs + 1 MV				CVs + 2 MVs						CVs + 3 MVs				CVs + 4 MVs
	Model 18	Model 19	Model 20	Model 21	Model 22	Model 23	Model 24	Model 25	Model 26	Model 27	Model 28	Model 29	Model 30	Model 31	Model 32
8	CVs	CVs	CVs	CVs	CVs	CVs	CVs	CVs	CVs	CVs	CVs	CVs	CVs	CVs	CVs
8															
9	IVs*MV2				IVs*MV2	IVs*MV2	IVs*MV2				IVs*MV2	IVs*MV2	IVs*MV2		IVs*MV2
9		IVs*MV5			IVs*MV5			IVs*MV5	IVs*MV5		IVs*MV5	IVs*MV5		IVs*MV5	IVs*MV5
9			IVs*MV6			IVs*MV6		IVs*MV6		IVs*MV6	IVs*MV6		IVs*MV6	IVs*MV6	IVs*MV6
9				IVs*MV7			IVs*MV7		IVs*MV7	IVs*MV7		IVs*MV7	IVs*MV7	IVs*MV7	IVs*MV7
Total	18	18	18	18	27	27	27	27	27	27	36	36	36	36	45

(1 added for constant)

5.5.1 Regression Analyses for DV0: Start of Construction to First Shipment

The number of cases for DV0 (Start of Construction to First Shipment) was 63. In the uncorrected selection runs, none of the models was significant according to their *F* statistics ($p < .10$). Model 15 (control variables, independent variables, and three moderation effects by MV2 (Supplier Diversity), MV6 (Teachability), and MV7 (Similar Manufacturing)) came closest to having significance ($p = .243$, $F = 1.341$, $p = .24$, $R^2 = .738$, adjusted $R^2 = .188$). Table 7 shows the results of the regression analyses for both DV0 and DV1.

In the corrected stepwise regression for DV0 (Start of Construction to First Shipment), there were no multivariate outliers, but MV5 (Documentation Exists) had to be excluded because it caused multicollinearity. Additionally, there was a problem with heteroskedasticity in variables IV18 ($p = .0409$), MV2 ($p = .498$), and IV18*MV2 ($p = .0266$). The heteroskedasticity-corrected model was marginally significant with $p = .088$, $F = 1.642$, $R^2 = .637$, and adjusted $R^2 = .249$.

Among the control variables, CV02 (Metal Industry) had a marginally significant ($p < .10$) negative correlation with the dependent variable, indicating that firms from the metal industry required less time for this phase of the setup process. CV05 (Number of Employees) had a highly significant ($p < .01$) negative correlation with DV0 (Start of Construction to First Shipment). This finding constitutes an anomaly, as it should in principle take longer to start a larger plant than a smaller one. It might be, however, that this is the effect of an interaction with the MNC's experience. The model did not control for this kind of interactions.

Among the independent variables, IV01 (RECIP Expatriate Intensity) was positively correlated ($p < .05$) with DV0 (Start of Construction to First Shipment), but only when moderated by MV6 (Teachability) and MV7 (Similar Manufacturing). The

first relationship confirms H1, in the sense that the presence of less MNC personnel extended this phase of the setup process, especially when the technology was teachable and when it was similar to the one used in the setup unit.

IV03 (Phone Communication) and its interaction term with MV2 (RECIP Supplier Diversity) had marginally significant ($p < .10$) positive correlations with the dependent variable. This stood in contrast to the negative coefficient ($p < .10$) of IV03's interaction term with MV5 (Documentation Exists). This confusing situation among the marginally significant predictors was apparently resolved by the highly significant ($p < .01$) positive correlation between IV03 (Phone Communication) moderated by MV7 (Similar Manufacturing) and the dependent variable. In fact, this correlation not only confirms H2 but points to an inverted causality: When the setup process was going slow, the phone communication with the setup unit increased.

IV08 (RECIP Purchases from Headquarters) moderated by MV6 (Teachability) was negatively correlated ($p < .05$) with the dependent variable. This result actually contradicts H4: The more the new subsidiary bought from its MNC, the longer it took to go through the initial stages of the setup, provided that the technology was teachable.

IV16 (GM's Setup Experience Anywhere) did not present a significant coefficient. However, when moderated by MV6 (Teachability), IV16 (GM's Setup Experience Anywhere) was positively correlated ($p < .10$) with the dependent variable, which constitutes an anomaly, as experience should reduce setup times.

When IV18 (GM Is Mexican) was moderated by MV2 (RECIP Supplier Diversity), it had a highly significant ($p < .01$) positive correlation with the dependent variable. This relationship partially supports H6, in the sense that being intimately acquainted with the host country helped to speed up the setup process. The data

showed that this was true for firms with a high supplier diversity, which points to the critical role that securing the inputs plays in this phase. Additionally, IV18 (GM Is Mexican) moderated by MV7 (Similar Manufacturing) was negatively correlated ($p <$ .10) with the dependent variable, which further confirms H6, provided that the manufacturing was similar.

The above results should be taken with caution, because of the relatively low significance of the regression, which could be a result of both the low case-to-variable ratio and the importance of extraneous influences during the construction phase.

TABLE 7
Results of Regression Analyses for DV0 (Start of Construction to First Shipment) and DV1 (Arrival of Machines to First Shipment)

		Stepwise Selected Variables for DV0[1,2]		Stepwise Selected Variables for DV1[1,2]	
		B	S.E.	B	S.E.
CV02	Metal Industry	-.73†	(.40)		
CV05	No. of Employees	-1.27**	(.40)		
CV06	HQ in Americas/Aus.			.15*	(.07)
CV13	Local Regulations				
CV14	Qualified Suppliers			.26*	(.11)
CV16	Cultural Differences	.03	(.89)		
CV17	Month of 1st Shipm.	.00	(.00)		
CV18	Respondent is GM				
IV01	RECIP Expatriate Intensity				
IV01*MV2	- mod. by RECIP Suppl. Div.			-1.15†	(.59)
IV01*MV5	- mod. by Documentation			4.21†	(2.49)
IV01*MV6	- mod. by Teachability	8.09*	(3.64)		
IV01*MV7	- mod. by Similar Mfg.	5.21*	(2.19)	.84†	(.47)
IV03	Phone Communication	.85†	(.45)	-.04	(.08)
IV03*MV2	- mod. by RECIP Suppl. Div.	-3.83†	(1.95)		
IV03*MV5	- mod. by Documentation	-8.69†	(4.70)	-2.02	(1.52)
IV03*MV6	- mod. by Teachability				
IV03*MV7	- mod. by Similar Mfg.	4.21**	(1.38)	.40†	(.23)
IV05	RECIP Incoming Visit Int.	-.50	(.87)	.54**	(.16)
IV05*MV2	- mod. by RECIP Suppl. Div.	-2.72	(3.67)	1.37	(.88)
IV05*MV5	- mod. by Documentation	-17.64	(12.36)		
IV05*MV6	- mod. by Teachability			.56	(.37)
IV05*MV7	- mod. by Similar Mfg.				
IV07	Interunit Trust	.29	(.17)	-.02	(.03)
IV07*MV2	- mod. by RECIP Suppl. Div.	.91	(.70)		
IV07*MV5	- mod. by Documentation				
IV07*MV6	- mod. by Teachability			-.11	(.09)
IV07*MV7	- mod. by Similar Mfg.				
IV08	RECIP Purchases from HQ				
IV08*MV2	- mod. by RECIP Suppl. Div.	2.86	(2.05)		
IV08*MV5	- mod. by Documentation	-5.93	(4.40)		
IV08*MV6	- mod. by Teachability	-2.29*	(1.11)	-.17	(.21)
IV08*MV7	- mod. by Similar Mfg.	-.20	(1.53)	.24	(.25)
IV13	Subsidiaries in Mexico	.50	(.60)	-.14	(.38)
IV13*MV2	- mod. by RECIP Suppl. Div.	-3.51	(2.21)	-.72†	(.40)
IV13*MV5	- mod. by Documentation			2.91	(5.09)
IV13*MV6	- mod. by Teachability	-3.90	(6.17)		
IV13*MV7	- mod. by Similar Mfg.				
IV16	GM's Setup Experience	-.29	(.34)		
IV16*MV2	- mod. by RECIP Suppl. Div.	-2.51	(1.53)	.35	(.34)
IV16*MV5	- mod. by Documentation	6.46	(5.33)	2.38*	(1.09)
IV16*MV6	- mod. by Teachability	1.88†	(1.06)	.43	(.27)
IV16*MV7	- mod. by Similar Mfg.			-.52*	(.25)
IV18	GM Is Mexican	.53	(.33)	-.08	(.09)
IV18*MV2	- mod. by RECIP Suppl. Div.	4.24**	(1.45)		
IV18*MV5	- mod. by Documentation			.29	(1.32)
IV18*MV6	- mod. by Teachability			-.48*	(.20)
IV18*MV7	- mod. by Similar Mfg.	-1.96†	(1.15)	-.43†	(.24)
MV2	RECIP Supplier Diversity	-1.01	(.93)	-.23	(.15)
MV5	Documentation Exists				
MV6	Teachability	-.67	(.46)	-.13	(.11)
MV7	Similar Manufacturing	.07	(.56)		
C	Intercept	5.83**	(1.79)	.38	(.23)
	n	63		101	
	df	30		72	
	R^2	.637		.441	
	Adjusted R^2	.249		.224	
	F statistic	1.642		2.028	
	Prob (*F* statistic)	.088		.009	

[1] White Heteroskedasticity-Consistent Standard Errors & Covariance
[2] With corrections for multicollinearity and outliers.
† $p < .10$* $p < .05$** $p < .01$

5.5.2 Regression Analyses for DV1: Arrival of Machines to First Shipment

The number of cases for DV1 (Arrival of Machines to First Shipment) was 109. In the uncorrected selection runs, none of the models was significant according to their *F* statistics ($p < .10$). Model 06 (control variables, independent variables, and moderation effects by MV7 (Similar Manufacturing)) came closest to having significance ($p = .217$, $F = 1.262$, $p = .22$, $R^2 = .265$, adjusted $R^2 = .055$).

In the corrected stepwise regression, cases #23, #38, #43, #45, #84, and #85 had Mahalanobis values greater than 61.10 and had to be excluded. In a second run, cases #101 and #102 also had to be excluded. CV16 (GM's Setup Experience Anywhere) and MV5 (Documentation Exists) caused multicollinearity and were removed from the model. The White test showed a problem with heteroskedasticity in IV18 ($p = .0035$) and IV16*MV6 ($p = .0499$). The heteroskedasticity-corrected model was significant with $p = .009$, $F = 2.028$, $R^2 = .441$, and adjusted $R^2 = .224$. Table 7 shows the results.

Among the control variables, CV06 (Headquarters in the Americas or Australia) had a significant positive correlation ($p < .05$) with DV1. MNCs from the New World took longer for this phase. Confirming the findings for DV0 about the critical role of the suppliers, CV14 (Problems with the Availability of Qualified Suppliers) also had a significant positive correlation ($p < .05$) with DV1.

IV01 (RECIP Expatriate Intensity) was marginally significant ($p < .10$) in three of its interaction terms: moderated by MV2 (RECIP Supplier Diversity), moderated by MV5 (Documentation Exists), and moderated by MV7 (Similar Manufacturing). All three coefficients pointed in the direction that supports H1.

There was a marginally significant ($p < .10$) positive correlation between IV03 (Phone Communication) moderated by MV7 (Similar Manufacturing) and the

dependent variable. In fact, this correlation supports H2 and points to an inverted causality: When the setup process was going slow, the phone communication with the setup unit increased.

IV05 (RECIP Incoming Visit Intensity) had a highly significant ($p < .01$) positive correlation with the dependent variable, supporting H1: Less visits from the setup unit extended the time required from the arrival of the machines to the first shipment.

There was a marginally significant ($p < .10$) negative correlation between IV13 (Subsidiaries in Mexico) moderated by MV2 (Similar Manufacturing) and the dependent variable. This supports H5 about the positive influence of the MNC's Experience on the setup process, although restricted to units with similar manufacturing activities.

The GM's Setup Experience (IV16) moderated by MV5 (Documentation Exists) had a positive correlation ($p < .05$) with the dependent variable, contrary to the hypothesized direction. On the other hand, the negative correlation ($p < .05$) between IV16 (GM's Setup Experience) moderated by MV7 (Similar Manufacturing) lent partial support to H6.

Another aspect of the GM's experience was his or her nationality: In this case, H6 found partial support. IV18 (GM Is Mexican) moderated by MV6 (Teachability) and MV7 (Similar Manufacturing) was negatively correlated (with $p < .05$ and $p < .10$, respectively) to DV1. In other words, having a national GM was helpful when the technology was not too complex and when it was similar to the one of the setup unit. For technologies that were difficult to teach, a foreign GM was preferable.

5.5.3 Regression Analyses for DV2: Arrival of Machines to Full Capacity

The number of cases for DV2 (Arrival of Machines to Full Capacity) was 100. In the uncorrected selection runs, four models were borderline significant with p values

between .10 and .15: model 03 (p = .104), model 09 (p = .151), model 13 (p = .123), and model 27 (p = .117). After correcting for multivariate outliers and multicollinearity, only model 03, model 27, and the model based on the stepwise regression remained significant at the $p < .10$ level. Table 8 shows the results.

In model 03 (control variables, independent variables, and moderation effects by MV2 (Supplier Diversity)), cases #24 and #35 exceeded the critical χ^2 value for 26 variables at an α level of .001, which is 54.05. Cases #38 and #61 were excluded in two subsequent runs. With 97 cases, case #61 also had to be excluded as a multivariate outlier. In the model with 96 cases, the interaction term IV18*MV2 had a conditioning index of 65.65, but only for one variable was its variance proportion greater than .5, so no corrections were made for multicollinearity. The White test did not show a problem with heteroskedasticity. This model was marginally significant with p = .098, F = 1.491, R^2 = .348, and adjusted R^2 = .114. Only three predictor variables were significant: IV03 (Phone Communication) was negatively correlated ($p < .10$) with the dependent variable, supporting H2 and the theory about the reverse causality for communication at a distance. The negative coefficient ($p < .05$) of IV08 (Purchases from Headquarters) also was opposite to the hypothesized direction (discussed below). Finally, the negative coefficient of IV13 (Subsidiaries in Mexico) ($p < .05$) was in line with H5.

In model 27 (control variables and moderation effects by MV2 (Supplier Diversity), MV5 (Documentation Exists) and MV7 (Similar Manufacturing), without independent variables), cases #23, #38, #43, #45, and #84 had Mahalanobis values greater than 67.99 and had to be excluded. In a second run, cases #101 and #102 also had to be excluded. MV5 (Documentation Exists) caused a problem with multicollinearity and was removed from the model. IV16*MV7 (GM's Setup

Experience moderated by Similar Manufacturing) had a conditioning index of 39.05 and was highly correlated with three variables, so it was excluded, too. However, when excluding this variable, the variable that caused multicollinearity was CV16 (Cultural Differences). After eliminating CV16, the reinstated interaction term IV16*MV7 did not cause a collinearity problem anymore. There was no problem with heteroskedasticity according to the White test. In contrast to the uncorrected estimations, model 27 turned out to be the best non-stepwise regression for DV2 with $p = .077$, $F = 1.530$, $R^2 = .461$, and adjusted $R^2 = .160$.

Within model 27, eight predictor variables were significant: CV17 (Month of First Shipment) was significant at the $p < .05$ level, although with a coefficient close to zero (-.002917). IV01 (RECIP Expatriate Intensity) moderated by MV2 (RECIP Supplier Diversity) was significant at the $p < .05$ level, lending support to H1 for the case where supplies came from many different sources (a measure of technology complexity). IV07 (Interunit Trust) moderated by MV5 (Documentation Exists) and by MV7 (Similar Manufacturing) was a significant predictor (at $p < .05$ and at $p < .10$, respectively) of the dependent variable. With their negative coefficients, these two relationships gave partial support to H3. IV08 (RECIP Purchases from Headquarters) moderated by MV05 (Documentation Exists) had a significant ($p < .05$) negative correlation with the dependent variable, which stands in contrast with H4 about the helpful influence of interdependence between the units. IV16 (GM's Setup Experience) moderated by MV2 (RECIP Supplier Diversity) and by MV7 (Similar Manufacturing) were significant predictors (at $p < .10$ and at $p < .05$, respectively) of the dependent variable. The signs of the coefficients gave support to H6. Finally, the interaction term between IV18 (GM is Mexican) and MV2 (Supplier Diversity) had a

highly significant negative coefficient ($p < .01$), which lends support to H6, although only for the special case of dealing with many suppliers.

In the corrected stepwise regression, cases #23, #38, and #45 had Mahalanobis values greater than 61.10 and had to be excluded. In two subsequent runs, cases #84 and #102 also had to be excluded. MV5 (Documentation Exists) caused multicollinearity and was removed from the model. The regression with 95 cases did not present a problem with heteroskedasticity and was significant with $p = .001$, $F = 2.599$, $R^2 = .537$, and adjusted $R^2 = .330$. Both by significance and by goodness of fit, this was clearly the best model for DV2.

Within the corrected stepwise model, CV06 (Headquarters in the Americas or Australia) had a significant positive correlation ($p < .10$) with DV2, which confirms the result for DV1, where MNCs from the New World also were slower than European or East Asian firms. The same as in model 27, IV01 (RECIP Expatriate Intensity) moderated by MV2 (RECIP Supplier Diversity) was significant at the $p < .05$ level, lending support to H1. In the case of IV05 (RECIP Incoming Visit Intensity), the influence of correcting for the complexity of technology becomes obvious: The coefficient of IV05 without moderation had a negative sign ($p < .10$), indicating that headquarter envoys would arrive when setup progress was slow, i.e., an opposite causality compared to the hypothesized one. However, IV05 (RECIP Incoming Visit Intensity) moderated by MV6 (Teachability) had a positive coefficient with a higher significance ($p < .01$), which actually supports H1, provided the technology was not too difficult to teach. Interunit Trust (IV07) had a highly significant ($p < .01$) relationship with DV2, confirming H3. The marginally significant ($p < .10$) coefficient for IV07*MV7 points to the fact that trust was especially important when the two units had similar manufacturing activities. Confirming the results from

models 03 and 27, a higher dependence on purchases from the headquarters was related to a longer setup process, which contradicts H4. Supporting H6, the GM's Setup Experience (IV16) had positive influence on setup times when moderated by MV2 (RECIP Supplier Diversity, $p < .05$) and MV8 (Teachability, $p < .01$). Finally Teachability (MV6) by itself was a significant ($p < .05$) predictor of DV2, which confirms the validity of the proposed influence of the technology's complexity.

TABLE 8
Results of Regression Analyses for DV2: Arrival of Machines to Full Capacity

		Model 03		Model 29		Stepwise[2]	
		B	S.E.	B	S.E.	B	S.E.
CV02	Metal Industry	.00	(.11)	-.01	(.12)	-.08	(.10)
CV05	No. of Employees	-.10	(.13)	-.05	(.12)	-.19	(.12)
CV06	HQ in Americas/Aus.	.13	(.11)	.18	(.11)	.18†	(.09)
CV13	Local Regulations	.08	(.16)	-.23	(.17)	-.16	(.14)
CV14	Qualified Suppliers	-.02	(.16)	-.08	(.17)	-.08	(.15)
CV16	Cultural Differences	.25	(.22)				
CV17	Month of 1st Shipm.	.00	(.00)	.00*	(.00)	.00	(.00)
CV18	Respondent is GM	.01	(.11)	-.06	(.11)		
IV01	RECIP Expatriate Intensity	-.34	(.26)			-.53	(.32)
IV01*MV2	- mod. by RECIP Suppl. Div.	-1.96	(1.27)	-3.00*	(1.28)	-2.73*	(1.08)
IV01*MV5	- mod. by Documentation			-7.37	(4.50)	-.22	(5.01)
IV01*MV6	- mod. by Teachability					.47	(.35)
IV01*MV7	- mod. by Similar Mfg.			.44	(.95)		
IV03	Phone Communication	.23†	(.14)				
IV03*MV2	- mod. by RECIP Suppl. Div.	.70	(.94)	.91	(.87)		
IV03*MV5	- mod. by Documentation			.47	(2.45)		
IV03*MV6	- mod. by Teachability						
IV03*MV7	- mod. by Similar Mfg.			.23	(.43)		
IV05	RECIP Incoming Visit Int.	-.34	(.29)			-.44†	(.25)
IV05*MV2	- mod. by RECIP Suppl. Div.	.56	(2.08)	1.60	(1.60)	1.27	(1.37)
IV05*MV5	- mod. by Documentation			4.85	(4.09)		
IV05*MV6	- mod. by Teachability					1.71**	(.61)
IV05*MV7	- mod. by Similar Mfg.			-1.16	(1.06)		
IV07	Interunit Trust	-.04	(.04)			-.12**	(.04)
IV07*MV2	- mod. by RECIP Suppl. Div.	.15	(.27)	.27	(.27)	.30	(.23)
IV07*MV5	- mod. by Documentation			-1.65*	(.72)		
IV07*MV6	- mod. by Teachability					-.20	(.12)
IV07*MV7	- mod. by Similar Mfg.			-.32†	(.17)	-.25†	(.12)
IV08	RECIP Purchases from HQ	-.21*	(.10)			-.25*	(.10)
IV08*MV2	- mod. by RECIP Suppl. Div.	.49	(.61)	.56	(.63)	.46	(.49)
IV08*MV5	- mod. by Documentation			-3.89†	(2.07)		
IV08*MV6	- mod. by Teachability						
IV08*MV7	- mod. by Similar Mfg.			.17	(.49)		
IV13	Subsidiaries in Mexico	-.31*	(.15)			.14	(.35)
IV13*MV2	- mod. by RECIP Suppl. Div.	.56	(.79)	-.21	(.73)		
IV13*MV5	- mod. by Documentation			1.32	(7.02)	-6.08	(4.48)
IV13*MV6	- mod. by Teachability						
IV13*MV7	- mod. by Similar Mfg.			-3.25	(3.37)		
IV16	GM's Setup Experience	-.02	(.11)			-.13	(.11)
IV16*MV2	- mod. by RECIP Suppl. Div.	.87	(.55)	1.05†	(.59)	1.36*	(.52)
IV16*MV5	- mod. by Documentation			-.69	(1.84)	1.23	(1.63)
IV16*MV6	- mod. by Teachability					-.81**	(.31)
IV16*MV7	- mod. by Similar Mfg.	-.37	(.37)	-.82*	(.30)		
IV18	GM Is Mexican	.05	(.10)				
IV18*MV2	- mod. by RECIP Suppl. Div.	-.80	(.51)	-1.67**	(.56)	-1.68**	(.48)
IV18*MV5	- mod. by Documentation			-2.17	(1.74)		
IV18*MV6	- mod. by Teachability					-.16	(.27)
IV18*MV7	- mod. by Similar Mfg.	-.12	(.37)				
MV2	RECIP Supplier Diversity	.46	(.30)	.24	(.27)	.28	(.24)
MV5	Documentation Exists						
MV6	Teachability			-.18	(.45)	-.32*	(.14)
MV7	Similar Manufacturing						
C	Intercept	.85	(.63)	1.90**	(.68)	2.58**	(.52)
	n	96		93		95	
	df	68		60		65	
	R^2	.348		.461		.537	
	Adjusted R^2	.114		.160		.330	
	F statistic	1.491		1.530		2.599	
	Prob (F statistic)	.098		.077		.001	

[1] White Heteroskedasticity-Consistent Standard Errors & Covariance
[2] With corrections for multicollinearity and outliers
† $p < .10$ * $p < .05$ ** $p < .01$

5.5.4 Regression Analyses for DV3: Arrival of Machines to Corporate-Level Productivity

The number of cases for DV3 was 80. In the uncorrected selection runs, models 02, 05, 10, 19, 23, and 30 were significant at the $p < .10$ level, while models 01, 21, 25, 26, 27, and 31 were significant at the $p < .05$ level. With an F statistic of 2.376, model 20 was significant at the $p < .01$ level. After making the correcting for multivariate outliers, multicollinearity, and heteroskedasticity, there remained five models with p values between .05 and .10 and R^2 values below .05. The other eight models with higher levels of significance (including the one with stepwise-selected variables) are reported in Table 9.

Model 01 (control variables only) did not present any problems with multivariate outliers or multicollinearity. However, there was heteroskedasticity in CV16 (p = .014). The heteroskedasticity-corrected model was significant with p = .018, F = 2.515, R^2 = .221, and adjusted R^2 = .133. CV16 (Influence of Cultural Differences) was significant at the $p < .10$ level, but its negative coefficient was counterintuitive (see the explanation in section 5.3). CV17 (Month of First Shipment) was significant at the $p < .05$ level, although close to zero (-.002953).

In model 10, (control variables, independent variables, and moderation by MV5 (Documentation Exists) and MV6 (Teachability)), cases #43, #80, and 84 were outliers with Mahalanobis values greater than 66.62 and had to be excluded. Additionally, case #102 had to be removed in a second run. MV5 (Documentation Exists) had to be dropped because it caused a problem with multicollinearity. White's test showed heteroskedasticity in IV05 (p = .0429) and MV6 (p = .0190). The heteroskedasticity-corrected model with 76 cases was significant with p = .025, F = 1.901, R^2 = .599, and adjusted R^2 = .284. It contained seven significant predictor variables: CV17 (Month

of First Shipment) was significant at the $p < .10$ level, although with a coefficient close to zero (-.003333). IV05*MV6 (Incoming Visit Intensity moderated by Teachability) was significant at the $p < .10$ level, lending partial support to the communication hypothesis (H1). Both IV07 (Interunit Trust) and IV07*M6 (Interunit Trust moderated by Teachability) were significant at the $p < .05$ level, supporting H3, although IV07*M5 (Interunit Trust moderated by Documentation Exists), which was marginally significant ($p < .10$), pointed in the opposite direction. The interaction term between IV13 (Subsidiaries in Mexico) and MV6 (Teachability) was highly significant at the $p < .01$ level, although the coefficient had the wrong sign, contradicting the corresponding hypothesis. IV16*M6 (GM's Setup Experience Anywhere moderated by Teachability) was significant at the $p < .05$ level, and also pointed in the wrong direction.

In model 21 (control variables, moderation by MV7 (Similar Manufacturing), no independent variables), cases #22, #27, #83, and #104 were outliers with Mahalanobis values greater than 42.31 and had to be excluded. There was no significant multicollinearity. However, the model had a problem with heteroskedasticity in CV06 ($p = .0398$) and IV13*M7 ($p = .0377$). The heteroskedasticity-corrected regression was significant with $p = .014$, $F = 2.196$, $R^2 = .392$, and adjusted $R^2 = .213$. There were three significant control variables: CV06 (Headquarters in the Americas or Australia) at the $p < .10$ level, CV16 (Influence of Cultural Differences) at the $p < .05$ level, and CV17 (Month of First Shipment) was significant at the $p < .10$ level, although with a coefficient close to zero (-.003898). Additionally, IV08 (Purchases from Headquarters) moderated by MV7 and IV13 (Subsidiaries in Mexico) moderated by MV7 (Similar Manufacturing) were marginally significant ($p < .10$).

In model 25 (control variables, moderation by MV5 (Documentation Exists) and MV6 (Teachability), no independent variables), cases #43, #45, and #84 were multivariate outliers with Mahalanobis values greater than 55.5 and had to be excluded. In a second run, case #80 also had to be excluded. MV5 caused multicollinearity and was removed from the model. The regression with 76 cases presented a problem with heteroskedasticity in CV16 ($p = .0335$). The heteroskedasticity-corrected regression was highly significant with $p = .006$, $F = 2.313$, $R^2 = .536$, and adjusted $R^2 = .304$. Among the control variables, CV16 (Cultural Differences) was marginally significant ($p < .10$), while CV17 (Month of First Shipment) was significant at the $p < .05$ level., although with a coefficient close to zero (-.003783). IV05 (Incoming Visit Intensity) moderated by MV6 (Teachability) was marginally significant ($p < .10$). IV13 (Subsidiaries in Mexico) moderated by MV5 (Documentation Exists) had a highly significant ($p < .01$) negative coefficient, lending support to H5. Finally IV16 (GM's Setup Experience Anywhere) moderated by MV6 (Teachability) was also marginally significant ($p < .10$ level).

In model 26 (control variables, moderation by MV5 (Documentation Exists) and MV7 (Similar Manufacturing), no independent variables), cases #22, #43, #45, #84, and #104 were multivariate outliers with Mahalanobis values greater than 55.47 and had to be excluded. In a second run, cases #27 and #102 also had to be excluded. MV5, MV7, and CV16 (GM's Setup Experience Anywhere) caused problems with multicollinearity and were removed from the model. The White test showed no problem with heteroskedasticity. The regression with 75 cases was significant with $p = .020$, $F = 2.001$, $R^2 = .474$, and adjusted $R^2 = .237$. CV17 (Month of First Shipment) was significant at the $p < .10$ level, although the coefficient was close to zero (-.003005). IV08 (Purchases from Headquarters) moderated by MV7 (Similar

Manufacturing) was significant at the $p < .05$ level. The significant ($p < .5$) negative coefficient of IV13 (Subsidiaries in Mexico) moderated by MV5 (Documentation Exists) supported H5.

Model 27 (control variables, moderation by MV6 (Teachability) and MV7 (Similar Manufacturing), no independent variables) did not present any problems with multivariate outliers, singularity, or multicollinearity. The White test showed heteroskedasticity in MV6 ($p = .0197$), IV13*MV6 ($p = .0037$), and IV13*MV7 ($p = .0004$). The heteroskedasticity-corrected regression was significant with $p = .018$, $F = 1.979$, $R^2 = .493$, and adjusted $R^2 = .244$. Significant ($p < .05$) control variables were CV16 (Influence of Cultural Differences) and CV17 (Month of First Shipment), although the latter was close to zero (-.003561). The interaction term between IV05 (Incoming Visit Intensity) and MV6 (Teachability) and the interaction term between IV16 (GM's Setup Experience Anywhere) and MV6 (Teachability) were both significant at the $p < .05$ level.

In model 31, (control variables, moderation by MV5 (Documentation Exists), MV6 (Teachability), and MV7 (Similar Manufacturing), no independent variables), cases #45, #80, and #84 were multivariate outliers with Mahalanobis values greater than 67.99 and had to be excluded. In a second run, case #102 also had to be excluded. The moderating variables MV5 (Documentation Exists) and MV7 (Similar Manufacturing) had to be removed because they caused problems with multicollinearity. The regression with 76 cases was heteroskedastic in CV06 ($p = .0200$), IV13*MV5 ($p = .0092$), MV6 ($p = .0014$), and IV13*MV7 ($p = .0132$). The heteroskedasticity-corrected regression was highly significant with $p = .004$, $F = 2.361$, $R^2 = .650$, and adjusted $R^2 = .375$. Among the models for DV3, it provided the best fit. The same as in model 27, CV16 (Influence of Cultural Differences) and

CV17 (Month of First Shipment) were significant at the $p < .05$ level, although the latter was close to zero (-.004457). IV03 (Phone Communication) moderated by MV7 (Similar Manufacturing) was significant ($p < .05$) but its direction indicated a reversed causality: A slow setup process triggered lots of phone calls. Similarly to model 26, IV08 (Purchases from Headquarters) moderated by MV7 (Similar Manufacturing) was marginally significant ($p < .10$), lending partial support to H4. The results for IV13 (Subsidiaries in Mexico) were contradictory: The relationship with the dependent variable was significantly ($p < .05$) negative when moderated by MV5 (Documentation Exists), which gives partial support to the corresponding hypothesis. At the same time, IV13 (Subsidiaries in Mexico) had a highly significant ($p < .01$) positive coefficient when moderated by MV6 (Teachability). At this point, it became evident that MV5 and MV6 were indeed conceptually different[38], a recurring phenomenon throughout the analyses. Finally, IV16 (GM's Setup Experience) moderated by MV6 (Teachability) was negatively related ($p < .05$) with DV3, which supports the corresponding hypothesis.

In the corrected stepwise regression, cases #22, #45, and #84 had Mahalanobis values greater than 52.62 and needed to be excluded. In a second run, case #102 also had to be excluded. CV16 (Cultural Differences) caused multicollinearity and was removed from the model. The White test showed heteroskedasticity in MV6 ($p = .0099$). The heteroskedasticity-corrected regression with 76 cases was highly significant with $p = .000$, $F = 3.391$, $R^2 = .600$, and adjusted $R^2 = .423$, so this was the best model in terms of both significance of the regression and adjusted R^2 value.

[38] The occurrence of the opposite signs of the interaction term coefficients moderated by MV5 (Documentations Exists) and MV6 (Teachability) is most vexing, as it invalidates one of the measures used by one of the most influential articles on knowledge transfer (Kogut & Zander, 1993), although it is not clear which. In fact, where independent variables were moderated by both MV5 and MV6, the coefficient signs were often opposite, although not always. (The above result was double checked to exclude the possibility of a coding error.)

Among the control variables, CV06 (Headquarters in the Americas or Australia) was marginally significant ($p < .10$), in the sense that firms from the New World tended to take longer to set up their Mexican subsidiaries. As in the preceding models, CV17 (Month of First Shipment) was significant at the $p < .05$ level, although close to zero (-.003444). As a parallel to model 10, IV03 (Phone Communication) moderated by MV5 (Documentation Exists) was marginally significant ($p < .10$) but its direction indicated a reversed causality: A slow setup process triggered lots of phone calls. The interaction term between IV05 (Incoming Visit Intensity) and MV6 (Teachability) was highly significant and confirmed the positive effect of incoming visits from the MNC, provided the technology could be easily taught. The negative relationship ($p < .05$) between IV07 (Interunit Trust) and DV3 supports H3, as does the highly significant ($p < .01$) negative relationship between the interaction term between IV07 (Interunit Trust) and MV6 (Teachability). These two correlations stand in contrast to the significant ($p < .05$) positive coefficient of the interaction term of IV07 (Interunit Trust) and MV05 (Documentation Exists), which makes the latter look like a possible confound.

As explained above, both model 31 and the corrected stepwise model could be considered the best model for DV3 (Arrival of Machines to Corporate-Level Productivity). Unfortunately, the two models differ almost completely in how they identify the significant predictor variables. There is agreement about the relevance of CV17 (Month of First Shipment, although the value is close to zero) and the interaction term of IV16 (GM's Setup Experience) and MV6 (Teachability). In addition, one could argue that two more variables should be considered as significant because they had been excluded on purpose from either model 31 or the corrected stepwise model: CV16 (Cultural Differences) and IV07 (Interunit Trust). Following

this logic, there was support for H3 (Trust) and partial support for H6 (GM's Experience) in relation to this phase.

TABLE 9
Results of Regression Analyses for DV3: Arrival of Machines to Corporate-Level Productivity

		Model 01[1]		Model 10[1]		Model 21[1]		Model 25[1]	
		B	S.E.	B	S.E.	B	S.E.	B	S.E.
CV02	Metal Industry	.01	(.10)	-.02	(.15)	-.06	(.11)	.04	(.11)
CV05	No. of Employees	.16	(.12)	.12	(.16)	.03	(.11)	.06	(.13)
CV06	HQ in Americas/Aus.	-.16	(.10)	-.06	(.15)	-.18†	(.10)	-.11	(.11)
CV13	Local Regulations	.19	(.16)	.20	(.20)	.16	(.15)	.16	(.16)
CV14	Qualified Suppliers	.17	(.15)	.07	(.22)	.23	(.17)	.09	(.18)
CV16	Cultural Differences	-.40†	(.21)	-.53	(.32)	-.47*	(.21)	-.49†	(.25)
CV17	Month of 1st Shipm.	.00*	(.00)	.00*	(.00)	.00†	(.00)	.00*	(.00)
CV18	Respondent is GM	.04	(.11)	.08	(.15)	.03	(.10)	.07	(.15)
IV01	RECIP Expatriate Intensity			.03	(.55)				
IV01*MV2	- mod. by RECIP Suppl. Div.								
IV01*MV5	- mod. by Documentation			2.17	(6.42)			4.06	(6.17)
IV01*MV6	- mod. by Teachability			-.11	(1.34)			-.38	(1.07)
IV01*MV7	- mod. by Similar Mfg.					-1.08	(1.18)		
IV03	Phone Communication			-.15	(.25)				
IV03*MV2	- mod. by RECIP Suppl. Div.								
IV03*MV5	- mod. by Documentation			5.28	(3.51)			2.63	(2.44)
IV03*MV6	- mod. by Teachability			.09	(.56)			.30	(.43)
IV03*MV7	- mod. by Similar Mfg.					.42	(.54)		
IV05	RECIP Incoming Visit Int.			-.23	(.40)				
IV05*MV2	- mod. by RECIP Suppl. Div.								
IV05*MV5	- mod. by Documentation			2.84	(6.08)			-1.86	(5.44)
IV05*MV6	- mod. by Teachability			1.84†	(.99)			1.77†	(1.01)
IV05*MV7	- mod. by Similar Mfg.					-.57	(1.88)		
IV07	Interunit Trust			-.20*	(.09)				
IV07*MV2	- mod. by RECIP Suppl. Div.								
IV07*MV5	- mod. by Documentation			2.52†	(1.31)			-.13	(.67)
IV07*MV6	- mod. by Teachability			-.33*	(.16)			-.27	(.19)
IV07*MV7	- mod. by Similar Mfg.					.10	(.31)		
IV08	RECIP Purchases from HQ			-.03	(.17)				
IV08*MV2	- mod. by RECIP Suppl. Div.								
IV08*MV5	- mod. by Documentation			1.06	(2.45)			.25	(2.16)
IV08*MV6	- mod. by Teachability			-.22	(.46)			-.03	(.38)
IV08*MV7	- mod. by Similar Mfg.					1.07†	(.62)		
IV13	Subsidiaries in Mexico			-.74	(.68)				
IV13*MV2	- mod. by RECIP Suppl. Div.								
IV13*MV5	- mod. by Documentation			-5.49	(8.11)			-1.90**	(3.16)
IV13*MV6	- mod. by Teachability			2.68**	(.78)			1.47	(.91)
IV13*MV7	- mod. by Similar Mfg.					-2.52†	(1.46)		
IV16	GM's Setup Experience			.03	(.14)				
IV16*MV2	- mod. by RECIP Suppl. Div.								
IV16*MV5	- mod. by Documentation			-1.57	(2.16)			-1.95	(1.76)
IV16*MV6	- mod. by Teachability			1.01*	(.49)			.83†	(.43)
IV16*MV7	- mod. by Similar Mfg.					-.23	(.50)		
IV18	GM Is Mexican			.01	(.15)				
IV18*MV2	- mod. by RECIP Suppl. Div.								
IV18*MV5	- mod. by Documentation			-.41	(2.02)			-.21	(1.83)
IV18*MV6	- mod. by Teachability			-.09	(.39)			-.18	(.31)
IV18*MV7	- mod. by Similar Mfg.					.75	(.50)		
MV2	RECIP Supplier Diversity								
MV5	Documentation Exists								
MV6	Teachability			-.06	(.20)			-.14	(.20)
MV7	Similar Manufacturing					.08	(.29)		
C	Intercept	1.31**	(.48)	2.18*	(.86)	1.58**	(.55)	1.81*	(.61)
	n	80		76		76		76	
	df	71		42		58		50	
	R^2	.221		.599		.392		.536	
	Adjusted R^2	.133		.284		.213		.304	
	F statistic	2.515		1.901		2.196		2.313	
	Prob (*F* statistic)	.018		.025		.014		.006	

[1] White Heteroskedasticity-Consistent Standard Errors & Covariance

† $p < .10$ * $p < .05$ ** $p < .01$

TABLE 9 (continued)
Results of Regression Analyses for DV3: Arrival of Machines to Corporate-Level Productivity

		Model 26		Model 27[1]		Model 31[1]		Stepwise[1, 2]	
		B	S.E.	B	S.E.	B	S.E.	B	S.E.
CV02	Metal Industry	-.01	(.14)	-.04	(.10)	-.01	(.11)		
CV05	No. of Employees	.10	(.13)	.03	(.11)	.04	(.13)	.13	(.10)
CV06	HQ in Americas/Aus.	-.16	(.13)	-.12	(.09)	-.11	(.09)	-.20†	(.11)
CV13	Local Regulations	.05	(.21)	.16	(.14)	.14	(.17)	.17	(.12)
CV14	Qualified Suppliers	.14	(.21)	.05	(.19)	-.09	(.19)		
CV16	Cultural Differences			-.49*	(.22)	-.66*	(.29)		
CV17	Month of 1st Shipm.	.00†	(.00)	.00*	(.00)	.00*	(.00)	.00*	(.00)
CV18	Respondent is GM	-.01	(.14)	.05	(.13)	-.02	(.15)		
IV01	RECIP Expatriate Intensity								
IV01*MV2	- mod. by RECIP Suppl. Div.							4.55	(5.79)
IV01*MV5	- mod. by Documentation	2.99	(4.86)			4.45	(6.88)	-1.24	(1.13)
IV01*MV6	- mod. by Teachability			.62	(1.07)	.90	(1.25)		
IV01*MV7	- mod. by Similar Mfg.	-.68	(1.04)	-1.05	(1.13)	-.90	(1.17)		
IV03	Phone Communication								
IV03*MV2	- mod. by RECIP Suppl. Div.								
IV03*MV5	- mod. by Documentation	3.47	(2.96)			2.32	(2.41)	3.73†	(2.11)
IV03*MV6	- mod. by Teachability			.13	(.29)	.10	(.38)		
IV03*MV7	- mod. by Similar Mfg.	.72	(.68)	.61	(.47)	1.01*	(.47)	.19	(.51)
IV05	RECIP Incoming Visit Int.								
IV05*MV2	- mod. by RECIP Suppl. Div.								
IV05*MV5	- mod. by Documentation	6.59	(4.71)			-2.31	(5.53)		
IV05*MV6	- mod. by Teachability			1.60*	(.70)	1.80	(1.07)	2.08**	(.60)
IV05*MV7	- mod. by Similar Mfg.	-1.27	(1.41)	-.96	(1.08)	-1.09	(1.11)		
IV07	Interunit Trust							-.18*	(.08)
IV07*MV2	- mod. by RECIP Suppl. Div.							.37	(.30)
IV07*MV5	- mod. by Documentation	-.63	(1.01)			-.11	(.81)	2.11*	(1.01)
IV07*MV6	- mod. by Teachability			-.17	(.17)	-.19	(.22)	-.35**	(.13)
IV07*MV7	- mod. by Similar Mfg.	.18	(.35)	-.15	(.20)	-.21	(.22)	.07	(.36)
IV08	RECIP Purchases from HQ								
IV08*MV2	- mod. by RECIP Suppl. Div.							-.59	(.43)
IV08*MV5	- mod. by Documentation	-.78	(2.52)			1.12	(1.94)		
IV08*MV6	- mod. by Teachability			-.14	(.38)	.07	(.47)		
IV08*MV7	- mod. by Similar Mfg.	1.37*	(.65)	.55	(.51)	.88†	(.50)	.55	(.47)
IV13	Subsidiaries in Mexico							-.41	(.29)
IV13*MV2	- mod. by RECIP Suppl. Div.								
IV13*MV5	- mod. by Documentation	-6.67*	(3.02)			-12.28*	(5.03)	-3.83	(3.71)
IV13*MV6	- mod. by Teachability			.29	(.37)	2.49**	(.66)		
IV13*MV7	- mod. by Similar Mfg.	-1.86	(1.38)	-2.17	(1.55)	-2.90	(1.92)		
IV16	GM's Setup Experience								
IV16*MV2	- mod. by RECIP Suppl. Div.								
IV16*MV5	- mod. by Documentation	-.24	(2.08)			-1.88	(1.84)	-.66	(1.12)
IV16*MV6	- mod. by Teachability			.81*	(.37)	.98*	(.42)	.72†	(.40)
IV16*MV7	- mod. by Similar Mfg.	-.60	(.51)	.13	(.49)	-.13	(.53)		
IV18	GM Is Mexican								
IV18*MV2	- mod. by RECIP Suppl. Div.					1.29	(1.92)		
IV18*MV5	- mod. by Documentation	-2.66	(2.09)			.08	(.36)		
IV18*MV6	- mod. by Teachability			.10	(.33)	-.16	(.52)		
IV18*MV7	- mod. by Similar Mfg.	.78	(.52)	-.29	(.50)				
MV2	RECIP Supplier Diversity							-.04	(.19)
MV5	Documentation Exists								
MV6	Teachability			-.28	(.18)	.09	(.22)	-.34†	(.17)
MV7	Similar Manufacturing			.07	(.31)			.35	(.23)
C	Intercept	1.18*	(.50)	2.05**	(.61)	2.25**	(.64)	1.43**	(.35)
	n	75		80		76		76	
	df	51		53		42		52	
	R^2	.474		.493		.650		.600	
	Adjusted R^2	.237		.244		.375		.423	
	F statistic	2.001		1.979		2.361		3.391	
	Prob (F statistic)	.020		.018		.004		.000	

[1] White Heteroskedasticity-Consistent Standard Errors & Covariance
[2] With corrections for multicollinearity and outliers
† $p < .10$ * $p < .05$ ** $p < .01$

5.5.5 Regression Analyses for DV4: First Shipment to Full Capacity

The number of cases for DV4 was 102. In the uncorrected selection runs, models 03, 04, 06, 07, 11, and 14 were significant at the $p < .10$ level. Model 02 had an F statistic of 1.78, i.e., it was significant at the $p < .05$ level. After correcting for multivariate outliers and multicollinearity, only models 02 and 06 and the corrected stepwise model remained significant at the $p < .05$ level. Table 10 shows the results.

Model 02 (control variables plus independent variables without moderation) did not contain any multivariate outliers or problems with multicollinearity or heteroskedasticity. The regression with 102 cases was significant with $p = .047$, $F = 1.780$, $R^2 = .251$, and adjusted $R^2 = .110$. Four predictor variables were significant at the $p < .05$ level: CV16 (Cultural Differences) had a positive coefficient, which correspondent to the theoretical expectations. IV03 (Phone Communication) also had a positive coefficient, supporting H2 and pointing to an inverse causality, as explained above. IV05 (Incoming Visit Intensity) had a negative coefficient, actually contradicting H1 for face-to-face communication and indicating a similar inverse causality as for IV03. Finally, IV08 (RECIP Purchases from Headquarters) had a negative coefficient, which contradicted H4, i.e., a higher degree of interdependence did actually slow down the setup process.

In model 06 (control variables, independent variables, and moderation effects by MV7 (Similar Manufacturing)), case #104 had a Mahalanobis value greater than 54.05 and was excluded. The regression with 101 cases did not present problems with multicollinearity or heteroskedasticity and was significant with $p = .044$, $F = 1.694$, $R^2 = .348$, and adjusted $R^2 = .143$. The relationships between the dependent variable and CV16 (Cultural Differences) and IV03 (Phone Communication) had the same directions and levels of significance as in model 02. Another parallel was the negative

coefficient ($p < .01$) of IV05 (RECIP Incoming Visit Intensity), which contradicted H1 when the communication was face to face. Interunit Trust (IV07), when moderated by MV7 (Similar Manufacturing), had a marginally significant ($p < .10$) negative correlation with DV4, lending partial support to H3. Again similarly to model 02, IV08 (RECIP Purchases from Headquarters) had a marginally significant ($p < .10$) negative coefficient, which contradicted H4. Finally, IV18 (GM Is Mexican) moderated by MV7 (Similar Manufacturing) had a marginally significant ($p < .10$) negative coefficient, giving partial support to H6.

In the corrected stepwise regression, cases #23, #38, #43, #45, and #84 had Mahalanobis values greater than 66.62 and had to be excluded. MV5 (Documentation Exists) caused multicollinearity and was removed from the model. The White test showed no problem with heteroskedasticity. The regression with 97 cases was highly significant with $p = .001$, $F = 2.520$, $R^2 = .569$, and adjusted $R^2 = .343$, which made it clearly the best model for DV4.

Within the corrected stepwise model, CV05 (Number of Employees) had a marginally significant ($p < .10$) negative coefficient that contradicted conventional wisdom, i.e., large firms were faster in this phase. Both the marginally significant ($p < .10$) negative coefficient of IV01 (RECIP Expatriate Intensity) moderated by MV2 (RECIP Supplier Diversity) and the marginally significant ($p < .10$) positive coefficient of IV03 (Phone Communication) moderated by MV6 (Teachability) supporting H1 and indicating a reverse causality. This was also the case for the negative coefficient of IV05 (Incoming Visit Intensity), which was highly significant ($p < .01$). However, IV05's interaction terms with both MV5 (Documentation, $p < .05$) and MV6 (Teachability, $p < .10$) had positive signs, so when the moderation effect was considered, there was support for H1. Similarly to model 06, Interunit Trust

(IV07), when moderated by MV7 (Similar Manufacturing), had a significant ($p < .05$) negative correlation with DV4, lending partial support to H3. Another parallel to model 06 was the negative coefficient ($p < .05$) of IV08 (RECIP Purchases from HQ) moderated by MV5 (Documentation). Again, H4 was partially disconfirmed. The marginally significant ($p < .10$) positive coefficient of IV16 (GM's Setup Experience) moderated by MV2 (Supplier Diversity) could be interpreted as disconfirmation of H6 or as a part of the generally negative effect of Supplier Diversity on setup times, although MV2 (Supplier Diversity) by itself was not significant. The marginally significant ($p < .10$) negative coefficient for IV18 (GM is Mexican) moderated by MV5 (Documentation) gives partial support to H6. Finally, MV7 (Similar Manufacturing) had a significant ($p < .05$) negative relationship with the dependent variable, which corresponds to the underlying theory.

TABLE 10
Results of Regression Analyses for DV4: First Shipment to Full Capacity

		Model 02		Model 06		Stepwise[2]	
		B	S.E.	B	S.E.	B	S.E.
CV02	Metal Industry	.10	(.13)	.06	(.14)	-.11	(.14)
CV05	No. of Employees	-.06	(.16)	-.10	(.17)	-.26†	(.16)
CV06	HQ in Americas/Aus.	.13	(.14)	.10	(.15)		
CV13	Local Regulations	.02	(.21)	-.01	(.21)	-.33	(.21)
CV14	Qualified Suppliers	-.05	(.20)	.04	(.21)	-.24	(.19)
CV16	Cultural Differences	.57*	(.27)	.62*	(.28)	.39	(.27)
CV17	Month of 1st Shipm.	.00	(.00)	.00	(.00)	.00	(.00)
CV18	Respondent is GM	-.01	(.14)	.01	(.14)		
IV01	RECIP Expatriate Intensity	-.31	(.32)	-.44	(.33)	-.39	(.42)
IV01*MV2	- mod. by RECIP Suppl. Div.					-2.61†	(1.54)
IV01*MV5	- mod. by Documentation					-6.05	(7.46)
IV01*MV6	- mod. by Teachability						
IV01*MV7	- mod. by Similar Mfg.			-1.76	(1.13)	-.09	(1.12)
IV03	Phone Communication	.36*	(.17)	.41*	(.19)		
IV03*MV2	- mod. by RECIP Suppl. Div.						
IV03*MV5	- mod. by Documentation					3.24	(2.82)
IV03*MV6	- mod. by Teachability			-.88	(.67)	.88†	(.51)
IV03*MV7	- mod. by Similar Mfg.						
IV05	RECIP Incoming Visit Int.	-.85*	(.36)	-1.18**	(.42)	-1.46**	(.43)
IV05*MV2	- mod. by RECIP Suppl. Div.						
IV05*MV5	- mod. by Documentation					13.37*	(6.45)
IV05*MV6	- mod. by Teachability					1.76†	(.94)
IV05*MV7	- mod. by Similar Mfg.			1.85	(1.68)	-1.04	(1.05)
IV07	Interunit Trust	-.03	(.06)	-.02	(.06)		
IV07*MV2	- mod. by RECIP Suppl. Div.					.44	(.31)
IV07*MV5	- mod. by Documentation					-.80	(.81)
IV07*MV6	- mod. by Teachability					-.27	(.17)
IV07*MV7	- mod. by Similar Mfg.			-.37†	(.21)	-.47*	(.18)
IV08	RECIP Purchases from HQ	-.34*	(.13)	-.28†	(.15)	-.18	(.15)
IV08*MV2	- mod. by RECIP Suppl. Div.					.48	(.68)
IV08*MV5	- mod. by Documentation					-4.83*	(2.03)
IV08*MV6	- mod. by Teachability						
IV08*MV7	- mod. by Similar Mfg.			-.71	(.64)		
IV13	Subsidiaries in Mexico	-.10	(.17)	-.14	(.17)		
IV13*MV2	- mod. by RECIP Suppl. Div.					-.72	(.83)
IV13*MV5	- mod. by Documentation					-2.31	(2.61)
IV13*MV6	- mod. by Teachability					-1.28	(.92)
IV13*MV7	- mod. by Similar Mfg.						
IV16	GM's Setup Experience	.00	(.13)	-.15	(.15)		
IV16*MV2	- mod. by RECIP Suppl. Div.					1.11†	(.65)
IV16*MV5	- mod. by Documentation						
IV16*MV6	- mod. by Teachability						
IV16*MV7	- mod. by Similar Mfg.			.91	(.58)	-.65	(.44)
IV18	GM Is Mexican	.00	(.13)	.06	(.14)	.12	(.15)
IV18*MV2	- mod. by RECIP Suppl. Div.					-1.06	(.64)
IV18*MV5	- mod. by Documentation					-3.77†	(2.16)
IV18*MV6	- mod. by Teachability						
IV18*MV7	- mod. by Similar Mfg.			-.88†	(.50)		
MV2	RECIP Supplier Diversity						
MV5	Documentation Exists						
MV6	Teachability					.42	(.32)
MV7	Similar Manufacturing			.24	(.23)	-.51*	(.20)
C	Intercept	.62	(.72)	.40	(.75)	2.45**	(.82)
	n	102		101		97	
	df	85		76		63	
	R^2	.251		.348		.569	
	Adjusted R^2	.110		.143		.343	
	F statistic	1.780		1.694		2.520	
	Prob (*F* statistic)	.047		.044		.001	

[2] With corrections for multicollinearity and outliers

† $p < .10$ * $p < .05$ ** $p < .01$

5.5.6 Regression Analyses for DV5: First Shipment to Corporate-Level Productivity

The number of cases for DV5 was 84. In the uncorrected selection runs, models 05, 06, 11, 16, 20, 24, 25 and 32 were significant at the $p < .10$ level. Models 01, 02, 04, 10, 29, and 31 were significant at the $p < .05$ level. Models 21 and 26 were significant at the $p < .01$ level; model 21 was the best with an F statistic of 2.36. After correcting for multivariate outliers and multicollinearity, ten models (including the corrected stepwise model) remained with a significance level of $p < .05$. Table 11 presents the results of the regression analyses.

Model 01 (control variables only) did not present any problems with multivariate outliers, collinearity, or heteroskedastic variables. The regression was significant with $p = .043$, $F = 2.130$, $R^2 = .185$, and adjusted $R^2 = .098$. CV05 (Number of Employees) was significant at the $p < .10$ level and had the expected direction, i.e., firms with more employees took longer for this phase. CV17 (Month of First Shipment) was significant at the $p = .05$ level, although the coefficient was close to zero (-.00387).

Model 02 (control variables and independent variables without moderation) did not present any problems with multivariate outliers or collinearity. The regression was heteroskedastic in CV06 ($p = .0240$) and IV13 ($p = .0089$). The heteroskedasticity-corrected regression was significant with $p = .039$, $F = 1.877$, $R^2 = .310$, and adjusted $R^2 = .145$. CV17 (Month of First Shipment) was significant at the $p = .05$ level, although the coefficient was close to zero (-.004389). IV13 (Subsidiaries in Mexico) was significant at the $p = .05$ level; its negative coefficient supported H5 concerning the MNC's experience.

In model 05 (control variables and independent variables with moderation by MV6 (Teachability)), cases #6, #68, and #80 were multivariate outliers with Mahalanobis

values greater than 54.05 and had to be excluded. In six subsequent runs, cases #49, #55, #61, #84, #88, #94, and #102 also had to be excluded. In the regression with 74 cases, IV13 (Subsidiaries in Mexico) and its interaction term with MV6 (Teachability) caused a near-singular matrix and had to be left out. The White test showed a problem with heteroskedasticity in IV13 ($p = .0280$). The heteroskedasticity-corrected regression was significant with $p = .043$, $F = 1.792$, $R^2 = .452$, and adjusted $R^2 = .200$. CV17 (Month of First Shipment) was significant at the $p < .01$ level, although close to zero (-.004885). The interaction terms between IV03 (Phone Communication) and both MV6 (Teachability) and IV05 (Incoming Visit Intensity) were significant at the $p < .10$ level. However, the coefficients of both variables confirmed H2 and pointed to a reverse causality between setup performance and communication. Finally, IV07 (Interunit Trust) was also marginally significant ($p < .10$), lending weak support to H3.

In model 10 included the control variables and the independent variables with moderation by MV5 (Documentation Exists) and MV6 (Teachability). In this model, cases #43, #45, #80, and #84 were multivariate outliers with Mahalanobis values greater than 66.62 and had to be excluded. In two subsequent runs, cases #102 and #94 also had to be dropped. MV5 caused multicollinearity and was removed from the model. The White test showed heteroskedasticity in IV05 ($p = .0465$). The heteroskedasticity-corrected regression with 78 cases was significant with $p = .021$, $F = 1.933$, $R^2 = .592$, and adjusted $R^2 = .286$. Within model 10, CV17 (Month of First Shipment) was highly significant ($p < .01$), although close to zero (-.004964). IV03 (Phone Communication) moderated by MV5 (Documentation Exists) had a significant ($p < .05$) positive relation with the dependent variable, which points to the inverted causality mentioned above. In contrast, the marginally significant ($p < .10$) positive coefficient of the interaction term between IV05 (RECIP Incoming Visit Intensity) and

MV6 (Teachability) lends partial support to H1. IV07 (Interunit Trust) had a negative effect ($p < .05$) on DV5, supporting H3. This effect was corroborated by the marginally significant ($p < .10$) negative coefficient of the interaction term between IV07 (Interunit Trust) and MV6 (Teachability). On the other hand, the marginally significant ($p < .10$) positive coefficient of the interaction term between IV07 (Interunit Trust) and DV5 (Documentation Exists) points to the latter as a possible confound. IV13 (Subsidiaries in Mexico) had a marginally significant ($p < .10$) negative coefficient, supporting H5. However, when moderated by MV6 (Teachability), the coefficient ($p < .05$) was positive, to be considered an anomaly. Finally, another anomaly was the marginally significant ($p < .10$) positive coefficient of the interaction term between IV16 (GM's Setup Experience) and MV6 (Teachability).

In model 19 (control variables, moderation by MV5 (Documentation Exists), no independent variables), cases #1, #43, #45, and #84 were multivariate outliers with Mahalanobis values greater than 42.31 and had to be excluded. MV5 (Documentation Exists) caused multicollinearity and was removed from the model. The White test revealed a problem with heteroskedasticity in IV16 ($p = .0450$) and IV16*MV5 ($p = .0301$). The heteroskedasticity-corrected regression with 83 cases was highly significant with $p = .005$, $F = 2.482$, $R^2 = .387$, and adjusted $R^2 = .231$. Three predictor variables were highly significant ($p <. 01$): CV17 (Month of First Shipment) was close to zero (-.004542). IV03 (Phone Communication) moderated by MV5 (Documentation Exists) had a highly significant positive coefficient, supporting H2, which could be considered as evidence of the aforementioned reversed causality relation. In contrast, the highly significant negative coefficient of IV13 (Subsidiaries in Mexico) moderated by MV5 (Documentation Exists) did give partial support to the

corresponding hypothesis (H5). In addition, the interaction term between IV16 (GM's Setup Experience Anywhere) and MV5 (Documentation Exists) had a marginally significant ($p < .10$) negative coefficient, lending partial support to H6.

In model 21 (control variables, moderation by MV7 (Similar Manufacturing), no independent variables), cases #22, #27, #83, #103 and #104 were multivariate outliers with Mahalanobis values greater than 42.31 and had to be excluded. In two subsequent runs, cases #24, #67, and #111 also had to be excluded. There were no problems with singularity or multicollinearity. The White test showed heteroskedasticity in CV06 ($p = .0087$) and IV13*MV7 ($p = .0001$). The heteroskedasticity-corrected regression with 76 cases was significant with $p = .030$, $F = 1.963$, $R^2 = .365$, and adjusted $R^2 = .179$. CV06 (Headquarters in the Americas or Australia) had a significant ($p < .05$) negative correlation with the dependent variable, indicating that firms from the New World were more efficient during this phase. CV17 (Month of First Shipment) was significant ($p < .05$), but close to zero (-.003959). The interaction term between IV03 (Phone Communication) and MV7 (Similar Manufacturing) had a marginally significant ($p < .10$) positive relationship with the dependent variable, indicating an inverse causality. Finally, the interaction term between IV13 (Subsidiaries in Mexico) and MV7 (Similar Manufacturing) was significant at the $p < .05$ level and pointed in the direction that supported H5.

In model 25 (control variables, moderation by MV5 (Documentation Exists) and MV6 (Teachability), no independent variables), cases #24, #43, #45, and #84 were multivariate outliers with Mahalanobis values greater than 55.48 and had to be excluded. In two subsequent runs, cases #1, #4, #80, #103, and #111 also had to be excluded. CV16, MV5, and MV6 caused multicollinearity and were removed from the model. The White test revealed problems with heteroskedasticity in CV02 ($p =$

.0247) and IV13*MV6 (p = .0056). The heteroskedasticity-corrected regression with 75 cases was significant with p = .026, F = 1.931, R^2 = .466, and adjusted R^2 = .224. Four predictor variables were significant at the $p < .05$ level: CV17 (Month of First Shipment) was close to zero (-.004305). The interaction term between IV05 (RECIP Incoming Visit Intensity) and MV6 (Teachability) was positive, giving partial support to H1. The interaction term between IV13 (Subsidiaries in Mexico) and MV5 (Documentation Exists) was negative, giving partial support to H5. Finally, the interaction term between IV16 (GM's Setup Experience Anywhere) and MV5 (Documentation Exists) was also negative, lending partial support to H6.

In model 26 (control variables, moderation by MV5 (Documentation Exists) and MV7 (Similar Manufacturing), no independent variables), cases #22, #43, #45, #84, and #104 were multivariate outliers with Mahalanobis values greater than 55.48 and had to be excluded. In two subsequent runs, cases #27, #94, and #102 also had to be excluded. MV5 caused a problem with multicollinearity and was removed from the model. The White test showed heteroskedasticity in CV02 (p = .0289), CV06 (p = .0207), IV03*MV5 (p = .0476), IV16*MV5 (p = .0454), and IV16*MV7 (p = .0296). The heteroskedasticity-corrected regression with 76 cases was significant with p = .010, F = 2.179, R^2 = .521, and adjusted R^2 = .282. Only two predictor variables were significant at the $p < .05$ level: CV17 (Month of First Shipment) was close to zero (-.004897). The interaction term between IV03 (Phone Communication) and MV5 (Documentation Exists) was positive, confirming the suspicion about the inverse causality for communication when it was not face-to-face. The negative coefficient for the interaction term between IV18 (GM's Setup Experience Anywhere) and MV5 (Documentation Exists) lent partial support to H6, although contradicted by the

marginally significant ($p < .10$) positive coefficient of the interaction term between IV18 (GM's Setup Experience Anywhere) and MV7 (Similar Manufacturing).

In model 27 (control variables, moderation by MV6 (Teachability) and MV7 (Similar Manufacturing) no independent variables), cases #22, #80, and #104 were multivariate outliers with Mahalanobis values greater than 55.48 and had to be excluded. In six subsequent runs, cases #61 and #73, #49, #94, #102, #88, and #55 and #84 also had to be excluded. MV6 and MV7 caused singularity while CV16 caused multicollinearity; these three variables were removed from the model. The White test showed heteroskedasticity in CV14 ($p = .0434$) and IV18*MV6 ($p = .0464$). The heteroskedasticity-corrected regression was significant with $p = .015$, $F = 2.104$, $R^2 = .497$, and adjusted $R^2 = .261$. CV06 (Headquarters in the Americas or Australia) had a marginally significant ($p < .10$) negative correlation with the dependent variable, indicating that firms from the New World were more efficient during this phase. CV17 (Month of First Shipment) was significant at the $p < .01$ level, although close to zero (-.005446). Finally, the interaction term between IV05 (Incoming Visit Intensity) and MV6 (Teachability) pointed in the direction to support H1, but was only marginally significant ($p < .10$).

In the corrected stepwise regression, cases #45 and #84 had Mahalanobis values greater than 55.48 and needed to be excluded. CV14 (Availability of Qualified Suppliers) and CV16 (Cultural Differences) caused multicollinearity and were removed from the model. The White test showed no problem with heteroskedasticity. The regression with 80 cases was highly significant with $p = .000$, $F = 4.105$, $R^2 = .642$, and adjusted $R^2 = .485$. This was the best model for DV5 in terms of both fit and significance. CV17 (Month of First Shipment) was significant at the $p < .01$ level, although close to zero (-.004184). IV01 (RECIP Expatriate Intensity) moderated by

MV2 (Supplier Diversity) had a marginally significant ($p < .10$) positive coefficient, which gave partial support to H1. As in model 26, the interaction term between IV03 (Phone Communication) and MV5 (Documentation Exists) was positive, confirming the suspicion about the inverse causality for communication when it was not face-to-face. The highly significant ($p < .10$) coefficient for IV05 (RECIP Incoming Visit Intensity) moderated by MV6 (Teachability) lent support to H1 when the communication was face to face and subject to having an easily teachable manufacturing technology. IV07 (Interunit Trust) moderated by IV7 (Similar Manufacturing) had a marginally significant ($p < .10$) negative coefficient, lending partial support to H3. IV08 (RECIP Purchases from Headquarters) had a marginally significant ($p < .10$) negative coefficient, which gave a weak support to the interdependence hypothesis (H4). However, when the manufacturing in both units was similar, there was an opposite effect ($p < .01$). Probably, this last relationship should be disregarded as there can be no real interdependence in the supply chain when both plants manufacture the same type of products. In this model, there was strong support for H5 due to the highly significant ($p < .01$) negative coefficient of IV13 (Subsidiaries in Mexico). Similarly to model 26, the marginally significant ($p < .10$) negative coefficient for the interaction term between IV18 (GM's Setup Experience Anywhere) and MV5 (Documentation Exists) lent partial support to H6. Finally, MV2 (Supplier Diversity) also seemed to have a direct influence on time needed from first shipment to corporate-level productivity: The coefficient had the wrong sign, but was only marginally ($p < .10$) significant.

TABLE 11
Results of Regression Analysis for DV5: First Shipment to Corporate-Level Productivity

		Model 01		Model 02[1]		Model 05[1]		Model 10[1]		Model 19[1]	
		B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.
CV02	Metal Industry	.10	(.14)	.12	(.12)	.12	(.15)	-.02	(15)	.09	(.12)
CV05	No. of Employees	.23†	(.12)	.19	(.16)	.20	(.16)	.12	(.19)	.23	(.15)
CV06	HQ in Americas/Aus.	-.16	(.13)	-.13	(.13)	-.12	(.16)	-.05	(.15)	-.17	(.12)
CV13	Local Regulations	.18	(.20)	.06	(.20)	.21	(.22)	.15	(.26)	.06	(.21)
CV14	Qualified Suppliers	.14	(.20)	.13	(.20)	-.04	(.19)	.06	(.24)	.07	(.18)
CV16	Cultural Differences	-.29	(.24)	-.06	(.26)	-.26	(.30)	-.29	(.31)	-.24	(.24)
CV17	Month of 1st Shipm.	.00*	(.00)	.00*	(.00)	.00**	(.00)	.00*	(.00)	.00**	(.00)
CV18	Respondent is GM	-.07	(.14)	-.02	(.14)	.10	(.17)	.06	(.20)	-.06	(.16)
IV01	RECIP Expatriate Intensity			.08	(.39)	.36	(.51)	-.28	(.59)		
IV01*MV2	- mod. by REC Suppl. Div.										
IV01*MV5	- mod. by Documentation							9.09	(9.19)	4.95	(5.57)
IV01*MV6	- mod. by Teachability					1.09	(1.70)	.02	(1.31)		
IV01*MV7	- mod. by Similar Mfg.										
IV03	Phone Communication			.21	(.17)	.23	(.18)	-.12	(.24)		
IV03*MV2	- mod. by REC Suppl. Div.										
IV03*MV5	- mod. by Documentation							7.87*	(3.40)	5.26**	(1.70)
IV03*MV6	- mod. by Teachability					.76†	(.45)	.20	(.55)		
IV03*MV7	- mod. by Similar Mfg.										
IV05	RECIP Incoming Visit Int.			-.05	(.41)	-.66†	(.39)	-.49	(.48)		
IV05*MV2	- mod. by REC Suppl. Div.										
IV05*MV5	- mod. by Documentation							1.67	(7.84)	4.15	(5.94)
IV05*MV6	- mod. by Teachability					-.28	(1.30)	2.27†	(1.26)		
IV05*MV7	- mod. by Similar Mfg.										
IV07	Interunit Trust			-.06	(.06)	-.10†	(.06)	-.24*	(.10)		
IV07*MV2	- mod. by REC Suppl. Div.										
IV07*MV5	- mod. by Documentation							2.87†	(1.66)	-.73	(.81)
IV07*MV6	- mod. by Teachability					-.11	(.22)	-.30†	(.17)		
IV07*MV7	- mod. by Similar Mfg.										
IV08	RECIP Purchases from HQ			-.14	(.12)	.00	(.12)	-.19	(.15)		
IV08*MV2	- mod. by REC Suppl. Div.										
IV08*MV5	- mod. by Documentation							2.82	(2.54)	.12	(1.91)
IV08*MV6	- mod. by Teachability					.29	(.43)	-.02	(.49)		
IV08*MV7	- mod. by Similar Mfg.										
IV13	Subsidiaries in Mexico			-.53*	(.26)			-1.42†	(.79)		
IV13*MV2	- mod. by REC Suppl. Div.										
IV13*MV5	- mod. by Documentation							-.19	(7.80)	-1.14**	(3.13)
IV13*MV6	- mod. by Teachability							3.03*	(1.34)		
IV13*MV7	- mod. by Similar Mfg.										
IV16	GM's Setup Experience			-.01	(.12)	-.07	(.13)	-.03	(.17)		
IV16*MV2	- mod. by REC Suppl. Div.										
IV16*MV5	- mod. by Documentation							-1.56	(2.10)	-2.95†	(1.68)
IV16*MV6	- mod. by Teachability					.59	(.44)	.88†	(.51)		
IV16*MV7	- mod. by Similar Mfg.										
IV18	GM Is Mexican			-.08	(.12)	.02	(.19)	-.02	(.18)		
IV18*MV2	- mod. by REC Suppl. Div.										
IV18*MV5	- mod. by Documentation							-.81	(2.55)	-1.31	(1.72)
IV18*MV6	- mod. by Teachability					.32	(.45)	-.05	(.45)		
IV18*MV7	- mod. by Similar Mfg.										
MV2	RECIP Supplier Diversity										
MV5	Documentation Exists										
MV6	Teachability					-.21	(.23)	.13	(.26)		
MV7	Similar Manufacturing										
C	Intercept	1.08†	(.60)	1.12	(.71)	1.53†	(.85)	2.11*	(.97)	1.28*	(.62)
	n	84		84		74		78		80	
	df	75		67		50		44		63	
	R^2	.185		.310		.452		.592		.387	
	Adjusted R^2	.098		.145		.200		.286		.231	
	F statistic	2.130		1.877		1.792		1.933		2.482	
	Prob (*F* statistic)	.043		.039		.043		.021		.005	

[1] White Heteroskedasticity-Consistent Standard Errors & Covariance

† $p < .10$ * $p < .05$ ** $p < .01$

TABLE 11 (continued)
Results of Regression Analysis for DV5: First Shipment to Corporate-Level Productivity

		Model 21[1]		Model 25[1]		Model 26[1]		Model 27[1]		Stepwise[2]	
		B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.
CV02	Metal Industry	.05	(.12)	.16	(.13)	.00	(.12)	.01	(.12)		
CV05	No. of Employees	.14	(.14)	.22	(.15)	.02	(.17)	.10	(.11)		
CV06	HQ in Americas/Aus.	-.24*	(.12)	-.19	(.14)	-.15	(.11)	-.23†	(.12)	-.13	(.11)
CV13	Local Regulations	.14	(.19)	.16	(.22)	-.06	(.21)	.12	(.18)		
CV14	Qualified Suppliers	.16	(.21)	.01	(.22)	.12	(.18)	-.10	(.20)		
CV16	Cultural Differences	-.17	(.25)			-.29	(.27)				
CV17	Month of 1st Shipm.	.00*	(.00)	.00*	(.00)	.00*	(.00)	-.01**	(.00)	.00*	(.00)
CV18	Respondent is GM	-.01	(.13)	-.04	(.19)	-.01	(.16)	.09	(.13)	-.05	(.13)
IV01	RECIP Expatriate Intensity										
IV01*MV2	- mod. by REC Suppl. Div.									1.97†	(1.14)
IV01*MV5	- mod. by Documentation			6.78	(8.46)	1.64	(6.41)			3.20	(4.84)
IV01*MV6	- mod. by Teachability			-1.18	(1.18)			1.20	(1.36)	1.11	(1.12)
IV01*MV7	- mod. by Similar Mfg.	-.95	(1.42)			-1.30	(1.75)	-1.18	(1.26)		
IV03	Phone Communication										
IV03*MV2	- mod. by REC Suppl. Div.										
IV03*MV5	- mod. by Documentation			.29	(8.13)	4.34*	(2.13)			4.94†	(2.55)
IV03*MV6	- mod. by Teachability			.57	(.99)			.13	(.47)		
IV03*MV7	- mod. by Similar Mfg.	1.58†	(.92)			1.01	(.62)	.75	(.70)	.82	(.60)
IV05	RECIP Incoming Visit Int.									-.45	(.30)
IV05*MV2	- mod. by REC Suppl. Div.									-2.43	(1.62)
IV05*MV5	- mod. by Documentation			-4.52	(6.79)	1.85	(6.43)				
IV05*MV6	- mod. by Teachability			2.25*	(1.02)			1.43†	(.78)	2.32**	(.80)
IV05*MV7	- mod. by Similar Mfg.	.58	(2.11)			-.11	(1.84)	-1.58	(1.58)	-1.00	(1.21)
IV07	Interunit Trust										
IV07*MV2	- mod. by REC Suppl. Div.										
IV07*MV5	- mod. by Documentation			.18	(.85)	-.49	(1.39)				
IV07*MV6	- mod. by Teachability			-.29	(.18)			-.07	(.19)	-.15	(.15)
IV07*MV7	- mod. by Similar Mfg.	-.03	(.35)			-.06	(.51)	-.10	(.39)	-.38†	(.19)
IV08	RECIP Purchases from HQ									-.19†	(.11)
IV08*MV2	- mod. by REC Suppl. Div.										
IV08*MV5	- mod. by Documentation			.31	(2.18)	.05	(2.58)				
IV08*MV6	- mod. by Teachability			.51	(.47)			.21	(.42)		
IV08*MV7	- mod. by Similar Mfg.	.50	(.73)			1.21	(1.03)	1.05	(.67)	1.30**	(.47)
IV13	Subsidiaries in Mexico									-1.10**	(.35)
IV13*MV2	- mod. by REC Suppl. Div.										
IV13*MV5	- mod. by Documentation			-10.86*	(4.36)	-1.03	(6.27)			2.59	(4.60)
IV13*MV6	- mod. by Teachability			-.10	(1.98			1.50	(1.51)		
IV13*MV7	- mod. by Similar Mfg.	-4.04*	(1.65)			-5.79	(3.57)	-3.41	(2.18)		
IV16	GM's Setup Experience									-.02	(.11)
IV16*MV2	- mod. by REC Suppl. Div.										
IV16*MV5	- mod. by Documentation			-4.59*	(1.86)	-1.09	(1.90)				
IV16*MV6	- mod. by Teachability			.22	(.54)			.57	(.44)	.32	(.42)
IV16*MV7	- mod. by Similar Mfg.	-.19	(.65)			-.48	(.55)	.20	(.57)		
IV18	GM Is Mexican										
IV18*MV2	- mod. by REC Suppl. Div.										
IV18*MV5	- mod. by Documentation			-.13	(2.47)	-3.36*	(1.65)			-2.17†	(1.26)
IV18*MV6	- mod. by Teachability			.22	(.33)			.57	(.40)		
IV18*MV7	- mod. by Similar Mfg.	.77	(.66)			1.01†	(.52)	.37	(.69)		
MV2	RECIP Supplier Diversity									-.42†	(.24)
MV5	Documentation Exists										
MV6	Teachability									-.20	(.18)
MV7	Similar Manufacturing	-.20	(.37)			-.27	(.50)			.27	(.21)
C	Intercept	1.40†	(.72)	.93†	(.49)	2.18*	(.92)	1.53**	(.45)	2.00**	(.28)
	n	76		75		76		73		80	
	df	58		51		50		49		55	
	R^2	.365		.466		.521		.497		.642	
	Adjusted R^2	.179		.224		.282		.261		.485	
	F statistic	1.963		1.931		2.179		2.104		4.105	
	Prob (*F* statistic)	.030		.026		.010		.015		.000	

[1] White Heteroskedasticity-Consistent Standard Errors & Covariance
[2] With corrections for multicollinearity and outliers
† $p < .10$ * $p < .05$ ** $p < .01$

5.5.7 Comparison of Regression Analyses across Phases

Table 12 presents the most significant[39] regression models for the different versions of the dependent variable. As a first conclusion, none of the variables was significant in all models, which clearly justifies the approach of separating the setup process into different stages. However, there are also some commonalities concerning control and moderation variables, which are discussed in the following paragraphs.

Compared to the other models, the regression for DV0 (Start of Production to First Shipment) produced a number of significant variables that were not repeated for any other phase. This could be due to either a statistical or a real-world cause, or both: The low case-to-variable ratio and/or the great amount of factors that were not under the control of the MNC during the construction phase.

Firms with Headquarters in the Americas and Australia (CV06) were quicker to bring their subsidiaries to making their first shipments (DV1) and then to full capacity (DV2), but slower to reach corporate-level productivity (DV3, DV5). Compared to their European and East Asian counterparts, the MNCs from the New World seemed to prefer quantity over quality.

The Month of First Shipment (CV17) was significant for DV3 and DV5, but practically zero for all models that included this control variable. Thus the influence of historical time is not clear.

Confirming the results of the principal component analysis (see section 2.6.4), the three moderating variables MV2 (Supplier Diversity), MV5 (Documentation Exists), and MV6 (Teachability) really seemed to tap into different concepts, instead of converging into the desired single construct of "complexity of technology": Across

[39] For DV3, there were two competing "best" models, which are both included in Table 12.

models and across variables, there was no occurrence of three significant interaction terms belonging to the same independent variable.

When the firms were dealing with a great Supplier Diversity (MV2), both Expatriate Intensity (IV01, for the phases of DV1, DV2, DV4, and DV5) and the fact that the GM was a Mexican (IV18, for DV0 and DV2) had a positive impact on setup times. This confirms both H1 and H6, subject to a diverse supplier network.

When the technology could be taught easily (MV6), the Incoming Visit Intensity (IV05) usually had a positive impact on setup times (DV2, DV3, DV4, and DV5).

Trust between the units (IV07) only mattered when considering longer time spans (DV2 and DV3) or when the technology used was really similar between units (DV2, DV4, and DV5).

TABLE 12
Best Models for the Different Versions of the Dependent Variable

		DV0 Stepwise[1, 2]		DV1 Stepwise[1, 2]		DV2 Stepwise[2]		DV3 Model 31[1]		DV3 Stepwise[1, 2]		DV4 Stepwise[2]		DV5 Stepwise[2]	
		B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.
CV02	Metal Industry	-.73†	(.40)			-.08	(.10)	-.01	(.11)			-.11	(.14)		
CV05	No. of Employees	-1.27**	(.40)			-.19	(.12)	.04	(.13)	.13	(.10)	-.26†	(.16)		
CV06	HQ in Americas/Aus.			.15*	(.07)	.18†	(.09)	-.11	(.09)	-.20†	(.11)			-.13	(.11)
CV13	Local Regulations					-.16	(.14)	.14	(.17)	.17	(.12)	-.33	(.21)		
CV14	Qualified Suppliers			.26*	(.11)	-.08	(.15)	-.09	(.19)			-.24	(.19)		
CV16	Cultural Differences	.03	(.89)					-.66*	(.29)			.39	(.27)		
CV17	Month of 1st Shipm.	.00	(.00)			.00	(.00)	.00*	(.00)	.00*	(.00)	.00	(.00)	.00*	(.00)
CV18	Respondent is GM							-.02	(.15)					-.05	(.13)
IV01	REC Expatriate Intens.					-.53	(.32)					-.39	(.42)		
IV01*MV2	- mod. by REC Sup. D.			-1.15†	(.59)	-2.73*	(1.08)			4.55	(5.79)	-2.61†	(1.54)	1.97†	(1.14)
IV01*MV5	- mod. by Document.			4.21†	(2.49)	-.22	(5.01)	4.45	(6.88)	-1.24	(1.13)	-6.05	(7.46)	3.20	(4.84)
IV01*MV6	- mod. by Teachability	8.09*	(3.64)			.47	(.35)	.90	(1.25)					1.11	(1.12)
IV01*MV7	- mod. by Similar Mfg.	5.21*	(2.19)	.84†	(.47)			-.90	(1.17)			-.09	(1.12)		
IV03	Phone Communication	.85†	(.45)	-.04	(.08)										
IV03*MV2	- mod. by REC Sup. D.	-3.83†	(1.95)												
IV03*MV5	- mod. by Document.	-8.69†	(4.70)	-2.02	(1.52)			2.32	(2.41)	3.73†	(2.11)	3.24	(2.82)	4.94†	(2.55)
IV03*MV6	- mod. by Teachability							.10	(.38)			.88†	(.51)		
IV03*MV7	- mod. by Similar Mfg.	4.21**	(1.38)	.40†	(.23)			1.01*	(.47)	.19	(.51)			.82	(.60)
IV05	REC Incoming Visit Int.	-.50	(.87)	.54**	(.16)	-.44†	(.25)					-1.46**	(.43)	-.45	(.30)
IV05*MV2	- mod. by REC Sup. D.	-2.72	(3.67)	1.37	(.88)	1.27	(1.37)							-2.43	(1.62)
IV05*MV5	- mod. by Document.	-17.64	(12.36)					-2.31	(5.53)			13.37*	(6.45)		
IV05*MV6	- mod. by Teachability			.56	(.37)	1.71**	(.61)	1.80	(1.07)	2.08**	(.60)	1.76†	(.94)	2.32**	(.80)
IV05*MV7	- mod. by Similar Mfg.							-1.09	(1.11)			-1.04	(1.05)	-1.00	(1.21)
IV07	Interunit Trust	.29	(.17)	-.02	(.03)	-.12**	(.04)			-.18*	(.08)				
IV07*MV2	- mod. by REC Sup. D.	.91	(.70)			.30	(.23)			.37	(.30)	.44	(.31)		
IV07*MV5	- mod. by Document.							-.11	(.81)	2.11*	(1.01)	-.80	(.81)		
IV07*MV6	- mod. by Teachability			-.11	(.09)	-.20	(.12)	-.19	(.22)	-.35**	(.13)	-.27	(.17)	-.15	(.15)
IV07*MV7	- mod. by Similar Mfg.					-.25†	(.12)	-.21	(.22)	.07	(.36)	-.47*	(.18)	-.38†	(.19)
IV08	REC Purchases from HQ					-.25*	(.10)					-.18	(.15)	-.19†	(.11)
IV08*MV2	- mod. by REC Sup. D.	2.86	(2.05)			.46	(.49)			-.59	(.43)	.48	(.68)		
IV08*MV5	- mod. by Document.	-5.93	(4.40)					1.12	(1.94)			-4.83*	(2.03)		
IV08*MV6	- mod. by Teachability	-2.29*	(1.11)	-.17	(.21)			.07	(.47)						
IV08*MV7	- mod. by Similar Mfg.	-.20	(1.53)	.24	(.25)			.88†	(.50)	.55	(.47)			1.30**	(.47)
IV13	Subsidiaries in Mexico	.50	(.60)	-.14	(.38)	.14	(.35)			-.41	(.29)			-1.10**	(.35)
IV13*MV2	- mod. by REC Sup. D.	-3.51	(2.21)	-.72†	(.40)							-.72	(.83)		
IV13*MV5	- mod. by Document.			2.91	(5.09)	-6.08	(4.48)	-12.28*	(5.03)	-3.83	(3.71)	-2.31	(2.61)	2.59	(4.60)
IV13*MV6	- mod. by Teachability	-3.90	(6.17)					2.49**	(.66)			-1.28	(.92)		
IV13*MV7	- mod. by Similar Mfg.							-2.90	(1.92)						
IV16	GM's Setup Experience	-.29	(.34)			-.13	(.11)							-.02	(.11)
IV16*MV2	- mod. by REC Sup. D.	-2.51	(1.53)	.35	(.34)	1.36*	(.52)					1.11†	(.65)		
IV16*MV5	- mod. by Document.	6.46	(5.33)	2.38*	(1.09)	1.23	(1.63)	-1.88	(1.84)	-.66	(1.12)				
IV16*MV6	- mod. by Teachability	1.88†	(1.06)	.43	(.27)	-.81**	(.31)	.98*	(.42)	.72†	(.40)			.32	(.42)
IV16*MV7	- mod. by Similar Mfg.			-.52*	(.25)			-.13	(.53)			-.65	(.44)		
IV18	GM Is Mexican	.53	(.33)	-.08	(.09)							.12	(.15)		
IV18*MV2	- mod. by REC Sup. D.	4.24**	(1.45)			-1.68**	(.48)	1.29	(1.92)			-1.06	(.64)		
IV18*MV5	- mod. by Document.			.29	(1.32)			.08	(.36)			-3.77†	(2.16)	-2.17†	(1.26)
IV18*MV6	- mod. by Teachability			-.48*	(.20)	-.16	(.27)	-.16	(.52)						
IV18*MV7	- mod. by Similar Mfg.	-1.96†	(1.15)	-.43†	(.24)										
MV2	REC Supplier Diversity	-1.01	(.93)	-.23	(.15)	.28	(.24)			-.04	(.19)			-.42†	(.24)
MV5	Documentation Exists														
MV6	Teachability	-.67	(.46)	-.13	(.11)	-.32*	(.14)	.09	(.22)	-.34†	(.17)	.42	(.32)	-.20	(.18)
MV7	Similar Manufacturing	.07	(.56)							.35	(.23)	-.51*	(.20)	.27	(.21)
C	Intercept	5.83**	(1.79)	.38	(.23)	2.58**	(.52)	2.25**	(.64)	1.43**	(.35)	2.45**	(.82)	2.00**	(.28)
	n	63		101		95		76		76		97		80	
	df	30		72		65		42		52		63		55	
	R^2	.637		.441		.537		.650		.600		.569		.642	
	Adjusted R^2	.249		.224		.330		.375		.423		.343		.485	
	F statistic	1.642		2.028		2.599		2.361		3.391		2.520		4.105	
	Prob (*F* statistic)	.088		.009		.001		.004		.000		.001		.000	

[1] White Heteroskedasticity-Consistent Standard Errors & Covariance
[2] With corrections for multicollinearity and outliers
† $p < .10$ * $p < .05$ ** $p < .01$

6 Results and Discussion

While section 5.5 presented the results of the regression analyses separately for each version of the dependent variable, section 6 looks at the effects of different variables across the phases of the setup processes. These results are discussed and compared to previous studies and the predictions derived from theory.

6.1 Significance of Findings

With the exception of the model for DV0[39] (Start of Construction to First Shipment), all the best models for all versions of the dependent variable were highly significant at the $p < .01$ level. The best models for DV1 through DV5 had fit indicators (R^2) ranging between .441 and .650. These results are in line with comparable studies in the context of MNCs. For example, Barner-Rasmussen's (2003)'s study with $n = 89$ obtained $R^2 = 0.494/0.267$ for $n = 89$ with "subsidiary managers' feedback-seeking behavior" as the dependent variable, Roth and Nigh's (1992) study with $n = 105$ yielded R^2 values of .25/.28 with "effectiveness of headquarter-subsidiary relationships" as the dependent variable, while Szulanski, Capetta, and Jensen's (2004) study with $n = 122$ obtained $R^2 = 0.504$ with "accuracy of reproduction of template" as the dependent variable.

From a theoretical standpoint, Green (1991) recommended having at least 94 subjects for 30 independent variables and at least 110 subjects for 40 independent variables in order to obtain a level of significance (alpha) of .05 and a power of .80, provided a large effect size ($R^2 = .26$). Again with the exception of the model for DV0 (Start of Construction to First Shipment), the effective sample sizes with between 76 and 101 cases and 24 to 34 predictor variables all led to R^2 values greater than .44, showing that the results of this study were indeed significant.

[39] See the discussion in section 5.1.

6.2 Control Variables

The statistical analysis considered a set of eight control variables, which were included in all systematic models. The corrected stepwise regression models reduced the number of control variables to between two and six, depending on the version of the dependent variable. The following paragraphs discuss the influence of the control variables for the different phases of the setup process.

The variable retained for taking into account the effect of industry (CV02, Metal Industry) was generally not significant for the different time spans of the setup process. The only exception was DV0 (Start of Construction to First Shipment), where it showed a marginal significance ($p < .10$). This rather modest effect becomes even more questionable when taking into account the reduced sample size ($n = 63$) for DV0 (Start of Construction to First Shipment), within which only 17 firms belonged to the metal industry. If one chooses to acknowledge the effect, firms from the metal industry took less time for the first steps in their setup processes. One possible explanation could be the industry structure of the host region: Northeast Mexico has traditionally been a center of the metal mechanic industry, so newly arriving firms can count on local expertise for building their facilities and installing their machines. However, in the subsequent phases of the setup process, these favorable conditions did not play a noticeable role anymore, as the specific proprietary technology of the foreign MNC became more relevant.

The size of the focal subsidiary was measured by its number of employees. Correlation analysis indicated that size increased with complexity, so larger subsidiaries should take longer to establish. However, this was not found for any phase of the setup process. To the contrary, there was a highly significant negative ($p < .01$) coefficient of CV05 (Number of Employees) for DV0 (Start of Construction to

First Shipment), which was echoed by the marginally significant ($p < .10$) coefficient of CV05 (Number of Employees) in the corrected stepwise model for DV4 (First Shipment to Full Capacity). It seems that in these cases, the larger firms had a higher technology transfer capacity for both the initial phase and the ramp-up process. When transfer capacity was measured as time required to achieve corporate-level productivity, however, subsidiary size not only became non-significant put took the opposite sign. This relationship between subsidiary size and the dependent variables that had corporate-level productivity as their end point (DV3 and DV5) was confirmed by the bivariate correlation analysis. Subsidiary size seemed thus to have two opposing effects on transfer times: Establishing a larger subsidiary was faster but the fine-tuning required for reaching a high degree of productivity was easier in smaller subsidiaries. A possible explanation would be the difference between planning and improvisation: The establishment of a large subsidiary normally implies a large investment, for which MNCs put into practice a detailed budget and planning procedure. If the investment (or the originating MNC) is small, such detailed planning is not carried out and time is lost due to unanticipated problems that have to be resolved along the way. On the other hand, when it comes to raising the level of productivity in the new subsidiary, many aspects of the production process have to be improved until the whole system works flawlessly, and not all these aspects can be completely planned from the start.

Although it is a standard topic in the international business literature, the effect of cultural distance on transfer times was not formulated as a separate research hypothesis due to the lack of variety in the sample (only 13 cases from East Asia). Nevertheless, cultural distance was included as both an objective measure (CV06 (Headquarters in the Americas or Australia)) and a subjective appreciation by the

respondents (CV16 (Perceived Influence of Cultural Differences on the Setup Process)). The expected direction of influence was that subsidiaries from culturally proximate headquarters would have shorter setup times, due to a lesser liability of foreignness, i.e., a lesser need to adapt their home-country ways of operating to the new local context. This predicted effect was found with marginal significance ($p <$ .10) for two models (model 21 (no unmoderated independent variables, moderation effects by MV7 (Similar Manufacturing)) and the corrected stepwise model) of DV3 (Arrival of Machines to Corporate-Level Productivity) and for model 27 (no unmoderated independent variables, moderation effects by MV6 (Teachability) and MV7 (Similar Manufacturing)) of DV5 (First Shipment to Corporate-Level Productivity). For model 21 of DV5 (First Shipment to Corporate-Level Productivity), the cultural-distance hypothesis was even confirmed at the $p < .05$ level. This means that for the fine-tuning required for increasing productivity, cultural distance seemed to be a real obstacle. In contrast, the opposite effect showed in the corrected stepwise models for DV1 (Arrival of Machines to First Shipment) and DV2 (Arrival of Machines to Full Capacity), with significance levels of $p < .05$ and $p < .10$, respectively. This interesting contradiction is similar to the effect of subsidiary size on setup time and could also be explained as the result of more or less detailed planning, which in principle helps in the earlier phases of the setup process: While the American MNCs confided in being able to improvise part of the initial phase and the ramp-up, European and East Asian MNCs might have thought that the stakes were too high for such a trial-and-error approach. And by planning more rigorously, they achieved shorter setup times.

This supposed difference between insouciance and conscientious planning shows more prominently in the significant coefficients for the subjective appreciation of

cultural distance. For DV4 (First Shipment to Full Capacity), the coefficients of CV16 (Perceived Cultural Difference) were positively significant ($p < .05$) in models 02 (unmoderated independent variables, no moderation effects) and 06 (unmoderated independent variables, moderation by MV7 (Similar Manufacturing)), although the coefficient was absent from the corrected stepwise model, which had the best fit. These results give partial support to the cultural-distance hypothesis as long as the merely quantitative aspect of production is considered. For several models (models 01, 21, 25, 27, and 31) with DV3 (Arrival of Machines to Corporate-Level Productivity) as the dependent variable, however, CV16 (Perceived Cultural Difference) took on a negative coefficient with significance levels of $p < .05$ and $p < .10$, depending on the model. Again, this effect was absent in the corrected stepwise model. However, there is reasonably strong support for concluding that those firms where managers actually saw cultural differences as an obstacle did better in the more difficult phase of productivity enhancement. Conversely, other firms where managers were unaware of these difficulties could have benefited from more culture consciousness. The results thus provide a rationale for offering cultural-awareness training to managers who have been selected to run a new subsidiary in a foreign country.

Among the two control variables considered for taking into account the influences of the local environment, Local Regulations (CV13) did not appear to be a significant issue. However, Availability of Qualified Suppliers (CV14) showed a significant ($p < .05$) coefficient for DV1 (Arrival of Machines to First Shipment). According to this result, the need to develop a local supplier network did slow down the setup process in its initial phase. Apparently, there still was a significant gap in the quality of the support infrastructure of Northeast Mexico compared to the MNCs' home countries.

The control variable for historical time (CV17 (Month of First Shipment)) was significant in most models across all phases of the setup process except DV0 (Arrival of Machines to First Shipment) and DV4 (First Shipment to Full Capacity). However, its value consistently showed up as zero (to the second digit) except for model 27 for DV5 (First Shipment to Corporate-Level Productivity), where it was -.01. The conclusion is that historical time did not have a significant influence on the duration of the setup process; i.e., neither external conditions nor transfer practices varied significantly between 1998 and 2006.

Likewise, the identity of the respondent (CV18 (Respondent is General Manager)) did not show any significant coefficients across models and versions of the dependent variable.

6.3 Moderation Approach

The results justify the inclusion of moderation variables for taking into account the difficulty of the transfer task: For DV0 (Start of Construction to First Shipment), DV1 (Arrival of Machines to First Shipment), DV2 (Arrival of Machines to Full Capacity), and DV3 (Arrival of Machines to Corporate-Level Productivity), the unmoderated models did not even meet the significance threshold of $p < .05$. For DV4 (First Shipment to Full Capacity), the unmoderated model only produced an R^2 value of .251 versus .569 for the corrected stepwise model (adjusted R^2 of .110 and .343, respectively). In the case of DV5 (First Shipment to Corporate-Level Productivity), the unmoderated model yielded a fit of $R^2 = .310$ compared to .642 for the corrected stepwise model (adjusted R^2 of .145 and .485, respectively). In summary, this study proves that for measuring transfer capacity, the difficulty of the transfer task needs to be taken into account. For the issue of complexity of technology, these results confirm the findings of Galbraith (1990), Holtbrügge and Berg (2004), and Subramanian and

Venkatraman (2001), while the interunit similarity aspect had not been considered in previous studies.

When looking at how moderation turned out in detail, however, the results were a lot more complicated[40], as moderation effects were not equally important across regression models and setup phases and as the unmoderated independent variables also played a role in different models.

6.3.1 Effects of MV2 (RECIP Supplier Diversity)

MV2 (RECIP Supplier Diversity) had a marginally significant ($p < .10$) direct influence within the corrected stepwise model for DV5 (First Shipment to Corporate-Level Productivity). This rather tenuous evidence that Supplier Diversity was indeed a good indicator for the difficulty of the transfer task was propped up by its significant interaction effects with IV01 (RECIP Expatriate Intensity), IV03 (Phone Communication), IV13 (Subsidiaries in Mexico), IV16 (GM's Setup Experience), and IV18 (GM Is Mexican).

When there was a large number of suppliers, having more expatriates at the new subsidiary helped to reduce ramp-up times, as evidenced by the significant ($p < .05$) interaction terms of IV01 (RECIP Expatriate Intensity) and MV2 (RECIP Supplier Diversity) within both model 27 (control variables, no unmoderated independent variables, moderation effects with MV6 (Teachability) and MV7 (Similar Manufacturing)) and the corrected stepwise model for DV2 (Arrival of Machines to Full Capacity). The same effect was marginally significant ($p < .10$) within the corrected stepwise models for DV1 (Arrival of Machines to First Shipment) and DV4 (First Shipment to Full Capacity). Judging by the size of the coefficients, the

[40] These highly complicated matters also explain why Minbaeva's (2007) approach of lumping together tacitness, complexity, non-specificity, and non-availability into a "characteristics of knowledge" construct produced a non-significant result in her model.

effectiveness of high expatriate intensity for subsidiaries with high supplier diversity was relatively low in the first phase of the setup, reached its peak for the ramp-up, while it was not helpful for increasing productivity. To the contrary, the coefficient of the interaction term of IV01 (RECIP Expatriate Intensity) and MV2 (RECIP Supplier Diversity) was even positive ($p < .10$) within the corrected stepwise model for DV5 (First Shipment to Corporate-Level Productivity). If supplier diversity is taken as a measure of the complexity of the operation, the permanently available foreign expertise was most helpful for ramping up production quickly, i.e., the phase where those people who knew how to run a factory could contribute for organizing the production system. There even is some evidence that there was an inverted causal relationship for the fine-tuning required for achieving high levels of productivity: Possibly, MNCs dispatched more expatriates when it was felt that productivity was not high enough at the new subsidiary, although this action failed to produce the desired results.

The interaction term between IV03 (Phone Communication) and MV2 (RECIP Supplier Diversity) was marginally significant ($p < .10$) for DV0 (Arrival of Machines to First Shipment). As in the other instances of significant coefficients for IV03 (Phone Communication), the sign points to a reverse causality: When the start-up was not going well, the phone was used more often.

For the first phase of the setup process, subsidiaries with a high supplier diversity also benefited when their MNCs had previously established plants in the host country, as evidenced by the marginally significant ($p < .10$) negative coefficient of the interaction term between IV13 (Subsidiaries in Mexico) and MV2 (Supplier Diversity) for DV1 (Arrival of Machines to First Shipment). Obviously, the second or third subsidiaries could tap into the first plants' supplier networks, which helped reduce

setup times. Once the supplier network had been acquired, the MNC's previous host-country experience ceased to play a significant role in the setup process.

The interaction terms between IV16 (GM's Setup Experience) and MV2 (RECIP Supplier Diversity) had significant coefficients within model 29 (no unmoderated independent variables, moderation by MV2 (RECIP Supplier Diversity), MV5 (Documentation Exists), and MV7 (Similar Manufacturing)) and the corrected stepwise model for DV2 (Arrival of Machines to Full Capacity), with significance levels of $p < .10$ and $p < .05$, respectively. For ramping up the production of supplier-intensive plants, the General Manager's Setup Experience (IV16) was indeed useful for reducing setup times, while during the other phases, the helpfulness of this experience was not evident.

Finally, MV2 (RECIP Supplier Diversity) also was highly significant ($p < .01$) in its interaction with IV18 (GM is Mexican) within the corrected stepwise model for DV0 (Start of Construction to First Shipment). The same effect was highly significant ($p < .01$) within both model 29 (no unmoderated independent variables, moderation by MV2 (RECIP Supplier Diversity), MV5 (Documentation Exists), and MV7 (Similar Manufacturing)) and the corrected stepwise model for DV2 (Arrival of Machines to Full Capacity). Thus, for starting and ramping up production, when the subsidiary needed to acquire a lot of suppliers, it was a definite advantage to have a Mexican general manager, i.e., someone who could tap into the local network of firms and help overcome the MNC's liability of foreignness.

6.3.2 Effects of MV5 (Documentation Exists)

MV5 (Documentation Exists) represented one of the main themes of the knowledge-based view: The codification of knowledge in order to increase its transferability. Testing this relationship implied measuring the degree of codification

(or its counterpart, tacitness) and tying it to organizational outcomes. However, MV5 (Documentation Exists) was the one moderating variable that produced the most complex results in this study. Already when preparing the data for analysis, it became obvious that Zander and Kogut's (1995) four items for measuring codification would not coalesce into a single variable. The item with the best face value was salvaged as MV5 (Documentation Exists). It did not have any direct influence on the different versions of the dependent variable, but presented significant interaction terms with all independent variables across one or several phases of the setup process.

The interaction term of IV01 (RECIP Expatriate Intensity) with MV5 (Documentation Exists) was marginally significant ($p < .10$) for DV1 (Arrival of Machines to First Shipment). When the technology was well documented, a relatively high expatriate intensity helped to speed up the process of making the new plant operational. A possible explanation is that the expatriates were fully proficient in the language that most MNC documents are written in, while Mexican nationals had more difficulties to extract the pertaining information. Normally, only a small part of the technical documentation is translated. The resulting language gap is most consequential during the installation phase, when the production system has to be built up without having local references. In subsequent phases, the plant is already up and running, so information requirements are lesser and full proficiency in the MNC's home-country language becomes less of a problem.

The interaction term of IV03 (Phone Communication) with MV5 (Documentation Exists) was marginally significant ($p < .10$) within the corrected stepwise models for DV0 (Start of Construction to First Shipment), DV3 (Arrival of Machines to Corporate-Level Productivity), and DV5 (First Shipment to Corporate-Level Productivity). For this last version of the dependent variable, the interaction term also

was significant ($p < .05$) within models 10 (unmoderated independent variables, moderation by MV5 (Documentation Exists) and MV6 (Teachability)) and 26 (no unmoderated independent variables, moderation by MV5 (Documentation Exists) and MV7 (Interunit Similarity)) and highly significant ($p < .01$) within model 19 (no unmoderated independent variables, moderation by MV5 (Documentation Exists)). For DV0, the coefficient was negative, while it was positive in all other instances. This means that while the plant was being established, phone communication together with a high degree of documentation helped with the process. In the phases where productivity enhancement was the goal, however, the frequency of phone communication was merely a symptom of unsatisfactory results, although the technology was supposedly well documented. This contrast shows how much of the relevant information is really amenable to documentation: There are usually detailed layouts and descriptions for installing a plant, which could be supplemented by additional information given over the phone. In contrast, fine-tuning the process in order to increase productivity still depended on tacit knowledge, where neither documentation nor phone calls were helpful. The results indicate an inverse causality: Mediated communication about issues that required face-to-face contact was harmful, maybe because it distracted from the real issues.

The interaction term of IV05 (RECIP Incoming Visit Intensity) with MV5 (Documentation Exists) was significant ($p < .05$) only within the corrected stepwise model for DV4 (First Shipment to Full Capacity). For the ramp-up phase at least, the combination of written documents and face-to-face communication helped reduce setup times, while the unmoderated IV05 (RECIP Incoming Visit Intensity) by itself was significantly ($p < .01$) related to longer setup times. This result gives support to Polanyi's (1967) original concept of the "tacit dimension" –according to which fully

successful communication of knowledge requires both explicit and tacit elements to be present– against Nonaka's (1994) idea of converting tacit into explicit knowledge (and vice versa). Unfortunately, the effect was limited to the ramp-up phase, while it was absent or non-significant for the models of the other phases. Probably, the time from first shipment to full capacity was the one phase where communication most mattered for the success of the setup process, while during the other phases, different factors came to the fore.

The interaction term of IV07 (Interunit Trust) with MV5 (Documentation Exists) was significant ($p < .05$) within model 29 (no unmoderated independent variables, moderation by MV2 (RECIP Supplier Diversity), MV5 (Documentation Exists), and MV7 (Similar Manufacturing)) for DV2 (Arrival of Machines to Full Capacity). It was also marginally significant ($p < .10$) within model 10 (unmoderated independent variables, moderation by MV5 (Documentation Exists) and MV6 (Teachability)) and highly significant ($p < .01$) within the corrected stepwise model for DV3 (Arrival of Machines to Corporate-Level Productivity). However, the results were inconsistent: For DV2 (Arrival of Machines to Full Capacity), the coefficient was negative, indicating that the combination of interunit trust and a high degree of documentation helped speed up the process. This result was in accordance with Polanyi's (1967) theory, as explained above. However, the coefficients within both models (see above) for DV3 (Arrival of Machines to Corporate-Level Productivity) were positive, as if trust and documentation together slowed down the setup process. This apparent contradiction confirms the thesis that documentation is irrelevant for reaching high levels of productivity. Possibly, the results surface a shortcoming of the instrument: MV5 (Documentation Exists) measures the quantity of written documentation, not its

quality, which could be the more important criterion. Unfortunately, testing this theory is a task left for future studies.

The interaction term of IV08 (RECIP Purchases from Headquarters) with MV5 (Documentation Exists) was marginally significant ($p < .10$) within model 29 (no unmoderated independent variables, moderation by MV2 (RECIP Supplier Diversity), MV5 (Documentation Exists), and MV7 (Similar Manufacturing)) for DV2 (Arrival of Machines to Full Capacity), but absent in the corrected stepwise model, which had the best fit. The interaction term also was marginally significant ($p < .10$) within model 10 (unmoderated independent variables, moderation by MV5 (Documentation Exists) and MV6 (Teachability)) for DV3 (Arrival of Machines to Corporate-Level Productivity), where the non-significant coefficient in the corrected stepwise model even took the opposite sign. These results seem too tenuous to draw any convincing conclusions.

The results were a lot clearer for the interaction term of IV13 (Subsidiaries in Mexico) with MV5 (Documentation Exists). The corresponding coefficient was significant at either the $p < .05$ or even the $p < .01$ level within three models (25, 26, and 31) for DV3 (Arrival of Machines to Corporate-Level Productivity) and within two models (19 and 25) for DV5 (First Shipment to Corporate-Level Productivity). Although the corresponding coefficients were non-significant in the corrected stepwise models for both dependent variables, those coefficients that were significant all had negative signs. This is evidence for the combined effect of documentation and host-country experienced for speeding up transfer times. Again, the result can be interpreted as an indicator of the successful combination of both explicit and tacit knowledge.

The interaction term of IV16 (GM's Setup Experience) with MV5 (Documentation Exists) was significant ($p < .05$) for DV1 (Arrival of Machines to First Shipment). However, the positive sign of the coefficient constitutes an anomaly, as in theory, personal and documented knowledge together should help to make the setup process more expedient. A possible explanation could be derived from correlation analysis: The general managers with the greatest setup experience tended to be Mexican nationals. Supposing that these managers were less familiar with the more complicated, written version of the home-country language of the MNC, a high reliance on documentation actually worked to the detriment of transfer efficiency, due to the fact that part of the written information was more difficult to use in the new subsidiary. This phenomenon affected the installation phase because –as seen above– it was the period where documented knowledge played the most prominent role. In contrast, the interaction term of IV16 (GM's Setup Experience) with MV5 (Documentation Exists) had positive signs within models 19 (no unmoderated independent variables, moderation by MV5 (Documentation Exists)) and 25 (no unmoderated independent variables, moderation by MV5 (Documentation Exists) and MV6 (Teachability)) for DV5 (First Shipment to Corporate-Level Productivity), with significance levels of $p < .10$ and $p < .05$, respectively. Although in the corrected stepwise model, this effect was eclipsed by the highly significant ($p < .01$) unmoderated IV13 (Subsidiaries in Mexico), these results lend partial support to the thesis that codified and personal knowledge need to be combined to be effective.

The interaction term of IV18 (GM Is Mexican) with MV5 (Documentation Exists) was marginally significant ($p < .01$) within the corrected stepwise models for DV4 (First Shipment to Full Capacity) and DV5 (First Shipment to Corporate-Level Productivity). For the latter version of the dependent variable, the interaction term

was also significant ($p < .05$) within model 26 (no unmoderated independent variables, moderation by MV5 (Documentation Exists) and MV7 (Similar Manufacturing)). Arguably, the combination of having good documentation and the advantages of being part of the local culture were greatest within the last phases of the setup process, where documentation was not all-important.

In summary, the results for MV5 (Documentation Exists) offer a more nuanced contribution to the debate about codification (cf. Johnson, Lorenz, & Lundvall, 2002) in the context of plant setup: Documentation is a helpful element, but only if it is complemented by various channels for face-to-face communication that allow the tacit elements of the knowledge to be transferred. Furthermore, the relationship between the quantity and the quality of documentation remains to be established.

6.3.3 Effects of MV6 (Teachability)

MV6 (Teachability) turned out to be the variable that most frequently appeared as the moderating element within significant interaction terms, which were present at least once across the difference setup phases. Moreover, MV6 (Teachability) was significant ($p < .05$) as a direct predictor variable for DV2 (Arrival of Machines to Full Capacity) and marginally significant as a direct predictor variable for DV3 (Arrival of Machines to Corporate-Level Productivity), i.e., the two versions of the dependent variable that spanned the longest periods of time. It can be concluded that the ease of teaching the technology was the best measure for the difficulty of the transfer task.

The interaction term of IV01 (RECIP Expatriate Intensity) with MV6 (Teachability) was significant ($p < .05$) for DV0 (Start of Construction to First Shipment). When the technology was easy to teach, a relatively high expatriate intensity helped to speed up the process of installing the new plant, while in the other setup phases, such an advantage did not exist. It can be concluded that the availability

of production knowledge became less critical as the setup process evolved over time. Moreover, the intricacies of highly complex technologies are often understood by only a small number of people within the MNC, so more expatriates did not make a significant contribution to the transfer of knowledge that was difficult to teach.

The interaction term of IV03 (Phone Communication) with MV6 (Teachability) was marginally significant ($p < .10$) within the corrected stepwise models for DV4 (First Shipment to Full Capacity) and within model 05 (unmoderated independent variables, moderation by MV6 (Teachability)) for DV5 (First Shipment to Corporate-Level Productivity). However, in both cases, the coefficients were positive, meaning that for the later phases of the setup process, mediated communication was inadequate for transmitting even knowledge that had been judged easy to acquire. Probably, this very quality of the technology led MNC managers to expect faster progress in the setup process, so they often communicated with each other, without achieving any improvement, though. As in other cases, IV03 (Phone Communication) thus was an effect of the setup process, not a factor that contributed to it.

The interaction term of IV05 (RECIP Incoming Visit Intensity) with MV6 (Teachability) was highly significant ($p < .01$) within the corrected stepwise models for DV2 (Arrival of Machines to Full Capacity), DV3 (Arrival of Machines to Corporate-Level Productivity) and DV5 (First Shipment to Corporate-Level Productivity). With a lower degree of significance, this effect was also found in models 10, 25, and 27 for DV3 (Arrival of Machines to Corporate-Level Productivity), in the corrected stepwise model for DV4 (First Shipment to Full Capacity), and in models 10, 25, and 27 for DV5 (First Shipment to Corporate-Level Productivity). Within the whole study, this was the most universally valid result: When a technology

could be taught easily, bringing in the MNC's experts to the new subsidiary definitely helped with the setup process.

The interaction term of IV07 (Interunit Trust) with MV6 (Teachability) was significant ($p < .05$) within model 10 (unmoderated independent variables, moderation by MV5 (Documentation Exists) and MV6 (Teachability)) and highly significant ($p < .01$) within the corrected stepwise model for DV3 (Arrival of Machines to Corporate-Level Productivity). The same interaction term was also marginally significant ($p < .10$) within model 10 for DV5 (First Shipment for Corporate-Level Productivity), although it was absent from the corrected stepwise model, which had the best fit. For the phases where documented knowledge was less important, the positive effect of teachability was enhanced by interunit trust. This relationship between trust and teaching seems indeed obvious: We are more open to learning from people in whom we can confide.

The interaction term of IV08 (RECIP Purchases from Headquarters) with MV6 (Teachability) was significant ($p < .05$) for DV0 (Start of Construction to First Shipment) only. The negative sign of the coefficient could be explained as follows: The delays caused by lacking supplies from the headquarters were exacerbated when the technology was not too complex. In other words, a malfunction in the MNC's internal supply chain was felt especially in the startup process of low and medium tech plants, for which the complexity of the manufacturing process was not the decisive factor.

The interaction term of IV13 (Subsidiaries in Mexico) with MV6 (Teachability) was highly significant ($p < .01$) within models 10 (unmoderated independent variables, moderation by MV5 (Documentation Exists) and MV6 (Teachability)) and 31 (no unmoderated independent variables, moderation by MV5 (Documentation Exists),

MV6 (Teachability), and MV7 (Similar Manufacturing)) for DV3 (Arrival of Machines to Corporate-Level Productivity), although absent in the corrected stepwise model, which had the best fit. Additionally, the interaction term was significant ($p < .05$) within model 10 for DV5 (First Shipment to Corporate-Level Productivity). In all cases, the coefficients were positive, which represents an anomaly: Having previously established subsidiaries in the country should always help with transfer performance, independently of the complexity of technology. However, there was some evidence that this constellation was detrimental for reaching high levels of productivity. It could be that an MNC's previous host-country experience led its managers to become overconfident in their ability to handle the new subsidiaries. Alternatively, one could suppose that the same experience made the MNC managers abandon the idea of reaching high levels of productivity in their Mexican affiliates, i.e., they believed that the productivity gap could not be closed at all. In any event, these speculations are not based on any solid data, as the corresponding interaction effect was not present in any of the models that exhibited the best fit.

The interaction term of IV16 (GM's Setup Experience) with MV6 (Teachability) was highly significant ($p < .01$) within the corrected stepwise model for DV2 (Arrival of Machines to Full Capacity). The coefficient's negative sign indicated that for the ramp-up phase of the setup process, personal setup experience was a definite advantage as long as the technology was not too complex. This result stands in contrast with the positive sign that the same interaction term took within the stepwise model for DV0 (Start of Construction to First Shipment), within five different models for DV3 (Arrival of Machines to Corporate-Level Productivity), and within model 10 (unmoderated independent variables, moderation by MV5 (Documentation Exists) and MV6 (Teachability)) for DV5 (First Shipment to Corporate-Level Productivity). This

apparent contradiction points to the fundamental difference between structured and unstructured tasks during the overall setup process: Ramping up production basically means installing more machines and training more personnel when the foundations have already been laid, so it is clear what has to be done. Apparently, this is a skill that can be transferred from one setup process to another. In contrast, both installing a new plant and fine-tuning the process to achieve high levels of productivity require unique actions, where –according to the results– the previous learning even harmed transfer performance. In other words, personal transfer experience can be a negative factor, as it might lead to complacency when creativity and attention to new details are called for. A complementary explanation would be a certain shortsightedness in the selection of the general managers: If MNCs choose managers based on their specific skills to expand production, they might forego other abilities that would produce better results before and after the ramp-up phase.

Finally, the interaction term of IV18 (GM's Is Mexican) with MV6 (Teachability) was significant ($p < .05$) within the corrected stepwise model for DV1 (Arrival of Machines to First Shipment). Thus, when the technology was not too complex, having a general manager who knew how to deal with the local conditions outweighed the advantages attributable to a foreign expert. This effect only appeared for the phase where the new plant had to establish its production system; in other phases, this combination of factors did not play a significant role.

In conclusion, MV6 (Teachability) was the most significant moderating variable. A technology that was easy to teach allowed for a speedy production ramp-up, while the effects of teachability were marginal at best for the other setup phases. In von Hippel's (1994) terms, teachability was the best indicator of knowledge "stickiness". The results for MV6 (Teachability) also showed that technology transferred had

different characteristics across the overall setup process: In the phases that included structured tasks, increasing face-to-face communication enhanced transfer efficiency for low and medium tech production systems, while in the phases that required actions that were more difficult to plan for in detail, this effect was not present at all or subject to having a trustful relationship. MV6 (Teachability) thus brought out the virtues of two different coordination mechanisms in transfer projects: Frequent face-to-face communication was the key factor for improving the performance at structured tasks, while trust was the main element helping with unstructured tasks.

6.3.4 Effects of MV7 (Similar Manufacturing)

MV7 (Similar Manufacturing) had a significant ($p < .05$) direct effect within the corrected stepwise model for DV4 (First Shipment to Full Capacity). Apparently, production ramp-up was easier when two corresponding plants were employing the same technology or a similar one. In these cases, the transfer of the production system was more of a replication, which proved to be faster than the implementation of new elements at the recently established subsidiary. The advantage of having similar plants came to bear most clearly in the expansion phase of the new subsidiary, which – as pointed out above– implied the most structured tasks for the managers.

The interaction term of IV01 (RECIP Expatriate Intensity) with MV7 (Similar Manufacturing) was significant ($p < .05$) for DV0 (Start of Construction to First Shipment) and marginally significant ($p < .10$) for DV1 (Arrival of Machines to First Shipment). In both cases, having more expatriates working at the new subsidiary helped speeding up the initial phase of the setup process, subject to having similar manufacturing operations. It thus made sense to start with a higher number of expatriates, especially if the transfer was basically a replication. It can be assumed that in the later phases, most of the interunit learning process had already taken place,

so a higher number of expatriate did not add value to the process. This decline of effectiveness is in line with the theory of the learning curve, but subject to a replication as different from an adaptation process.

The interaction term of IV03 (Phone Communication) with MV7 (Similar Manufacturing) was significant across four different versions of the dependent variable. It was highly significant ($p < .01$) for DV0 (Start of Construction to First Shipment), marginally significant ($p < .10$) for DV1 (Arrival of Machines to First Shipment), significant at the $p < .05$ level within model 31 for DV3 (Arrival of Machines to Corporate-Level Productivity), and marginally significant ($p < .10$) within model 21 for DV5 (First Shipment to Corporate-Level Productivity). These results indicate that especially in the first phases of the setup process, there was intensive mediated communication between the setup unit and the new subsidiary. In all instances, however, the corresponding coefficients were positive, which corroborates the thesis that mediated communication is not helpful for transfer performance but only indicates that there are indeed problems. For the specific case of a high degree of interunit similarity, the frequency of the phone calls might have indicated that again and again, contact was established in order to speed up the setup process, as supposedly, giving support to the new subsidiary was a quick and easy job. However, these attempts of transfer support through mediated communication did not result in performance improvements.

There was no significant interaction term of IV05 (RECIP Incoming Intensity) with MV7 (Similar Manufacturing). The questionnaire did not ask from which MNC unit the visitors came to the new subsidiary, so the absence of significance may be due to visits from MNC units other than the one identified as setup unit.

The interaction term of IV07 (Interunit Trust) with MV7 (Similar Manufacturing) was marginally significant ($p < .10$) within model 29 and the corrected stepwise model for DV2 (Arrival of Machines to Full Capacity) and within model 6 for DV4 (First Shipment to Full Capacity). The clearest result ($p < .05$) was within the corrected stepwise model for DV4 (First Shipment to Full Capacity), which had the best fit. In all instances, trust was an important modifier for speeding up the ramp-up process. This points to the internal dynamics of the MNC network, which came up in the conversations with some subsidiary managers: In some cases, the new subsidiary in Mexico was being built up while the corresponding subsidiary in the first-world country (most often the USA) was being shut down. Basically, the MNC shifted production to a country with lower wages. Under these conditions, the personnel of the old plant had no incentives to help with the setup of the new one subsidiary, which was going to take away their jobs. At the receiving unit, this unwillingness resulted in low trust and lengthened setup times. Possibly, this effect did not show up in later phases of the setup process because the old plants had already been shut down after the new subsidiaries had reached their full capacity.

The interaction term of IV08 (RECIP Purchases from Headquarters) with MV7 (Similar Manufacturing) was significant at the $p < .05$ level within model 26 and marginally significant ($p < .10$) within model 31 for DV3 (Arrival of Machines to Corporate-Level Productivity). However, in the corrected stepwise model –which had the best fit– the corresponding coefficient was not significant. Probably, this result was spurious, because a real supply chain relationship is incompatible with having the same kind of manufacturing operation.

The interaction term of IV13 (Subsidiaries in Mexico) with MV7 (Similar Manufacturing) was marginally significant ($p < .10$) within model 21 (no unmoderated

independent variables, moderation by MV7 (Similar Manufacturing) for DV3 (Arrival of Machines to Corporate-Level Productivity). The interaction term also was significant at the $p < .05$ level within the same model for DV5 (First Shipment to Corporate-Level Productivity). In the corresponding corrected stepwise models, the interaction terms with MV7 (Similar Manufacturing) had been excluded and supplanted by the interaction term with MV5 (Documentation Exists) for DV3 or the unmoderated independent variable for DV5, respectively. There is thus some support for the combined positive effect of previous host-country experience and a similar technology on increasing productivity. Both factors indicate the presence of non-codified knowledge, which –as previously seen– played a special role in this phase.

The interaction term of IV16 (GM's Setup Experience) with MV7 (Similar Manufacturing) was significant at the $p < .05$ level within the corrected stepwise model for DV1 (Arrival of Machines to First Delivery). The same interaction term was also significant within model 29 (no unmoderated independent variables, moderation by MV2 (RECIP Supplier Diversity), MV5 (Documentation Exists), and MV7 (Similar Manufacturing)) for DV2 (Arrival of Machines to Full Capacity), although it was driven out from the corrected stepwise model by the highly significant interaction term with MV6 (Teachability). There is thus only weak evidence that the combined effect of the GM's setup experience and interunit similarity in manufacturing was helpful for starting and ramping up production. These phases included the more structured tasks pertaining to the setup process. This points to a significant difference between setup experience at the personal and at the organizational level, where personal experience is relevant for structured task, while organizational experience helps with tasks requiring more creativity and improvisation. .

Finally, the interaction term of IV18 (GM Is Mexican) with MV7 (Similar Manufacturing) was marginally significant ($p < .10$) in four models pertaining to different phases of the setup process. Within the corrected stepwise model for DV0 (Start of Construction to First Shipment) and DV1 (Arrival of Machines to First Shipment), the interaction term had a negative effect on setup times. Thus, the combination of a host-country national acting as general manager and interunit similarity in manufacturing speeded up the installation process, while having a Mexican GM alone did not help. In other words, when the task consisted of replicating a production model, the local knowledge at the subsidiary management level helped to make the necessary adaptations and connections to the host-country environment. The same effect found partial support within model 06 (unmoderated independent variables, moderation by IV07 (Similar Manufacturing)) for DV4 (First Shipment to Full Capacity), although the interaction term was not present in the corrected stepwise model. This is another example of the fact that Mexican general managers were most effective for those transfer processes where the tasks were clearly structured, either by having a model to copy from or for the mere expansion of an existing production system during the ramp-up process. Under different circumstances, the subsidiaries did not benefit from having a Mexican general manager. To the contrary, the positive coefficient that the interaction term took within model 26 for DV5 (First Shipment to Corporate-Level Productivity) even favored foreign managers over local nationals during the fine-tuning required for achieving high levels of productivity. As the interaction effect was absent from the best-fit model, however, there is only slight support for this last statement.

In conclusion, MV7 (Similar Manufacturing) turned out to be a significant criterion for making transfer projects comparable. In almost all quantitative studies of

technology transfer, the object of transfer is supposed to be identical for the different transfer events, a condition that is normally fulfilled by a selecting a setting where one and the same organizational practice or application of a given technology is replicated at different sites. In this study however, only 71% of the subsidiaries were characterized by respondents as having a "very similar" manufacturing process. The inclusion of MV7 (Similar Manufacturing) showed that for the remaining 29% within this study, the transfer tasks were indeed more arduous, independently of the organizational mechanisms used for transferring. Additionally, MV7 (Similar Manufacturing) allowed to differentiate between the strengths and weaknesses of host-country and expatriate general managers.

6.3.5 General Results of the Moderation Approach

Among the eight independent variables, six were significant in both their unmoderated and their moderated forms within at least one model for the different phases of the setup process. Only IV01 (RECIP Expatriate Intensity) and IV16 (GM's Setup Experience) were not independently significant in any of the models for the different setup phases, so the moderation approach was required for bringing out the significance of these independent variables.

All four moderating variable had significant effects on transfer times. The introduction of moderating variables helped to assess the overall difficulty of setting up a new subsidiary, depending on the technology used. Moreover, the moderating variables allowed distinguishing between structured and unstructured tasks within the transfer effort and pointed to whether national or foreign managers were more apt at achieving results during these phases. Additionally, the moderation approach helped to identify the importance of securing suppliers during the first phases of the setup process.

For three versions of the dependent variable, namely DV2 (Arrival of Machines to Full Capacity), DV3 (Arrival of Machines to Corporate-Level Productivity), and DV5 (First Shipment to Corporate-Level Productivity), model 27 (control variables, no unmoderated independent variables, moderation by MV6 (Teachability) and MV7 (Similar Manufacturing)) turned out to be significant with R^2 = .461, R^2 = .493 and R^2 = .497, respectively. Therefore, this model could be considered as the best systematic form for these phases, as a possible alternative for overcoming the lack of systemacy of the corrected stepwise models. For DV4 (First Shipment to Full Capacity), moderation by MV7 (Similar Manufacturing, model 06) constituted the non-stepwise model with the best fit (R^2 = .348). However, for all versions of the dependent variable, the multi-moderation models derived from stepwise regressions were superior in both significance and fit, and also turned out a higher number of significant predictor variables.

6.4 Results for Hypotheses 1 and 2: Communication between the Units

Three independent variables were used for testing hypothesis 1 on the positive influence of interunit communication on Transfer Capability: IV01 (RECIP Expatriate Intensity), IV03 (Phone Communication), and IV05 (RECIP Incoming Visit Intensity).

IV01 (RECIP Expatriate Intensity) did not have any direct influence on the different versions of the dependent variable. When it was moderated by MV2 (Supplier Diversity), however, IV01 (RECIP Expatriate Intensity) confirmed hypothesis 1 for DV2 (Arrival of Machines to Full Capacity), while the coefficients were only marginally significant and inconsistent in signs for the other versions of the dependent variable. Thus, the number of expatriates was a reliable predictor of transfer performance only for the ramp-up phase, if one disregards the multiple moderation effects (see section 6.3).

IV03 (Phone Communication) in its unmoderated form had a marginally significant ($p < .10$) effect within the corrected stepwise models for DV0 (Start of Construction to First Shipment) and DV2 (Arrival of Machines to Full Capacity). IV03 (Phone Communication) also had a significant effect ($p < .05$) within models 02 (no moderation effects) and 06 (moderation by M7 (Similar Manufacturing) for DV4 (First Shipment for Full Capacity), although the coefficient was absent from the corrected stepwise model, which exhibited the best fit. In all of the above cases, the coefficient was positive, pointing to a reverse causality during the ramp-up phase: When production was not expanded as fast as desired, the phones kept ringing. IV03 (Phone Communication) in one of its moderated forms was fully significant ($p < .05$) only for DV3 (Arrival of Machines to Corporate-Level Productivity) and marginally significant for the other phases of the setup process (DV1, DV2, DV4, and DV5). For all phases, however, the sign of the coefficient was opposite to the predicted direction. This result not only confirmed Hypothesis 2 about the lower significance of mediated communication compared to face-to-face communication but established a reverse causality relationship: When setup progress was slower, phone communication increased. This inverse relationship between communication frequency and performance has been found in other studies. For example, Smith, Smith, Olian, Sims, O'Bannon, and Scully present the following explanation: "[C]ommunication frequency indicates conflict and disagreement in the group, resulting in a flurry of meetings and written memos that detract from task-oriented activities" (1994: 432). Similarly, too much controlling intervention by the setup unit could have slowed down the transfer progress, as phone calls usually offer little help for solving complex problems, such as adapting to unforeseen circumstances. In summary, Daft and Lengel's (1986) concept

of media richness found full support in this study: Phones are a poor instrument for transferring technology.

The unmoderated IV05 (RECIP Incoming Visit Intensity) was highly significant ($p < .01$) for DV1 (Arrival of Machines to First Shipment), while the moderated versions of the same variable were not significant. The sign of the coefficient supported H1, meaning that face-to-face communication was always important for speeding up the initial setup phase, independently of the technology used and the organizational characteristics. The fact that the same unmoderated independent variable had the reverse influence within the three significant models for DV4 (First Shipment to Full Capacity) can be interpreted as a reverse causality that occurred during the ramp-up phase: Visits from the MNC increased when the expansion of production was not going fast enough. An alternative explanation for this extraneous result appears in the corrected stepwise model, which included interaction effects of IV05 (RECIP Incoming Visit Intensity) with MV5 (Documentation Exists), MV6 (Teachability), and MV7 (Similar Manufacturing): The effect of the unmoderated IV05 (RECIP Incoming Visit Intensity) was at least partially cancelled out by its significant ($p < .05$ and $p < .01$, respectively) interaction terms with MV5 (Documentation Exists) and MV6 (Teachability), which did point in the right direction to support H1. Following this line of reasoning, it can be concluded that in the ramp-up phase, frequent face-to-face interaction only helped when the technology employed was well documented and/or relatively easy to teach.

The highly significant coefficients for IV05 (RECIP Incoming Visit Intensity) – either unmoderated or moderated by MV6 (Teachability)– confirmed hypothesis 1 for

all phases of the setup process, i.e., DV1, DV2, DV3, DV4, and DV5[41]. This result parallels Bresman, Birkinshaw, and Nobel's (1999) finding about the importance of frequent visits and meetings for knowledge transfer in international acquisitions, Gupta and Govindarajan's (2000) findings that rich transmission channels facilitate knowledge inflows into MNC subsidiaries, and Persson's (2006) finding that "liaison mechanisms" facilitated knowledge flows. In contrast to the unhelpful role of phone calls (IV05), the positive role of incoming visits supports Daft and Lengel's (1986) theory about the different impact of mediated versus face-to-face communication.

6.5 Results for Hypothesis 3: Interunit Trust

IV07 (Interunit Trust) in its unmoderated form was highly significant ($p < .01$) within the corrected stepwise model for DV2 (Arrival of Machines to Full Capacity). IV07 (Interunit Trust) was also significant at the $p < .05$ level within model 10 (unmoderated independent variables, moderation by MV5 (Documentation Exists) and MV6 (Teachability)) and the corrected stepwise model for DV3 (Arrival of Machines to Corporate-Level Productivity) as well as within model 10 for DV5 (First Shipment to Corporate-Level Productivity). In all cases, trust between the focal unit and the setup unit reduced setup times, supporting H3. This result was independent of the complexity of the technology used and interunit similarity, but only applied to the most extended phases within the setup process and to those phases where productivity was the main issue. Thus, trust had to be built over long periods of time and it only was relevant for obtaining support during the productivity-enhancement phase, i.e., when the setup unit's tasks were no longer so well defined as in the beginning. Trust thus becomes an important element of transfer efficiency when processes cannot be predefined by clearly assigned tasks and accountabilities.

[41] Due to its low *F* value and the resulting number of extraneous results, DV0 (Start of Construction to First Shipment) is ignored in this discussion of the hypotheses.

Hypothesis 3 about the positive influence of interunit trust on transfer capability was fully supported ($p < .01$) for DV2 (Arrival of Machines to Full Capacity), DV3 (Arrival of Machines to Corporate-Level Productivity), and DV4 (First Shipment to Full Capacity), but only marginally ($p < .10$) for DV5 (First Shipment to Corporate-Level Productivity), and not at all for DV1 (Arrival of Machines to First Shipment). It looks as if interunit trust was important for ramping up production to full capacity and for increasing productivity, although to a lesser degree. Before this period, however, other factors seemed to make trust between the recipient unit and the sending unit less relevant. For the initial phase, the new subsidiaries seemed to depend less on goodwill cooperation from the setup unit. A possible explanation is that until the new subsidiary has started its production, the supporting activities by the setup units are rather well defined: Providing initial training, installing machines, and getting the system to run. After these basic tasks have been completed and the new subsidiary is producing, the support role of the setup unit is officially completed. From this point on, the interunit relationship must be sufficiently trustful to support even the less structured tasks, such as providing on-the-spot help and fine-tuning the production system.

6.6 Results for Hypothesis 4: Interdependence between Units

IV08 (RECIP Purchases from Headquarters) in its unmoderated form was significant ($p < .05$) for DV2 (Arrival of Machines to Full Capacity) within the corrected stepwise model and for DV4 (First Shipment to Full Capacity) within the unmoderated model, although the latter effect was supplanted by the significant ($p < .05$) interaction effect of IV08 (RECIP Purchase from Headquarters) with MV5 (Documentation Exists) within the corrected stepwise model. A similarly negative coefficient appeared with marginal significance ($p < .10$) within the corrected stepwise

model for DV5 (First Shipment to Corporate-Level Productivity), although it was at least partially cancelled out by the highly significant ($p < .01$) interaction effect with MV7 (Similar Manufacturing). Interestingly, the signs of the corresponding coefficients disconfirmed H4 in the sense that subsidiaries that depended on supplies from their MNCs took longer to start and ramp-up production. In other words, having to wait for supplies from the HQ slowed down the new subsidiaries' expansion process in comparison to plants that could rely on a supplier network that did not include the respective MNC. This effect was independent of the complexity of the technology and the similarity between units.

Generally speaking, hypothesis 4 about the helpful effect of interdependence between units for transfer capability was not supported. This result is contrary to Holtbrügge and Berg's (2004) findings. However, the regressions showed some interesting results: For DV2 (Arrival of Machines to Full Capacity) and DV4 (First Shipment to Full Capacity), the recipient unit's dependence on supplies form the MNC actually slowed down setup progress, which was contrary to the hypothesized direction. On the other hand, the positive coefficients of IV08*MV7 (RECIP Purchases from Headquarters moderated by Similar Manufacturing) for DV3 (Arrival of Machines to Corporate-Level Productivity) and DV5 (First Shipment to Corporate-Level Productivity) are probably confounds, because if the manufacturing is really very similar, there should not be a supply chain relationship between units.

It must be admitted here that the disparity of the data did not allow testing the effects of interdependence other than the supply chain relationship, especially the shared evaluation system and the overall compensation strategy for the subsidiary managers (cf. Roth & O'Donnell, 1996). Interdependence between units seems to be a

more complex subject, requiring a more detailed look at possible three- and four-way interactions between the factors influencing transfer success.

6.7 Results for Hypothesis 5: MNC Experience

IV13 (Subsidiaries in Mexico) in its unmoderated form was significant at the $p < .05$ level within model 03 (unmoderated independent variables, moderation by MV2 (Supplier Diversity) for DV2 (Arrival of Machines to Full Capacity), although this effect disappeared in the corrected stepwise model, which had the best fit. A clearer effect of the unmoderated IV13 (Subsidiaries in Mexico) was its highly significant ($p < .01$) coefficient within the corrected stepwise model for DV5 (First Shipment to Corporate-Level Productivity). In both cases, the signs of the coefficient supported H5 about the positive effect on the MNC's previous experience on transfer efficiency. Thus, independently of complexity of technology and interunit similarity, having learnt to deal with the specific circumstances of the Mexican context helped the MNC in two phases: For ramping up production and –more distinctly– for increasing productivity.

Hypothesis 5 was also partially supported for DV3 (Arrival of Machines to Corporate-Level Productivity), conditioned to a high degree of documentation of the technology. In other words, for the first part of the setup process, MNCs could only capitalize on their previous experience with other subsidiaries in Mexico when they had documented the technology, which supports the arguments in favor of codification (cf. Ancori, Bureth, & Cohendet, 2000).

6.8 Results for Hypothesis 6: General Manager's Experience

Hypothesis 6 about the positive effect of the general manager's experience on transfer capability was only partially supported. The fact that the general manager was Mexican (IV18) was significant for the earlier phases of the setup process subject to a

high supplier diversity (for DV2 (Arrival of Machines to Full Capacity)) and a high degree of teachability (for DV1 (Arrival of Machines to First Shipment)). This last result confirms Bonache and Brewster's (2001) finding that MNCs prefer to recruit internally when the knowledge to be transferred is specific. The coefficient of IV18 (GM is Mexican) was also marginally significant for the later phases of the setup process (DV4 (First Shipment to Full Capacity) and DV5 (First Shipment to Corporate-Level Productivity)), conditioned to a high degree of documentation.

In contrast, the coefficient of IV16 (GM's Setup Experience) only was in line with hypothesis 6 when the technology was teachable, and then only for DV2 (Arrival of Machines to Full Capacity). In other words, MNCs benefited from having a manager with setup experience only for ramping up production and when the technology was not too complex. While this result was statistically solid ($p < .01$), other, less significant ($p < .05$) coefficients for interaction terms had contradictory signs. In contrast, Lin and Berg (2001b) found unconditional support for their hypothesis that the transferee's international experience had a positive effect on the effectiveness of the corresponding transfer project. The above contradictions indicate a need for a more fine-grained approach in order to identify what type of managerial experience is really relevant for transfer processes.

In summary, the inclusion of four different moderating variables brought out many details that had not been considered in previous transfer studies. Especially, it showed the difference between structured and unstructured tasks which dominate different phases of the setup process: Personal experience was most important for the ramp-up, while interunit trust helped most for reaching high levels of productivity. For all phases, however, having the experts visit the new facility speeded up transfer processes.

7 Conclusions

This chapter highlights the conclusions that can be drawn from the present study for the theory of the MNC and the knowledge-based of the firm. The following section is dedicated to the practical advice that the results of this study offer to MNC managers. Limitations to this study are admitted and discussed and future directions for research are indicated. The chapter closes with some general conclusions.

7.1 Contributions

This study makes contributions to two bodies of management theory: the theory of the multinational corporation and the knowledge-based view of the firm. Additionally, the results have practical implications for MNC managers dealing with the setup of new facilities abroad.

7.1.1 Contributions to the Theory of the MNC

This study sheds new light on the inner workings of the MNC, specifically the key process of its international expansion. Among the hundreds of papers that have been published on knowledge transfer, this author could only identify three quantitative studies[39] that deal with the setup of manufacturing facilities. The first one was Teece's seminal study on the difficulty of technology transfer (published in two papers: Teece (1977a) and Teece (1977b)), which unfortunately does not satisfy today's criteria for statistical reliability. In one paper, Teece (1977a) dealt with the cost of technology transfer, while in the second one (Teece (1977b), he estimated cost-time elasticities. Ramachandran (1993) related transfer cost to mode of entry, without measuring the degree of transfer efficiency itself, which would have been the really interesting variable. One main contribution of this study is thus a systematic measuring of a new dependent variable, which is the time required for setup, a phenomenon that had been

[39] Zander and Kogut's (1995) study about the "speed" of transfer dealt with the question how long it took *until* a new technology was transferred, not the duration of the transfer process.

dealt with only in case studies. The data indicate that setting up a new plant can take between less than a month and several years. It was shown that size is not a significant factor for setup times, while a more complex technology did slow down the process.

These results have implications for the theory of the multinational corporation. Dunning's (1988) eclectic theory of the MNC stated that ownership-specific advantages were sufficient for the international expansion of a firm. In many industries, however, these advantages can erode within a couple of years because the competitors are catching up. If a firm is not able to achieve high levels of productivity in its foreign affiliates within a relatively short span of time, the ownership advantage may have disappeared. Transfer capability thus becomes an additional necessary condition for the profitable internationalization of domestic firms and the expansion of existing MNC networks. For international success, it is not enough to possess the technology in the home country location; the MNC must also be able to efficiently internationalize its production. Expressed in the terminology of strategic management, a firm can derive the full benefits from its technological advantage only if it is capable of exploiting it on a larger scale. The findings of this study thus echo the literature's shift of attention from resource endowment (Wernerfelt, 1984) to capabilities, as developed by Richardson (1972).

A parallel line of reasoning derived from financial management led Kogut and Kulatilaka (1994) to demonstrate that MNCs can gain an advantage from the flexibility inherent in their multinational production network. This implies that the MNC top management should install subsidiaries in different parts of the world. However, the results of this study demonstrate that MNCs differ significantly in the times they take to add just one new fully operational facility. Differences in transfer

capability thus restrict the ability to achieve flexibility, which means that Kogut and Kulatilaka's (1994) "option value" is not equally available for all MNCs. Inversely, laying the foundations for transfer capability –by building trust and willingness to cooperate within the MNC network as well as by having a sufficient number of experts available to help fledgling subsidiaries– will increase transfer speed and thus the flexibility to modify the existing production network.

More generally, transfer capability puts a cap on the speed of growth of an MNC's network. Of course, these restrictions on the speed of expansion affect all multi-unit firms, not only MNCs, as Kogut and Zander (1992) explained. This study presents empirical evidence that especially high-tech firms can be doubly affected: On one hand, advanced technologies tend to be more difficult to transmit than better established ones. On the other hand, there are usually only a few experts that really dominate a new technology. Until the new operational technology has become routine, these experts are often all but indispensable at the location of first implementation and will not be available for helping with the transfer task. Both factors proved to be highly significant in this study, which shows that even in the context of decreasing obstacles to globalization, innovative firms will need time for taking full advantage of complex production methods when manufacturing in several locations is required.

Another topic to which this study makes a contribution is the MNC's choice of entry mode into a host country (for overviews of the literature, cf. Zhao & Decker, 2004; Zhao, Luo, & Suh, 2004), i.e., the factors that determine whether a company expands internationally through export, licensing, joint venture, greenfield investment, or acquisition. Until now, the importance of the transfer process has been largely ignored by the research community. An exception is the mathematical model

proposed by Mattoo, Olarreaga, and Saggi (2004), according to which exogenously determined high transfer costs would lead MNCs to prefer acquisitions of existing firms over greenfield investments. Unfortunately, the argument for transfer cost as a determinant of entry mode has not yet been confirmed by any empirical studies. Although the design if this study was not one of comparative contracting as suggested by transaction cost theory (Williamson, 1985), it offers a first glimpse at the matter: Transfer times become increasingly more relevant than monetary costs in those sectors of the modern economy where firms compete –at least partially– on speed, either for reaping the fruits of technological advantages or as preemptive strikes for securing market shares in gradually opening economies. The strong dispersion of transfer times found in this study strongly suggests that there is a high-end truncation of the sample, i.e., firms that expected times to completion to be excessive presumably either abandoned their FDI projects in the early stages or did not even move beyond the planning phase. For those firms that either experienced or expected such results, restricted transfer capacity could have motivated a choice of joint ventures or acquisitions even when other factors would have favored a greenfield investment. What can be concluded from the present study is that the firms with the longest setup times should at least have looked as other modes of acquiring manufacturing capacity in the country in order to compensate their competitive disadvantage caused by limited transfer capability.

This study also shows that MNCs have numerous ways of influencing the duration of the setup process, but that most of these practices improve performance only conditioned to characteristics of the technology to be transferred. These results stand in contrast with the deterministic findings of the two previous studies on setup processes by MNCs: Teece (1977a, with the qualifications concerning validity, see

above) showed that transfer costs were determined by the characteristics of the technology and the transferor's experience, while Ramachandran (1993) found that the amount of resources allocated to transfer depended on the choice of entry mode. This study thus supports the combination of the historically separate approaches of technological determinism (e.g., Woodward, 1965) and managerial choice (e.g., Child, 1972). Unfortunately, it was not possible to measure transfer cost in this study. If one follows Teece's (1977b) argument that transfer cost and transfer time are substitutable to a certain degree, however, this study not only confirms the above results but points to significant interaction effects between given characteristics of the technology and the efforts made to transfer it.

The overall process of setting up new manufacturing facilities was divided into phases, delimited by the milestones of Arrival of Machines, First Shipment, Full Capacity, and Corporate-Level Productivity. The combination of these end points led to the construction of a new series of dependent variables inspired by Szulanski's (1996, 2000, 2003) stagewise approach, but applied to a different context. What stands out from the detailed results is that different phases benefited from different organizational arrangements. Specifically, both having a host-country national as general managers and counting on a relatively high number of foreign experts increased the efficiency in the early phases of the setup. For the later phases, the subsidiaries improved their performance most when they received numerous visits from MNC experts.

7.1.2 Contributions to the Knowledge-Based View of the Firm

This study constitutes an application of the knowledge-based view of the firm, which Penrose (1959) developed based on Adam Smith's original insights into the advantages of the division of labor (cf. Loasby, 1999). Richardson (1972) further

developed these ideas into the concept of capabilities, which form the framework for the current study. Proponents of the resource-based view (e.g., Barney & Clark, 2007) claim that there is really no difference between the resource approach and the capability approach, as both link the firm's attributes to its competitive advantage. This study showed, however, that human actions such as visits and trust building, which are conceptually distinct from assets such as machines or patents, can make a substantial difference in performance. There is no compelling reason for supposing that the extent of the aforementioned actions is fully determined by the financial assets and human resources of the firm; rather, the transfer effort should be conceptualized as a combination of resource availability, planning, organizational routines, and flexibility allowing for organizational learning. All these factors together contribute to transfer efficiency and demonstrate the firm's transfer capability. The empirical research in this study thus makes a convincing case for distinguishing between resources and capabilities.

Another claim by proponents of the resource-based view (e.g., Barney & Clark, 2007) is that knowledge is a resource like any other, so that there would be no need for a separate knowledge-based view of the organization. In contrast, this study demonstrates the explanatory power of several key themes within the KBV that refer to aspects of internal organization and thus go beyond the RBV.

Maybe the main result of this study is that the most significant differentiator in the process of setting up new subsidiaries is the way how knowledge is transferred, instead of external circumstances, as might be assumed. The fact that a knowledge-based model of transfer could explain up to 65% of the variation in setup times leaves little room for radically different approaches. The knowledge-based view has thus been confirmed as a good approach for technology transfer studies

One of the central themes of the KBV is that knowledge not only has a tacit dimension (Polanyi, 1967) but that the tacit portion of knowledge can actually be made explicit or codified (cf. Nonaka, 1994). The corollary is that firms' efforts at codification benefit their transfer performance. Although Tsoukas (1996) pointed out that tacitness is irreducible in principle, the tacit-codified dichotomy has become one of the standard topics in the technology transfer literature (cf. Johnson, Lorenz, & Lundvall, 2002). In this sense, the present study stands out for its negative result: Kogut and Zander's measures of "codifiability" (actually codification) did not coalesce into a single measure and even the retained item ("Documentation Exists") produced highly incoherent results, except for the initial phase of the setup process. This finding contradicts other studies where tacitness was indeed a significant predictor (e.g., Hansen, 1999; Schulz, 2001, 2003; Subramaniam & Venkatraman, 2001; Zander & Kogut, 1995) as well as a series of rationales for codification (cf. Cowan, David, & Foray, 2000). The resulting anomaly can be interpreted in two complementary ways[40]: First, one could presume that at least for the aggregate level of plant setup processes, the actual differences in the degree of codification have become insignificant, mostly due to the pervasive use of computer-based documentation of technical processes and the high degree of standardization and documentation of organizational processes fostered by ISO 9000 and similar norms. In this line of reasoning, codification would simply not be a relevant differentiator between firms anymore. The second interpretation would be that codification is irrelevant because it is simply not practical to write down in advance all those matters that could make a transfer process difficult. Following Johnson, Lorenz, and Lundvall (2002), the critical distinction would be between know-what and know-how, where making a new plant fully operational

[40] There is also a possibility that Documentation has a non-linear influence on transfer. Trying out such quadratic and cubic variations of the pertaining variable has to be left to further analyses of the data.

critical hinges on uncodified or even uncodifiable know-how. In conclusion, it does not make sense to conceptualize a rich body of technical and organizational knowledge as if it had uniform properties: While the standard parts of knowledge are easily transferred, specific know-how remains intractable and requires direct human interaction for its transfer.

Adler (2001) has proposed that the knowledge economy requires the use of trust as a coordinating mechanism, as the traditional means of markets and hierarchies (cf. Williamson, 1975) are not suited for working with the public good of knowledge. The present study confirms this thesis and indicates that transferor and transferee units indeed need to work as a community (in Adler's (2001) terms), as the task of knowledge transfer includes many actions that resist routinization, control, and incentivation.

Within the general literature on knowledge transfer, the study demonstrated that the detailed moderation model resulted in a more fine-grained picture than the widely used "stickiness" and "causal ambiguity" approaches, which confound properties of knowledge and the mechanisms used to transfer that knowledge. While the fashionable but misleading dichotomy between tacit and explicit knowledge (cf. Tsoukas, 1996) was avoided[41], one major finding of this study is that face-to-face communication helps with this type of knowledge transfer, while mediated communication is of limited help. Additionally, the highly complex results for documentation as a moderating variable demonstrated that the practical know-how required for making a manufacturing plant operational relies on types of knowledge

[41] The fundamental shortcoming of all empirical studies that pretend to measure tacitness is that they have to work with more or less reliable subjective evaluations and/or proxies, as measuring tacitness directly would require making the tacit knowledge explicit.

that go beyond documents and software, i.e., where the non-codified portions of knowledge became decisive for transfer success.

7.1.3 Contributions to Practice

The original motivation for this study was a practical one: To identify those factors that help managers set up a new subsidiary in a foreign country. The goal was to transcend the simplistic advice usually offered in practitioner journals (e.g., O'Dell & Grayson, 1999). Fortunately, the results from this study can be translated directly into advice for managers of MNCs that intend to set up a manufacturing subsidiary in a foreign country (not just in Mexico).

The study confirmed one of the standard applications of international business studies: Being aware of cultural differences helps with performance in a foreign country. Based on the results, offering culture-awareness training should often shorten setup times.

One of the major problems in the initial phases of the setup processes was to establish a functioning supplier network. To avoid being slowed down by a lack of materials, MNCs should start with this task even before they establish the subsidiary. Because of their ability to connect to the local business community, the manager in charge of this task should definitely be a host-country national. If that person is able to consolidate a great number of different suppliers into just a few, the setup of the new facility will probably run more smoothly. Additionally, a warning is in order for those plants that rely on supplies from their MNC: In many cases, waiting for the materials from their own companies was a real obstacle to setup progress. To avoid such a situation, the new subsidiaries' managers should get a firm commitment that their supply needs will be covered on time.

One of the major questions posed at MNC headquarters is probably whether the new subsidiary should be headed by a local or a foreigner from the MNC's host country. According to this study, a host-country national does better for the early phases of low to medium tech subsidiaries, later on and for high-tech production, foreign experts deliver a better setup performance. However, it would probably not be wise to change the general manager in the middle of the production, just because of his or her nationality. More importantly, MNCs should make sure that the subsidiary management really functions as a team where the different members can all bring in their strengths.

Furthermore, the study confirms the usefulness of the common practice of having many expatriates during the ramp-up, and later reducing their numbers. This not only helps to keep a cap on costs (expatriate managers are more expensive) but also liberates the experts for other tasks within the MNC, as their presence at the new subsidiary shows decreasing returns over time. When the goal is to increase productivity at the new productivity, the best means is to arrange for frequent visits by personnel form other MNC units who can contribute with their specific expertise. On a practical level, this means that the sending unit should set aside some time for its relevant managers and engineers to visit the new subsidiary as often as required.

Another factor that was found to have a significant impact on the setup process was the level of trust in the interunit relationship. The headquarters or setup unit should also try to build a trustful relationship, fulfill its commitments and follow up on its promises so that the new subsidiary does not feel left alone with its possible problems.

7.2 Limitations

One argument against the validity of the analyses presented in this study is the reduced sample size of 113[42], which varied between 76 and 101 in the actual regression runs for the different versions of the dependent variable. However, the statistical validity seems acceptable (see section 6.1). Moreover, establishing the sample and collecting the data took well over one year, so any larger study would require a team effort or the participation of paid full-time research assistants.

A possible problem with measuring organizational performance through questionnaires instead of archival data is that people might willingly or unwillingly be misrepresenting the actual situation. A study by Dess and Robinson (1984), however, found that this kind of data is reasonably reliable. In the absence of archival data, the questionnaire method does not seem to be a bad choice. Additionally, most questions concerned facts, not opinions. Unfortunately, it was already very difficult to obtain responses from one knowledgeable member of the management team, so contacting multiple informants was simply not feasible. In the few cases where two or three managers answered the questionnaire together, no major disagreements came up when they were discussing the issues.

The retrospective nature of most questions also raises the issue of faulty memory and unconscious embellishment. Miller, Cardinal, and Glick (1997) recommend using free reports (not forcing an answer if respondent does not remember), multiple informants per organizational unit, and questions going to facts, not to thoughts or opinions. Regrettably, this study could comply only partially with these recommendations. Furthermore, some of the data provided (full capacity and

[42] The gold standard in quantitative research on technology transfer is still Gupta and Govindarajan's (2000) paper, which mustered responses from 372 subsidiaries.

organizational-level productivity) was prospective, where the researcher simply had to rely on the respondent's educated guess.

As mentioned before, there is no remedy against a possible survival bias, as aborted transfer projects did not show up in the sample. Another issue for which there was no solution in this case was a possible self-selection bias, as firms with problems in transfer process might have been less willing to participate in survey.

On the other hand, the frequently mentioned problem of measuring organizational-level constructs (trust) at the individual level did not occur in this study design, as Cummings & Bromiley's (1996) instrument is specifically geared to measuring trust between units, not between individuals.

The setup of the study included another limitation: Within the communication framework of the overall transfer capability model, data were obtained from one side only. Again, time limitations did not allow complementing the data with a survey of managers at the sending units.

7.3 Directions for Future Research

This study could be considered as the first step in a larger research program. The following sections describe ways to expand the research.

7.3.1 Alternative Dependent Variables

Although the data for cost as the dependent variable were very incomplete, it would be interesting to see if it is possible to salvage those cases where the respondents did provide the relevant data. In addition, the questionnaire contained items for budget and schedule compliance that could also be used as alternative dependent variables (cf. Pinto & Mantel, 1990). The results could then be compared to the time-based dependent variables that were considered in this thesis.

7.3.2 Exploring Mediation and Three-Way Interaction Effects

In the correlation analysis, there was some evidence of relationships that are more complex than the model tested here, which consisted of direct relationships between dependent variables and predictor variables plus moderation effects. As a theoretical justification, Tyler has proposed that a firm's "cooperative capabilities" are interdependent and form a "complex system" (2001: 18). In a statistical analysis, such interdependence would show as interaction effects, which, if found, would validate interaction capability within the dyad as a coherent concept.

One form of interaction between the main variables proposed here is between communication and trust. This interaction has been mentioned as a hypothesis in the literature: Droege, Anderson, and Bowler (2003) proposed that both initial trust and gradually formed trust increase accuracy and quantity of information exchange; Roberts (2000) suggested that the use of information and communication technologies increases trust in MNC technology transfer (no empirical research), while Inkpen and Currall (2004) speculated that repeated transactions increase interfirm trust in JVs. Empirically, Becerra & Gupta (2003) found that –at the individual level– the trustor's attitudinal predisposition had a stronger influence on trust in low communication contexts than in high communication context.

There could also be a relationship between the nationality of the general manager (IV18) and the number of expatriates (IV01), in the sense that the best results are obtained by teams that incorporate both foreigners and host country nationals. This was the result obtained in a study by Gong (2006).

Recently, Goerzen and Beamish (2007) have shown that the presence of "excess" expatriates only had a positive impact on subsidiaries' performance when the MNCs had significant host country experience. If confirmed with my data, this connection

would translate into an interaction effect between Expatriate Intensity (IV01) and MNC Experience (IV13).

Based on propositions and empirical findings published in related studies, some interaction effects between independent variables and control variables could also be expected: Doney, Cannon and Mullen (1998) proposed a relationship between national culture and trust, but testability would depend on sufficiently large numbers of different MNC home countries (sample size and variability). Ranft and Lord (2002) proposed a relationship between communication and relative firm size, based on a multiple-case study of mergers and acquisitions. Pahlberg (1997) suggested a relationship between cultural distance and buyer-seller interdependence, based on the reasoning that with looser ties, cultural differences did not matter that much.

Other such interaction effects could exist at the individual level of the general manager: For example, Perrone, Zaheer, and McEvily (2003) found a relationship between company tenure and trust in their study on the relationships between supplier representatives and purchasing managers. Becerra and Gupta (2003) found partial support for the hypothesis that the trustor's organizational tenure had a stronger influence on trust in low communication contexts than in high communication contexts. As can be seen from the studies mentioned above, it is by no means clear if these interaction effects will actually materialize within the setting of the proposed study.

Within a multiple-regression model, interaction effects are modeled as moderators. The current study, however, already included moderators for taking into account the difficulty of the transfer task. For a model with possible double and triple moderations, the regression approach is not practical any more. The classical solution for such situations is structural equation modeling. However, it would not work for

this study due to the relatively small sample size. The method of choice would thus be partial least squares (cf. Chin & Newsted, 1999). However, for the seven years since 2000, only five research papers in international business that use PLS could be identified (Devinney, Midgley, & Venaik, 2000; Ordóñez de Pablos, 2006; Robins, Tallman, & Fladmoe-Lindquist, 2002; Tsang, 2002; West & Graham, 2004). This rarity represents both an opportunity and a challenge: On one hand, a PLS-based study could offer new insights that go beyond the testing of individual hypotheses to a more system-based modeling of relationships, thereby pushing the limits of mainstream management science. On the other hand, the low number of PLS-based articles shows that only a few researchers seem to be familiar with the method, so it would probably be difficult to publish such a study in one of the leading journals (cf. Hulland, 1999).

7.3.3 Testing the Unexplored Portions of the Transfer Capability Model

One of the more obvious routes for complementing this study would be testing the sending units' emissive capacity, with a focus on expatriate selection and training, budget restrictions, codification efforts, and the ongoing support for technology transfer processes. The only aspect that has been thoroughly studied is expatriate adjustment, although mostly without tying it to organizational results. Given the geographical dispersion of the MNC sending units, the likely involvement of several key persons in each project, and the duration of these processes, the best method would probably involve multiple case studies.

Another unexplored aspect of the overall model is the recipient unit's adaptive capacity, which goes beyond of the marketing-oriented concept of "local responsiveness" (cf. Hurt, 2007). The topic received a theoretical grounding in a recent paper by Yakhlef (2007). On the empirical side, however, there are very few case studies (e.g., Adenfelt & Lagerström, 2006; Szulansky, Jensen, & Lee, 2003;

Szulanski & Jensen, 2006) and quantitative studies (e.g., Jensen & Szulanski, 2004; Williams, 2007). Especially, there is no coherent model of what these adaptations should really consist of. The starting point could be a thorough literature review to identify key elements that could be used for a more systematic study. One possible approach could be to compare adaptation of one transfer object to different countries, preferably within one or several MNCs that are in the process of expanding to several regions of the world over a relatively short period of time.

A study of the fully developed transfer capability model would also be highly desirable, but would require access to managers at different levels or locations within one larger MNC that has expanded over the last years. A possible model could be Osman-Gani's (1992) PhD study on MNC managers' perceptions of transferring.

Another research project that emerged through the interviews with the survey respondents could look at the personal characteristics of successful MNC subsidiary managers. In fact, there seems to be a group of persons who specialize in setting up plants for foreign MNCs. Apart from the literature on expatriate adjustment, there is very little systematic evidence about this topic in the management literature[43], so it could be an interesting topic to develop.

7.4 Some General Conclusions

This study represented a major effort for establishing the sample, gathering the data, and analyzing the results. In any endeavor of this kind, the question is whether the results justify the investment in time and energy. As the literature contained next to no quantitative research on the setup of new plants by MNCs, the contributions of this study are indeed significant. It could be shown that among the predetermined factors, teachability was the single best predictor of setup times and that the best way

[43] An exception is Vora, Kostova, and Roth's (2007) recent paper on subsidiary managers' "dual organizational identification".

to improve transfer efficiency was to increase expert visits from the MNC to the new subsidiary. Furthermore, the study demonstrated that different phases of the setup process require different sets of skills and transfer-related activities, where both local and foreign managers' knowledge can increase transfer capability. Thus, the study contributes to both the theory of the MNC and offers important guidance for managers involved in the international expansion processes of their firms.

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APPENDIX 1: QUESTIONNAIRE IN ENGLISH

A. External Influences on the Setup of the Subsidiary in Mexico

The following section concerns external factors that possibly had an influence on the setup of your unit within the international corporation, which is referred to as "subsidiary in Mexico". Please check the option that best reflects your assessment.

	Made it easier	Had no influence	Made it more difficult
1. In your opinion, how did the local authorities influence the setup of the subsidiary in Mexico?			
2. In your opinion, how did the local rules and regulations influence the setup of the subsidiary in Mexico?			
3. In your opinion, how did the availability of qualified suppliers influence the setup of the subsidiary in Mexico?			
4. In your opinion, how did the availability of qualified labor influence the setup of the subsidiary in Mexico?			
5. In your opinion, how did the differences between national cultures influence the setup of the subsidiary in Mexico?			

B. Setup Process of the Subsidiary in Mexico

The following section concerns the concrete data for the setup of the subsidiary in Mexico. Please fill in the corresponding numbers or check the box labeled "Not applicable".

6. When did the construction of the manufacturing facilities for the subsidiary in Mexico start?

_____ (month) _____ (year)

Not applicable

7. When did the first machines for the subsidiary arrive in Mexico?

_____ (month) _____ (year)

Not applicable

8. When did the subsidiary in Mexico reach full operational capacity or when will it reach full operational capacity?

_____ (month) _____ (year)

Not applicable

9. **When did the subsidiary in Mexico make its first regular shipment or when will it make its first regular shipment?** *(not try-outs)*
   _____ (month) ____ (year)
   Not applicable

10. **When did the subsidiary in Mexico reach the same level of productivity as other units in the international corporation or when will it reach that level?**
   _____ (month) ____ (year)
   Not applicable

11. **How many <u>employees</u> did the subsidiary in Mexico have when it reached full operational capacity or how many employees will it have when it reaches full operational capacity?**
   _____ employees

12. **What was the <u>capital investment</u> in the subsidiary in Mexico when it full operational capacity or what will the capital investment be when it reaches full operational capacity?**
   _____ (million US$)

13. **How many <u>expatriates</u> worked at the subsidiary in Mexico during the <u>first year</u> after it was started?**
   _____ expatriates

14. **How many <u>expatriates</u> worked at the subsidiary in Mexico during the <u>second year</u> after it was started?**
   _____ expatriates

15. **On average, what is the annual cost of employing an expatriate at the subsidiary in Mexico?**
   _____ (thousand US$)
   Not applicable

16. **How many <u>interns/trainees</u> did the subsidiary in Mexico send to other units of the international corporation during the <u>first year</u> after it was started?**
   _____ interns/trainees

17. **How many <u>interns/trainees</u> did the subsidiary in Mexico send to other units of the international corporation during the <u>second year</u> after it was started?**
   _____ interns/trainees

18. **On average, what is the cost of sending an intern/trainee abroad?**
   _____ (thousand US$)
   Not applicable

19. What was the total cost of technology transfer (training of local personnel, expatriates, interns, visits by experts)?

_____ (million US$)

Not calculated

20. Have there been <u>cost</u> overruns in the setup process?

No → ***SKIP TO QUESTION #21***

Yes

↓

a. If yes, by what percentage relative to the budget as originally planned?

_____ % over budget

21. Have there been <u>schedule</u> overruns in the setup process?

No → ***SKIP TO QUESTION #22***

Yes

↓

a. If yes, by how many months relative to the schedule as originally planned?

_____ months over schedule

C. <u>Complexity of the Technology</u>

The following section concerns the complexity of the technology used in the subsidiary. Please fill in the corresponding numbers or words, or check the corresponding box.

22. What industry does your company belong to?

_____ (industry)

23. How many different items does the subsidiary in Mexico manufacture? *(The same item sold in different package sizes should be counted as one.)*

_____ different items

24. What is the percentage of value added to inputs by the subsidiary in Mexico?

_____ % of value added

25. How many different key suppliers of production materials does the subsidiary in Mexico have?

_____ key suppliers

26. Is the core technology of the subsidiary in Mexico state of the art in the industry?

Yes → ***SKIP TO QUESTION #27***

No

↓

a. If not, how many years has this technology been used in the industry?

_____ years

27. Does the core technology employed by the subsidiary in Mexico include proprietary technology of the international corporation it belongs to?

No → ***SKIP TO QUESTION #28***

Yes

↓

a. If yes, had this technology been previously implemented within the international corporation?

Yes

No

D. <u>Documentation of Technology</u>

In the following section, you will be asked to assess how well documented the technology used by the subsidiary in Mexico is. For each phrase, there will be seven options ranging from "strongly disagree" to "strongly agree". Please check the option that best represents your personal assessment.

28. A useful manual describing our manufacturing process can be written.

Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree

29. Large parts of our manufacturing control are embodied in standard type software that we modified for our needs.

Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree

30. Large parts of our manufacturing control are embodied in software developed exclusively for our use.

Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree

31. Extensive documentation describing critical parts of the manufacturing process exists in our company.

Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree

E. Ease of Teaching the Technology

In the following section, you will be asked to assess how easy it is to teach the technology used by the subsidiary in Mexico. For each phrase, there will be seven options ranging from "strongly disagree" to "strongly agree". Please check the option that best represents your personal assessment.

32. New manufacturing personnel can easily learn how to manufacture the product by talking to skilled manufacturing employees.

Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree

33. New manufacturing personnel can easily learn how to manufacture the product by studying a complete set of instructions.

Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree

34. Educating and training new manufacturing personnel is a quick job.

Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree

35. New manufacturing personnel know enough after a normal high school education to manufacture our product.

Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree

36. New manufacturing personnel know enough after vocational training to manufacture our product.

Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree

F. Communication Between the Subsidiary in Mexico and the Unit That Organized Its Setup

The following section concerns the frequency and means of communication used between the subsidiary in Mexico and the unit of the international corporation that

organized the setup of the subsidiary in Mexico. Please check the corresponding option or fill in the number.

37. During the <u>first year</u> after the subsidiary in Mexico was started, how often did the management team have <u>phone</u> contact with the unit that organized its setup?

0-5 times per month
6-10 times per month
11-15 times per month
16-20 times per month
Over 20 times per month

38. During the <u>second year</u> after this subsidiary was started, how often did the management team have <u>phone</u> contact with the unit that organized its setup?

0-5 times per month
6-10 times per month
11-15 times per month
16-20 times per month
Over 20 times per month
Not applicable

39. During the <u>first year</u> after the subsidiary in Mexico was started, how often did the management team have <u>e-mail or intranet</u> contact with the unit that organized its setup?

0-5 times per month
6-10 times per month
11-15 times per month
16-20 times per month
Over 20 times per month

40. During the <u>second year</u> after the subsidiary in Mexico was started, how often did the management team have <u>e-mail or intranet</u> contact with the unit that organized its setup?

0-5 times per month
6-10 times per month
11-15 times per month
16-20 times per month
Over 20 times per month
Not applicable

41. During the <u>first year</u> after the subsidiary in Mexico was started, how many <u>visits</u> did the subsidiary in Mexico <u>receive</u> from the unit that organized its setup?

___ visits received in first year

42. During the <u>second year</u> after the subsidiary in Mexico was started, how many visits did the subsidiary in Mexico receive from the unit that organized its setup?

___ visits received in second year

Not applicable

43. During the <u>first year</u> after the subsidiary in Mexico was started, how many <u>visits</u> per month did its personnel <u>make</u> to the unit that organized its setup?

___ visits made in first year

44. During the <u>second year</u> after the subsidiary in Mexico was started, how many <u>visits</u> per month did its personnel <u>make</u> on average to the unit that organized its setup?

___ visits made in second year

Not applicable

G. <u>Quality of the Relationship Between the Subsidiary in Mexico and the Unit that Organized its Setup</u>

In the following section, you will be asked to assess the quality of the relationship between the subsidiary in Mexico and the unit within the international corporation that organized the setup of the subsidiary in Mexico. For each phrase, there will be seven options ranging from "strongly disagree" to "strongly agree". Please check the option that best represents the assessment of your management team.

45. We think the people in the unit that organized the setup of the subsidiary in Mexico told the truth in our interactions.

Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree

46. We think that the unit that organized the setup of the subsidiary in Mexico met its obligations to our subsidiary.

Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree

47. In our opinion, the unit that organized the setup of the subsidiary in Mexico was reliable.

Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree

48. We think that people in the unit that organized the setup of the subsidiary in Mexico succeeded by stepping on other people.

Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree

49. We feel that the unit that organized the setup of the subsidiary in Mexico tried to get the upper hand.

Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree

50. We think that the unit that organized the setup of the subsidiary in Mexico took advantage of our problems.

Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree

51. We feel that the unit that organized the setup of the subsidiary in Mexico interacted with us honestly.

Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree

52. We feel that the unit that organized the setup of the subsidiary in Mexico kept its word.

Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree

53. We think that the unit that organized the setup of the subsidiary in Mexico did not try to mislead us.

Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree

54. We feel that the unit that organized the setup of the subsidiary in Mexico tried to get out of its commitments.

Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree

55. We feel that the unit that organized the setup of the subsidiary in Mexico dealt with joint expectations fairly.

Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree

56. We feel that the unit that organized the setup of the subsidiary in Mexico took advantage of people who were vulnerable.

Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree

H. Common Interests and Shared Incentives

The following section concerns the ongoing cooperation between the subsidiary in Mexico and the unit of the international corporation that organized its setup. Please check the corresponding option or fill in the word or number.

57. What is the location of the international corporation's unit that organized the setup of the subsidiary in Mexico?

_____ (country)

58. Does the subsidiary in Mexico buy products from the unit that organized its setup?

No → ***SKIP TO QUESTION #59***

Yes

↓

a. If yes, what was the percentage of the total purchases of the subsidiary in Mexico?

_____ % of total purchases

59. Does the subsidiary in Mexico <u>sell</u> products to the unit that organized its setup?

No → ***SKIP TO QUESTION #60***

Yes

↓

a. If yes, what is the percentage of the total sales of the subsidiary in Mexico?

_____ % of total sales

60. How similar or different is the <u>manufacturing process</u> of the subsidiary in Mexico compared to the international corporation's unit that organized the setup of the subsidiary in Mexico?

Very similar

Somewhat similar

Somewhat different

Very different

61. How similar or different is the <u>organizational structure</u> of the subsidiary in Mexico compared to the international corporation's unit that organized the setup of the subsidiary in Mexico?

Very similar

Somewhat similar

Somewhat different

Very different

62. Was there or is there an evaluation system with shared responsibility for results between the managers of both the subsidiary in Mexico and the unit that organized its setup?

No → ***SKIP TO QUESTION #62***

Yes

↓

a. If yes, what percentage of the evaluation is affected by the shared responsibility?

_____ % of the evaluation

I. <u>Experience of the Unit that Organized the Setup of the Subsidiary in Mexico</u>

The following section concerns the experience of the international corporation with the setup of manufacturing subsidiaries in foreign countries. Please check the corresponding option or fill in the number.

63. Did the unit that organized the setup of the subsidiary in Mexico have previous experience with the setup of manufacturing subsidiaries within the last ten years?

No → ***SKIP TO QUESTION #62***

Yes

↓

a. If yes, with how many subsidiaries did that unit set up over the last 10 years, excluding this subsidiary in Mexico?

_____ subsidiaries

b. If yes, in what country or countries were these subsidiaries set up most recently?

_____ (country where subsidiary #1 is located)

_____ (country where subsidiary #2 is located)

c. If yes, in which years were these subsidiaries set up?

_____ (subsidiary #1)

_____ (subsidiary #2)

J. Ownership Structure of the Subsidiary in Mexico

The following section concerns the ownership structure of the subsidiary in Mexico. Please check the corresponding option or fill in the number.

64. Is the subsidiary in Mexico fully owned by the international corporation?

Yes → ***SKIP TO QUESTION #65***

No

↓

a. If no, which percentage of capital does the other partner hold?

_____ % of capital

b. If no, does the other partner contribute to the management of the subsidiary in Mexico?

Yes

No

c. If no, does the other partner contribute to the core technology of the subsidiary in Mexico?

Yes

No

K. Respondent's Personal Experience

The following section concerns your professional experience. Please fill in the word or number or check the corresponding option.

65. What is your nationality?

_____ (country)

66. How long have you been working in this industry?

_____ years

67. How long have you been working in this international corporation?

_____ years

68. Did you have personal experience with the setup of new subsidiaries prior to this one?

No → ***SKIP TO QUESTION #69***

Yes

↓

a. If yes, in which country or countries?

_____ (country #1)

_____ (country #2)

_____ (country #3)

L. <u>Possible Follow-Up</u>

We will keep all your answers strictly confidential. For some aspects of this research project, however, it would be useful to gather additional information from the unit that organized the setup of the subsidiary in Mexico.

69. Would you allow us to get in touch with your main contact person at the unit that organized the setup of the subsidiary in Mexico?

No

Yes

↓

a. If yes, please indicate the contact information for that person:

Name:_____

Position/Title: _____

E-mail: _____

Phone: _____

THANK YOU FOR ANSWERING THIS QUESTIONNAIRE.
PLEASE MAIL IT TO THE FOLLOWING ADDRESS:

Dr. Andreas M. Hartmann (ABD)
Departamento de Negocios Internacionales
Tecnológico de Monterrey
Eugenio Garza Sada 2501
64849 Monterrey, N.L., Mexico

APPENDIX 2: QUESTIONNAIRE IN SPANISH

A. <u>Influencias externas sobre el establecimiento de la subsidiaria en México</u>

La siguiente sección está relacionada con los factores externos que posiblemente influencían el establecer su unidad dentro de la corporación internacional, a la que se refiere como "subsidiaria en México". Por favor, marque la opción que mejor refleje su opinión.

	Lo facilitaron	No influyeron	Lo dificultaron
1. En su opinión, ¿qué influencia tuvieron las <u>autoridades locales</u> en el establecimiento de la subsidiaria en México?			
2. En su opinión, ¿qué influencia tuvieron las <u>leyes y regulaciones</u> en el establecimiento de la subsidiaria en México?			
3. En su opinión, ¿qué influencia tuvo la disponibilidad de <u>proveedores calificados</u> en el establecimiento de la subsidiaria en México?			
4. En su opinión, ¿qué influencia tuvo la disponibilidad de <u>mano de obra calificada</u> en el establecimiento de la subsidiaria en México?			
5. En su opinión, ¿qué influencia tuvieron las <u>diferencias culturales</u> en el establecimiento de la subsidiaria en México?			

B. <u>Proceso de establecimiento de la subsidiaria en México</u>

La siguiente sección trata sobre los datos concretos para el establecimiento de la subsidiaria en México. Por favor, escriba los números correspondientes o marque en el recuadro de "No aplica".

6. ¿Cuándo inició la construcción de la planta de manufactura de la subsidiaria en México?

_____ (mes) _____ (año)

No aplica

7. ¿Cuándo llegaron las primeras máquinas para la subsidiaria en México?

_____ (mes) _____ (año)

No aplica

8. ¿Cuándo llegó la subsidiaria en México a su capacidad total de operación o cuándo llegará a su capacidad total de operación?

_____ (mes) _____ (año)

No aplica

9. **¿Cuándo realizó la subsidiaria en México su primera entrega regular o cuando realizará su primera entrega regular?** *(no de prueba)*
   _____ (mes) _____ (año)
   No aplica

10. **¿Cuándo llegó la subsidiaria en México al mismo nivel de productividad que las demás unidades en la corporación internacional o cuándo llegará a ese nivel?**
    _____ (mes) _____ (año)
    No aplica

11. **¿Cuántos empleados tuvo la subsidiaria en México cuando llegó a su capacidad total de operación o cuántos empleados tendrá cuando llegue a su capacidad total de operación?**
    _____ empleados

12. **¿Cuál es o fue la <u>inversión de capital</u> en la subsidiaria en México al momento en que alcanzó su capacidad total de operación o cuál será la inversión de capital cuando llegue a su capacidad total de operación?**
    _____ (millones de dólares EUA)

13. **¿Cuántos <u>expatriados</u> trabajaron en la subsidiaria en México durante el <u>primer año</u> después del arranque de operaciones?**
    _____ expatriados

14. **¿Cuántos <u>expatriados</u> trabajaron en la subsidiaria en México durante el <u>segundo año</u> después del arranque de operaciones?**
    _____ expatriados
    No aplica

15. **En promedio, ¿cuál es el costo anual de emplear a un expatriado en la subsidiaria en México?**
    _____ (miles de dólares EUA)
    No aplica

16. **¿Cuántos <u>internos/aprendices</u> envió la subsidiaria en México al extranjero durante el <u>primer año</u> después de que inició operaciones?**
    _____ internos/aprendices

17. **¿Cuántos <u>internos/aprendices</u> envió la subsidiaria en México al extranjero durante el <u>segundo año</u> después de que inició operaciones?**
    _____ internos/aprendices

18. **En promedio ¿cuál es el costo de enviar a un interno/aprendiz al extranjero?**
    _____ (miles de dólares EUA)
    No aplica

19. ¿Cuál es el costo total de la transferencia de tecnología (capacitación del personal local, extranjeros, internos, visitas de expertos)?

_____ (millones de dólares EUA)

No se ha calculado

20. ¿Se han excedido los <u>costos</u> en el proceso de establecimiento?

No → ***PASE A LA PREGUNTA #21***

Sí

↓

a. En caso afirmativo, ¿en qué porcentaje, en relación al presupuesto original?

_____ % sobre el presupuesto

21. ¿Se han excedido los <u>plazos</u> en el proceso de establecimiento?

No → ***PASE A LA PREGUNTA #22***

Sí

↓

a. En caso afirmativo, ¿por cuántos meses en relación a lo programado originalmente ?

_____ meses sobre lo programado

C. <u>Complejidad de la tecnología</u>

La siguiente sección se refiere a la complejidad de la tecnología usada en la subsidiaria. Por favor, escriba el número o las palabras correspondientes o marque en el recuadro.

22. ¿A qué sector industrial pertenece su empresa?

_____ (industria)

23. ¿Cuántos productos diferentes fabrica la subsidiaria en México? *(El mismo producto en diferentes tamaños de empaque debe contarse como uno solo.)*

_____ productos diferentes

24. ¿Cuál es el porcentaje de valor agregado de la subsidiaria en México en relación a los insumos?

_____ % de valor agregado

25. ¿Cuántos proveedores clave de materiales de producción tiene la subsidiaria en México?

_____ proveedores clave

26. ¿Es la tecnología núcleo de la subsidiaria en México considerada tecnología de punta en la industria?

Sí → ***PASE A LA PREGUNTA #27***

No

↓

a. En caso negativo, ¿por cuántos años se ha estado empleando esta tecnología en la industria?

_____ años

27. ¿Incluye la tecnología clave utilizada por la subsidiaria en México, tecnología propietaria que desarrolló internamente la corporación internacional a la que pertenece?

No → ***PASE A LA PREGUNTA #28***

Sí

↓

a. En caso afirmativo, ¿se había implementado esta tecnología previamente en la corporación internacional?

Sí

No

D. <u>Documentación de la tecnología</u>

En la siguiente sección, se le preguntará qué tan bien está documentada la tecnología usada en la subsidiaria. Para cada frase habrá siete opciones que van desde "totalmente en desacuerdo" a "totalmente de acuerdo". Por favor, marque la opción que mejor represente su apreciación personal.

28. Puede elaborarse un manual útil que describe nuestro proceso de manufactura.

Total-mente en des-acuerdo	En des-acuerdo	Parcial-mente en des-acuerdo	Ni de acuerdo ni en desa-cuerdo	Parcial-mente de acuerdo	De acuerdo	Total-mente de acuerdo

29. Gran parte de nuestro control de manufactura está incorporado en software estándar que hemos modificado de acuerdo a nuestras necesidades.

Total-mente en des-acuerdo	En des-acuerdo	Parcial-mente en des-acuerdo	Ni de acuerdo ni en desa-cuerdo	Parcial-mente de acuerdo	De acuerdo	Total-mente de acuerdo

30. Gran parte de nuestro control de manufactura se incluye en software que ha sido desarrollado exclusivamente para nuestro uso.

Total-mente en des-acuerdo	En des-acuerdo	Parcial-mente en des-acuerdo	Ni de acuerdo ni en desa-cuerdo	Parcial-mente de acuerdo	De acuerdo	Total-mente de acuerdo

31. En nuestra empresa existe gran cantidad de documentación que describe las partes críticas del proceso de manufactura.

Total-mente en des-acuerdo	En des-acuerdo	Parcial-mente en des-acuerdo	Ni de acuerdo ni en desa-cuerdo	Parcial-mente de acuerdo	De acuerdo	Total-mente de acuerdo

E. <u>Facilidad para enseñar la tecnología</u>

En la siguiente sección, se le pedirá evaluar la facilidad con la que se puede enseñar la tecnología usada en la subsidiaria en México. Para cada frase habrá siete opciones que van desde "completamente de acuerdo" a "completamente en desacuerdo". Por favor, marque la opción que mejor represente su apreciación personal.

32. El personal nuevo de manufactura puede aprender fácilmente a fabricar el producto, hablando con empleados capacitados en la manufactura.

Total-mente en des-acuerdo	En des-acuerdo	Parcial-mente en des-acuerdo	Ni de acuerdo ni en desa-cuerdo	Parcial-mente de acuerdo	De acuerdo	Total-mente de acuerdo

33. El personal nuevo de manufactura puede aprender fácilmente a fabricar el producto, estudiando un juego completo de instrucciones.

Total-mente en des-acuerdo	En des-acuerdo	Parcial-mente en des-acuerdo	Ni de acuerdo ni en desa-cuerdo	Parcial-mente de acuerdo	De acuerdo	Total-mente de acuerdo

34. Educar y capacitar al personal nuevo de manufactura es una tarea rápida.

Total-mente en des-acuerdo	En des-acuerdo	Parcial-mente en des-acuerdo	Ni de acuerdo ni en desa-cuerdo	Parcial-mente de acuerdo	De acuerdo	Total-mente de acuerdo

35. El personal nuevo de manufactura tiene conocimientos suficientes para fabricar nuestro producto después de haber recibido una educación normal en una escuela preparatoria.

Total-mente en des-acuerdo	En des-acuerdo	Parcial-mente en des-acuerdo	Ni de acuerdo ni en desa-cuerdo	Parcial-mente de acuerdo	De acuerdo	Total-mente de acuerdo

36. El personal nuevo de manufactura tiene conocimientos suficientes para fabricar nuestro producto después de haber recibido una capacitación técnica profesional.

Total-mente en des-acuerdo	En des-acuerdo	Parcial-mente en des-acuerdo	Ni de acuerdo ni en desa-cuerdo	Parcial-mente de acuerdo	De acuerdo	Total-mente de acuerdo

F. <u>Comunicación entre la subsidiaria en México y la unidad que organizó su establecimiento</u>

La siguiente sección trata la frecuencia y los medios usados para entablar comunicación entre la subsidiaria en México y la unidad internacional de la corporación internacional que organizó el establecimiento de la subsidiaria en México. Por favor, marque la opción o escriba el número que corresponda.

37. Durante el <u>primer año</u> después de que inició la subsidiaria en México, ¿con qué frecuencia tuvo contacto <u>telefónico</u> el equipo administrativo con la unidad que organizó su establecimiento?

0-5 veces al mes
6-10 veces al mes
11-15 veces al mes
16-20 veces al mes
Más de 20 veces al mes

38. Durante el <u>segundo año</u> después de que inició la subsidiaria en México, ¿con qué frecuencia tuvo contacto <u>telefónico</u> el equipo administrativo con la unidad que organizó su establecimiento?

0-5 veces al mes
6-10 veces al mes
11-15 veces al mes
16-20 veces al mes
Más de 20 veces al mes
No aplica

39. Durante el <u>primer año</u> después de que inició la subsidiaria en México, ¿con qué frecuencia tuvo contacto por <u>correo electrónico o intranet</u> el equipo administrativo con la unidad que estableció su establecimiento?

0-5 veces al mes
6-10 veces al mes
11-15 veces al mes
16-20 veces al mes
Más de 20 veces al mes

40. Durante el <u>segundo año</u> después de que inició la subsidiaria en México, ¿con qué frecuencia tuvo contacto por <u>correo electrónico o intranet</u> el equipo administrativo con la unidad que estableció su establecimiento?

0-5 veces al mes
6-10 veces al mes
11-15 veces al mes
16-20 veces al mes
Más de 20 veces al mes
No aplica

41. Durante el <u>primer año</u> después de que inició la subsidiaria en México, ¿cuántas <u>visitas recibió</u> de la unidad que organizó su establecimiento?

___ visitas en el primer año

42. Durante el <u>segundo año</u> después de que inició la subsidiaria en México, ¿cuántas <u>visitas recibió</u> de la unidad que organizó su establecimiento?

___ visitas en el segundo año
No aplica

43. Durante el <u>primer año</u> después de que inició la subsidiaria en México, ¿cuántas veces <u>visitó</u> el personal de la subsidiaria en México a la unidad que organizó su establecimiento?

___ visitas en el primer año

44. Durante el <u>segundo año</u> después de que inició la subsidiaria en México, ¿cuántas veces <u>visitó</u> el personal de la subsidiaria en México a la unidad que organizó su establecimiento?

___ visitas en el segundo año
No aplica

G. <u>Calidad de la relación entre la subsidiaria en México y la unidad que organizó su establecimiento</u>

En la siguiente sección, se le pedirá que evalúe la calidad de la relación entre la subsidiaria en México y la unidad dentro de la corporación internacional que organizó su establecimiento. Para cada frase habrá siete opciones que van desde

"completamente de acuerdo" a "completamente en desacuerdo". Por favor, marque la opción que mejor represente su apreciación personal.

45. Pensamos que las personas en la unidad que organizó el establecimiento de la subsidiaria en México dijeron la verdad en sus interacciones con nosotros.

Total-mente en des-acuerdo	En des-acuerdo	Parcial-mente en des-acuerdo	Ni de acuerdo ni en desa-cuerdo	Parcial-mente de acuerdo	De acuerdo	Total-mente de acuerdo

46. Pensamos que la unidad que organizó el establecimiento de la subsidiaria en México cumplió con sus obligaciones frente a nuestra subsidiaria.

Total-mente en des-acuerdo	En des-acuerdo	Parcial-mente en des-acuerdo	Ni de acuerdo ni en desa-cuerdo	Parcial-mente de acuerdo	De acuerdo	Total-mente de acuerdo

47. En nuestra opinión, la unidad que organizó el establecimiento de la subsidiaria en México fue confiable.

Total-mente en des-acuerdo	En des-acuerdo	Parcial-mente en des-acuerdo	Ni de acuerdo ni en desa-cuerdo	Parcial-mente de acuerdo	De acuerdo	Total-mente de acuerdo

48. Pensamos que las personas en la unidad que organizó el establecimiento de la subsidiaria en México tuvieron éxito pasando por encima de otras personas.

Total-mente en des-acuerdo	En des-acuerdo	Parcial-mente en des-acuerdo	Ni de acuerdo ni en desa-cuerdo	Parcial-mente de acuerdo	De acuerdo	Total-mente de acuerdo

49. Pensamos que la unidad que organizó el establecimiento de la subsidiaria en México trató de imponerse.

Total-mente en des-acuerdo	En des-acuerdo	Parcial-mente en des-acuerdo	Ni de acuerdo ni en desa-cuerdo	Parcial-mente de acuerdo	De acuerdo	Total-mente de acuerdo

50. Pensamos que la unidad que organizó el establecimiento de la subsidiaria en México se aprovechó de nuestros problemas.

Total-mente en des-acuerdo	En des-acuerdo	Parcial-mente en des-acuerdo	Ni de acuerdo ni en desa-cuerdo	Parcial-mente de acuerdo	De acuerdo	Total-mente de acuerdo

51. Pensamos que la unidad que organizó el establecimiento de la subsidiaria en México interactuó con nosotros honestamente.

Total-mente en des-acuerdo	En des-acuerdo	Parcial-mente en des-acuerdo	Ni de acuerdo ni en desa-cuerdo	Parcial-mente de acuerdo	De acuerdo	Total-mente de acuerdo

52. Pensamos que la unidad que organizó el establecimiento de la subsidiaria en México mantuvo su palabra.

Total-mente en des-acuerdo	En des-acuerdo	Parcial-mente en des-acuerdo	Ni de acuerdo ni en desa-cuerdo	Parcial-mente de acuerdo	De acuerdo	Total-mente de acuerdo

53. Pensamos que la unidad que organizó el establecimiento de la subsidiaria en México no trató de engañarnos.

Total-mente en des-acuerdo	En des-acuerdo	Parcial-mente en des-acuerdo	Ni de acuerdo ni en desa-cuerdo	Parcial-mente de acuerdo	De acuerdo	Total-mente de acuerdo

54. Pensamos que la unidad que organizó el establecimiento de la subsidiaria en México trató de deshacerse de sus compromisos.

Total-mente en des-acuerdo	En des-acuerdo	Parcial-mente en des-acuerdo	Ni de acuerdo ni en desa-cuerdo	Parcial-mente de acuerdo	De acuerdo	Total-mente de acuerdo

55. Pensamos que la unidad que organizó el establecimiento de la subsidiaria en México trató las expectativas conjuntas de manera justa.

Total-mente en des-acuerdo	En des-acuerdo	Parcial-mente en des-acuerdo	Ni de acuerdo ni en desa-cuerdo	Parcial-mente de acuerdo	De acuerdo	Total-mente de acuerdo

56. Pensamos que la unidad que organizó el establecimiento de la subsidiaria en México se aprovechó de las personas vulnerables.

Total-mente en des-acuerdo	En des-acuerdo	Parcial-mente en des-acuerdo	Ni de acuerdo ni en desa-cuerdo	Parcial-mente de acuerdo	De acuerdo	Total-mente de acuerdo

H. <u>Intereses comunes e incentivos compartidos</u>

La siguiente sección trata la cooperación que se lleva a cabo actualmente entre la subsidiaria en México y la unidad de la corporación internacional que organizó su establecimiento. Por favor, marque la opción correspondiente o escriba la palabra o número solicitado.

57. ¿Dónde está ubicada la unidad de la corporación internacional que organizó el establecimiento de la subsidiaria en México?

_____ (país)

58. ¿<u>Compra</u> la subsidiaria en México productos de la unidad que organizó su establecimiento?

No → ***PASE A LA PREGUNTA #59***

Sí

↓

a. En caso afirmativo, ¿qué porcentaje es respecto a las compras totales de la subsidiaria en México?

_____ % de las compras totales

59. ¿<u>Vende</u> la subsidiaria en México productos a la unidad que organizó su establecimiento?

No → ***PASE A LA PREGUNTA #60***

Sí

↓

b. En caso afirmativo, ¿qué porcentaje es respecto a las ventas totales de la subsidiaria en México?

_____ % de las ventas totales

60. ¿Qué tan semejante o diferente es el <u>proceso de manufactura</u> de la subsidiaria en México en comparación con la unidad de la corporación internacional que organizó el establecimiento de la subsidiaria en México?

Muy semejante
Algo semejante
Algo diferente
Muy diferente

61. ¿Qué tan semejante o diferente es la <u>estructura organizacional</u> de la subsidiaria en México en comparación con la unidad de la corporación internacional que organizó el establecimiento de la subsidiaria en México?

Muy semejante
Algo semejante
Algo diferente
Muy diferente

62. ¿Hubo o hay un sistema de evaluación con responsabilidades compartidas para los resultados entre los gerentes de la subsidiaria en México y la unidad que organizó su establecimiento?

No → ***PASE A LA PREGUNTA #63***
Sí
↓

a. En caso afirmativo, ¿qué porcentaje de la evaluación se ve afectada por la responsabilidad compartida?

_____ % de la evaluación

I. <u>Experiencia de la unidad que organizó el establecimiento de la subsidiaria en México</u>

La siguiente sección trata sobre la experiencia de la corporación internacional con la instalación de subsidiarias de manufactura en países extranjeros. Por favor, marque la opción correspondiente o escriba el número.

63. ¿Tuvo la unidad que organizó el establecimiento de la subsidiaria en México, experiencia previa con el establecimiento de otras subsidiarias en el transcurso de los últimos diez años?

No → ***PASE A LA PREGUNTA #64***

Sí

↓

a. En caso afirmativo, ¿cuántas subsidiarias estableció en los últimos 10 años, excluyendo esta subsidiaria en México?

_____ subsidiarias

b. En caso afirmativo, ¿en qué país o países se establecieron más recientemente esas subsidiarias?

_____ (país #1)

_____ (país #2)

c. En caso afirmativo, ¿en qué años se establecieron esas subsidiarias?

_____ (subsidiaria #1)

_____ (subsidiaria #2)

J. <u>Estructura de propiedad de la subsidiaria en México</u>

La siguiente sección trata sobre la estructura de la propiedad de la subsidiaria en México. Por favor, marque la opción correspondiente o escriba el número.

64. ¿Es la corporación internacional la única propietaria de la subsidiaria en México?

Sí → ***PASE A LA PREGUNTA #65***

No

↓

a. En caso negativo, ¿qué porcentaje del capital pertenece al otro socio?

_____ % del capital

b. En caso negativo, ¿contribuye el otro socio a la administración de la subsidiaria en México?

Sí

No

c. En caso negativo, ¿contribuye el otro socio a la tecnología de la subsidiaria en México?

Sí

No

K. <u>Experiencia personal de la persona que contesta la encuesta</u>

La siguiente sección es acerca de su experiencia profesional. Por favor, escriba la palabra o el número o marque la opción correspondiente.

65. ¿Cuál es su nacionalidad?

_____ (país)

66. ¿Cuánto tiempo ha estado trabajando en esta industria?

_____ años

67. ¿Cuánto tiempo ha estado trabajando para esta corporación internacional?

_____ años

68. ¿Tuvo experiencia personal con el establecimiento de nuevas subsidiarias antes de ésta?

No → ***PASE A LA PREGUNTA #69***

Sí

↓

a. En caso afirmativo, ¿en que país o países?

_____ (país #1)

_____ (país #2)

_____ (país #3)

L. <u>Posible seguimiento</u>

Mantendremos todas sus repuestas bajo estricta confidencialidad. Por algunos aspectos del proyecto de investigación, sería útil obtener información adicional de la unidad que organizó la instalación de la subsidiaria en México.

69. ¿Nos permitiría comunicarnos con su principal persona de contacto en la unidad que organizó el establecimiento de la subsidiaria en México?

No

Sí

↓

a. En caso afirmativo, favor de proporcionar la información para ponernos en contacto con esa persona.

Nombre:_____

Puesto/Título: _____

Correo electrónico: _____

Teléfono: _____

GRACIAS POR CONTESTAR ESTE CUESTIONARIO.
POR FAVOR, MÁNDELO A LA DIRECCIÓN SIGUIENTE:

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BIOGRAPHICAL SKETCH

Andreas Michael Hartmann was born in Braunschweig (Brunswick), Germany in 1960. He obtained a double Master's degree in translation and conference interpretation from the University of Heidelberg in 1991/1992. Since 1990, he has been working as a free-lance translator and interpreter. Additionally, he has taught language and translation courses at several universities in Germany. Since 1993, he has been employed as a full-time professor at the Tecnológico de Monterrey, Campus Monterrey, Mexico, where he also obtained a Master's in Business Administration in 1996. While continuing with his teaching duties, he pursued his doctoral studies in business administration at the same Tecnológico de Monterrey, including a three-semester stay at HEC Montréal, Canada. Since 2006, Andreas M. Hartmann has been working as an associate professor in the Department of International Business at the Tecnológico de Monterrey.

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This dissertation was typed by the author.