



# How Foreign and Domestic Firms Differ in Leveraging IT-Enabled Supply Chain Information Integration in BOP Markets: The Role of Supplier and Client Business Collaboration

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## Abstract

Although attractive to foreign and domestic firms, bottom-of-pyramid (BOP) markets pose unique challenges. Research suggests that IT-enabled supply chain information integration (IT-SCII) helps firms collaborate with suppliers and clients in broad business activities, operate in a unique context, and overcome salient challenges in BOP markets. Anecdotal evidence and research suggest that foreign and domestic firms have differing advantages: While foreign firms have considerable global experience, domestic firms have substantial local market knowledge. We draw on the ownership-location-internalization (OLI) framework to theorize that domestic and foreign firms leverage IT-SCII differently because of their differing ownership-based advantages in BOP markets. We hypothesize that the influence of IT-SCII on client business collaboration and the influence of client business collaboration on firm performance are stronger for domestic firms than for foreign firms. Conversely, we hypothesize that the influence of IT-SCII on supplier business collaboration and the influence of supplier business collaboration on firm performance are stronger for foreign firms than for domestic firms. We test our hypotheses in the automotive parts manufacturing BOP market comprising foreign and domestic firms in India. Partial least squares and econometric analyses of 172 firms reveal broad support for our hypotheses. By incorporating the OLI framework into IT-enabled supply chain literature, our study contributes to theory and practice by highlighting that IT-SCII has differing implications for foreign and domestic firms in BOP markets.

**Keywords:** IT-Enabled Supply Chain Information Integration, Client Business Collaboration, Supplier Business Collaboration, BOP Markets, IT-Enabled Supply Chains, Partial Least Squares, OLI Framework, IT Business Value

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## 1 Introduction

The “bottom of the pyramid” (BOP) refers to the socioeconomic group of people living with very

limited resources and income (estimated at \$2 a day). This group is projected to account for nearly 30% of the increase in world population by 2050 (Prahalad, 2012). Despite low incomes and low purchasing

power, customers in BOP markets have high aspirations to acquire products and services because of rising awareness from traditional and digital media (Fawcett & Waller, 2015).<sup>1</sup> BOP markets thus provide substantial untapped opportunities to serve a broad base of potential end customers and are attractive to both domestic and foreign firms seeking to expand their businesses globally (Prahalad, 2008). Notwithstanding their potential, BOP markets present several challenges because of relatively limited accessibility of end customers (Peng et al., 2008) arising from distribution challenges (Sheth, 2011), strong dependence on local market structures, and locally embedded relationship-based legacy operations (Tarafdar et al., 2012). Thus, supply chains in BOP markets often lack sophistication compared to those in developed markets.

Firms can overcome supply chain challenges in BOP markets by leveraging information technology (IT) to acquire and manage information to understand the unique context. For example, integration of IT-based systems, including mobile phones and apps, helped agribusiness firms in India's BOP market overcome infrastructure challenges through access to virtual marketplaces (Matthew, 2018). Firms can also collaborate with local suppliers and clients to overcome the challenges of BOP markets (Khalid et al., 2015). For example, Godrej & Boyce Manufacturing, an Indian consumer goods manufacturer, collaborated with local distributors and clients to understand and satisfy BOP market needs by creating a low-cost refrigeration solution (Furr & Dyer, 2015).

Although foreign firms are attracted to BOP markets because of their potential, foreign firms face stiff competition from domestic firms operating in these markets. For example, Danone Dairy, a French dairy company, realized limited success in the Indian BOP market and exited India (Shedd, 2019). Conversely, as previously noted, domestic firm Godrej & Boyce Manufacturing succeeded by using its local market knowledge (Furr & Dyer, 2015). The fundamental issue is the disparity arising from ownership differences between foreign and domestic firms in terms of proximity to the informational environment

surrounding the local market. Since domestic firms are embedded in the local context, they have local market information advantages (Li et al., 2008). In contrast, foreign firms may have less information about the local market but possess advantages related to global exposure and experience with a global network of partners (Dunning, 2000). The difference in proximity to the informational environment creates different implications for the ways in which foreign and domestic firms leverage IT for information integration in supply chains and tap this informational environment to achieve collaboration and ultimately firm performance. Guided by the above practical and theoretical motivation, we study how foreign and domestic firms leverage "IT-enabled supply chain information integration" (IT-SCII) differently in BOP markets. IT-SCII refers to the extent to which information systems used by firms in the supply chain context help firms identify and access data, connect to data sources, and combine data within and outside the firm (Prajogo & Olhager, 2012). IT-SCII can influence firm performance by enabling collaboration with suppliers and clients because it increases visibility across the supply chain via information and knowledge flows (Rai et al., 2012).

We address the following research question: *How do foreign and domestic firms differ in terms of leveraging IT-enabled supply chain information integration (IT-SCII) in BOP markets, via supplier business collaboration and client business collaboration?* Drawing on the ownership-location-internalization (OLI) framework or eclectic paradigm (Dunning, 1980), we posit that underlying differences in advantages between foreign and domestic firms in BOP markets influence how they differently leverage IT-SCII for client business collaboration, supplier business collaboration, and hence firm performance. Figure 1 presents our research model.<sup>2</sup>

According to the OLI framework, ownership differences generate ownership advantages that arise from factors such as possession of assets and the ability to coordinate value-added activities, or firm-specific norms and values arising from the institutional environment (Dunning, 1988; Eden & Dai, 2010; Verbeke & Yuan, 2010).

<sup>1</sup> In this study, "BOP" and "BOP markets" synonymously refer to the group of people comprising the BOP. Thus, BOP markets refer to consumers at the BOP and producers that serve the BOP (Tarafdar et al., 2012). This is similar to, for example, using the term "niche market" to refer to a group of niche customers. For instance, "operating in BOP markets" refers to the notion of serving BOP customers.

<sup>2</sup> Our conceptualization of IT-SCII is distinct from the notion of supply chain integration, which is often used interchangeably with supply chain collaboration in operations management literature. Supply chain integration

is a broad term, referring to the unified control of several processes and thus emphasizes central control, ownership, or process integration governed by contractual means (Cao & Zhang, 2011). However, IT-SCII focuses only on IT-enabled collection, access, sharing, management and integration of information across supply chain partners. Our focus on IT-SCII is consistent with prior literature that highlights individual components of supply chain integration, such as customer integration, supplier integration, and internal integration. See Van der Vaart & van Donk (2008) and Flynn et al. (2010) for details.

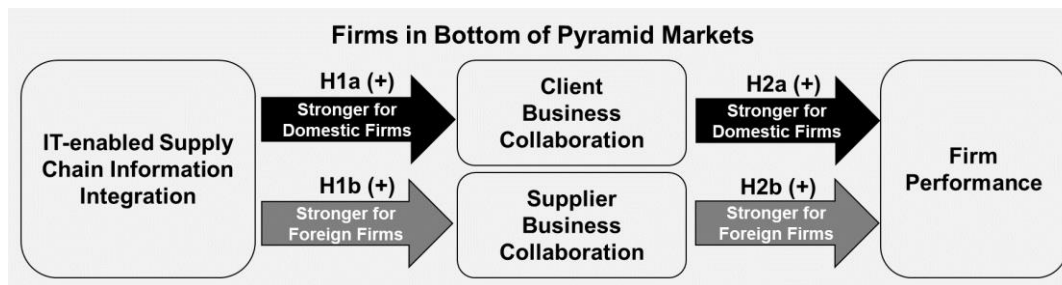


Figure 1. Research Model

We view IT-SCII as an ownership advantage because IT-SCII provides an ability to work efficiently and coordinate with suppliers and clients to encourage productive business collaborations (Dunning & Wymbs, 2001). We theorize that domestic and foreign firms leverage IT differently. Domestic firms are more engaged locally and carry deeper insights and contextual knowledge about the local BOP market. Thus, we posit that global experience and the knowledge advantages of foreign firms are superseded by deep knowledge about the local market context of domestic firms when leveraging IT-SCII for client business collaboration and when leveraging client business collaboration for firm performance. In contrast, global knowledge and experience are more transferable from the global context to the BOP market, when leveraging IT-SCII for supplier business collaboration and firm performance. Therefore, on the supplier side, foreign firms retain their advantage of global knowledge and experience relative to domestic firms and are not superseded by the superior local market knowledge of domestic firms.

Building on these theoretical arguments, we develop and test our hypotheses using a unique dataset of 172 automotive parts manufacturing firms located in India that serve the BOP market. The data were collected using a primary matched-pair survey method in a dual online-offline mode (A. Kathuria et al., 2018; Khuntia et al., 2019). Our analyses using partial least squares (PLS) and econometric methods provide broad empirical support for our theory. Our findings highlight that in BOP markets, the influence of IT-SCII on client business collaboration and supplier business collaboration, and ultimately firm performance is different for foreign and domestic firms.

Our study makes several key theoretical contributions. First, we contribute to the IT business value literature by highlighting that ownership matters when firms leverage IT, suggesting that there are different theoretical mechanisms by which foreign and domestic firms benefit from IT. We shed light on the theoretical tension of global experience versus local market knowledge to the extent that they are important distinguishing advantages of foreign and domestic firms, respectively. This tension is especially intriguing because, while there are arguments for each being

advantageous, we know little about how these advantages compare relative to one another. Second, we contribute to IT-enabled supply chain literature by integrating IS and the OLI framework, to uncover IT-SCII as an ownership-related advantage. Third, we extend the literature on IS phenomena at the firm level in BOP markets by offering nuanced theoretical insights indicating that the advantages of foreign and domestic firms do not apply uniformly for supplier collaboration and client collaboration. Overall, this study contributes by highlighting the intertwined nature of ownership-related advantages and IT.

## 2 Theoretical Background

### 2.1 The Ownership-Location-Internalization Framework

The eclectic OLI paradigm offers a unifying framework for determining the origin and pattern of firms' international activities (Dunning, 1980; Eden & Dai, 2010) (see Appendix Table A1). This paradigm posits that such activities are enabled by three sets of advantages, namely ownership, location, and internalization (OLI). The *ownership* dimension of the framework (O) refers to advantages stemming from firm ownership, either foreign or domestic (Dunning, 2000). Another advantage (L) for firms operating across nations arises from operating in a specific *location* (country). Finally, *internalization* (I) refers to the control advantage over firm assets. It is important to note that the OLI paradigm posits that the significance of each of these advantages and the configuration between them is context specific and varies across activities (e.g., supply chain information integration) and markets (e.g., BOP markets).

Ownership advantages are of at least two types:  $O_a$  and  $O_i$ .  $O_a$  advantages arise from "exclusive possession and use of certain kinds of income-generating assets," and  $O_i$  advantages arise from the "ability to coordinate separate value-added activities" in order to manage environmental risks (Dunning, 1988, p. 25; Eden & Dai, 2010). A third ownership advantage, termed  $O_i$  *institutional advantage*, stems from "firm-specific norms and values, and the imprint of the home country

institutional environment on the firm” (Eden & Dai, 2010, p. 29) and was later added to the framework by Dunning (Verbeke & Yuan, 2010). The potential of the OLI framework to contribute to understanding information systems (IS) phenomena has not been adequately exploited thus far, barring few notable exceptions (e.g., Su, 2013) (see Appendix Table A2).

In this study, we focus on the *ownership* aspect of the OLI framework to understand how foreign and domestic firms in BOP markets leverage IT-SCII differently, while using the *location* aspect to support some of our theoretical arguments. We build on the premise that difference in ownership (foreign versus domestic) endows firms with different resources and advantages (Eden & Dai, 2010)<sup>3</sup> that, in turn, explain differences in leveraging IT-SCII via supplier business collaboration and client business collaboration. For example, while domestic firms have in-depth knowledge of the local market, foreign firms may have stronger brands than domestic firms (Ghemawat & Hout, 2008). Foreign firms develop advantages that can be transferred from one’s own country to the host country (Rugman & Verbeke, 1992). These advantages may arise either from the foreign firm’s “ownership of, or access to, a set of income-generating assets, or from their ability to coordinate these assets with other assets across national boundaries in a way that benefits them relative to their [domestic] competitors” (Dunning, 2001, p. 176).

## 2.2 Why Foreign versus Domestic Ownership Matters in BOP Markets

In BOP markets, ownership signals the unique characteristics, structure, and distinct identity of a firm (Peng et al., 2004). Firms with the same ownership type share a similar socially coded identity, which is distinct from firms with a different ownership type (Le Mens et al., 2011). Because of different ownership types, foreign and domestic firms have different knowledge, skills, and advantages. External stakeholders (e.g., clients, suppliers) often perceive foreign firms as different from domestic firms (Chan & Makino, 2007). Further, BOP markets provide challenging contextual and institutional environments for both domestic and foreign firms (Simanis & Duke, 2014). The origins and experiences of domestic and foreign firms in these markets are different and thus differentially influence the firm’s ability to react and respond to situations and challenges (Li et al., 2008). Foreign firms often bring their standards, practices, and processes from their own countries (Khuntia et al., 2019). Domestic firms are indigenously acquainted with local practices, including formal and

informal ways of doing business. Thus, having knowledge about end customers can confer unique advantages to domestic firms in BOP markets (Ghemawat & Hout, 2008). A firm’s ownership type may hence influence how the firm’s practices are viewed by stakeholders, in turn swaying the performance implications of the practices (Van den Waeyenberg & Hens, 2012). More generally, foreign and domestic ownership differences in the context of BOP markets are crucial for understanding the performance implications of firms’ practices in the supply chain.

## 2.3 IT-Enabled Supply Chain

The relationship between IT and supply chains has been widely explored in the IS literature. In this context, scholars have studied how different IT-enabled capabilities influence organizational outcomes. For instance, Rai et al. (2015) drew on transaction cost economics and IT capability perspectives to analyze how integration capabilities for IT-enabled interfirm and intrafirm processes influence firm performance, depending on the firm’s plural sourcing strategy. Other studies have found that combinations of IT and non-IT resources, such as IT-related backend integration and partner support, are positively related to process or supply chain performance (Dong et al., 2009; Luo et al., 2015).

IS research has examined how buyers and suppliers benefit from improved information sharing in supply chains. Buyers and suppliers use IT to improve processes and enhance flexibility. IT also helps improve financial leverage, reduce costs, and increase productivity (Klein & Rai, 2009; Wang et al., 2013; Wong et al., 2011; Xia & Xia, 2008). Information systems help in building high-quality relationships between clients and suppliers with different cultural backgrounds (Anderson Jr et al., 2017). IT-enabled information integration leads to stronger supply chain relationships, which promote supply chain collaboration (Lee, 2004; Tippins & Sohi, 2003). As noted by Fawcett et al. (2011, p. 40), “adopting the IT needed to share information on customer and supplier needs, capacities and capabilities enables decision makers to include the right members of the SC [supply chain] in appropriate value-creation processes.” Empirical evidence also suggests that IT may have different effects on the client and supplier side (Yao & Zhu, 2012). Despite important insights and evidence of different mechanisms in client and supplier relationships, it is not clear how information integration enabled by IT in the supply

<sup>3</sup> International business literature often uses the phrase “multinational firms” to refer to a firm domiciled and operating abroad (Celly et al., 2016). In our study, such multinational firms are firms that are domiciled (headquartered) outside India (the country of the focal BOP

market) since they are operating abroad. Firms domiciled in India (the country of the focal BOP market) are operating in their home country and are hence not multinationals, i.e., not foreign, in this context (Khuntia et al., 2019).



chain fuels business collaborations with clients and suppliers differently across foreign and domestic firms in BOP markets.

Studies related to the effects of IT in supply chains in BOP markets are scant, with few exceptions such as Banker et al. (2011) who found that coffee producers that participate in trading platforms obtain higher profits as long as prices are not volatile and face-to-face interactions are not required. Given the unique characteristics of BOP markets (Pralhad, 2012), it is important to understand the influence of IT-enabled supply chain information integration on buyer and supplier relationships. Appendix Table A3 shows illustrative studies in the vast literature on IT-enabled supply chains.

## **2.4 IT-Enabled Supply Chain Information Integration in BOP Markets**

Information integration in supply chains offers significant benefits, such as reduced order cycle times, increased agility to respond to customer demands, and increased firm profitability (Dutta et al., 2017; Kulp et al., 2004). IT-SCII helps firms to adapt to contextual complexities by being able to acquire, use, and subsequently leverage information for business; and quickly sense, change and adapt business priorities. Some examples of IT systems that can be used for supply chain information integration are supply chain planning systems, logistics systems, procurement systems, inventory management systems, and collaborative planning, forecasting, and replenishment (CPFR) systems. IT-SCII can be particularly beneficial for foreign firms seeking to overcome their lack of contextual and market knowledge. For example, 7-Eleven, faced difficulties entering the Japanese market, despite their vast experience in the US market. To improve performance, 7-Eleven used point-of-sale data and demographic information to understand end customer preferences and forecast demand. Information integration transformed 7-Eleven into a market leader, helping the organization to increase sales and inventory turnover (Gottfredson et al., 2005; Lee & Whang, 2001).

Information acquired via IT-SCII helps firms increase digital reach, boost partner collaborations, and meet the unique needs of end customers in BOP markets (Malhotra et al., 2005; Rai et al., 2012). Specific to BOP markets, information integration using IT helps compensate for inadequate infrastructure. For example, global positioning systems and cell phone-based systems help manage delays caused by local distribution and logistics. Since IT provides efficiency in transactions and communications, firms in BOP markets can leverage IT to offset local challenges in supply chains.

Despite the advantages of information integration, BOP markets present obstacles to leveraging IT-SCII. First,

challenges arise from idiosyncratic barriers or practices in BOP markets that hinder supply chain efficiency (e.g., weaker feedback systems across supply chain partners) (Rai et al., 2009). Second, communication in BOP markets often occurs via personal or telephone interactions. Since IT-SCII entails IT-based systems (e.g., electronic data interfaces), firms' reluctance in BOP markets to discontinue traditional ways of operating and communicating may be a significant barrier to IT-SCII success, especially for domestic firms. Third, firms in BOP markets face significant dispersion of their supply chains since customers are difficult to reach because they are dispersed across urban and rural areas (Sheth, 2011). For example, 22% of India's urban population is part of the BOP, and 70% of India's rural BOP population contributes to 50% of India's GDP, but lives across 600,000 villages, only 13% of which have a population higher than 2000 (Aithal & Mukhopadhyay, 2007). The dispersion of end customers and supply chains creates many small and medium enterprises with different supply chain collaboration dynamics. Hence, managing supply chain spread to meet the needs of clients and end customers is a strong motivation for IT-SCII system usage.

## **2.5 Client Business Collaboration and Supplier Business Collaboration in BOP Markets**

Firms need to adapt to BOP environments to reach a highly dispersed low-income consumer base (Aithal & Mukhopadhyay, 2007; Kumar et al., 2013). The need for such adaptation applies not only to the immediate supplier of products to BOP end customers but also to all of the upstream suppliers across the supply chain of the product because upstream suppliers also need to maintain the BOP focus to meet the cost constraints and demands of the BOP market (Brix-Asala et al., 2016). One way of adapting to BOP environments is through business collaborations with clients and suppliers. Client (supplier) business collaboration refers to the collaboration between the focal firm and its clients (suppliers) in broad business activities such as research & development, product and process improvements, new product development, and market and business research, which help firms understand the BOP context (Andrade Rojas et al., 2018; Borgatti & Halgin, 2011; Lin et al., 2009). Client business collaboration addresses the requirements needed for reaching out to clients, and supplier business collaboration helps build a multi-firm distribution system to deliver products and services, develop resources, and gain knowledge of local market conditions, business practices, and norms (Kumar et al., 2013; Li et al., 2008; Steensma et al., 2008). Prior research supports the assertion that client business collaboration and supplier business collaboration are

important in BOP markets (Khalid et al., 2015; Kumaraswamy et al., 2012).<sup>4</sup>

Research suggests that client business collaboration facilitates business in BOP markets (Kumaraswamy et al., 2012) by enabling orientation to local norms. For instance, firms operating in rural areas of India need to be conversant in the local metrics for weights: Tolä (11.66 grams), or Sër (80 Tolä). Similarly, in local dialects, the colloquialisms and norms for loading and unloading are different. Client business collaboration provides avenues for accessing client knowledge, thereby reducing cost and improving performance (Teo, 2012).

In BOP markets, firms need to establish strategies to improve the access to and affordability of products (Kumar et al., 2013). One way of doing this is to collaborate with suppliers to conduct market and business research and adapt product distribution in line with local needs (e.g., transportation, logistics, and packaging) (Hahn & Gold, 2014). Thus, firms need to develop supplier business collaborations to help overcome supply, support, and selling challenges in BOP markets (Hoskisson et al., 2000; Subramanian & Gopalakrishna, 2001).

### 3 Conceptual Framework

Figure 1 shows our research model, and Table 1 recaps the definitions of the main constructs. We focus on supplier business collaboration and client business

collaboration because in BOP markets, developing collaborations with suppliers and clients is crucial for success (Hoskisson et al., 2000; Subramanian & Gopalakrishna, 2001). While clients are essential sources of information related to product localization (Setia et al., 2013), suppliers provide resources and knowledge regarding operational details of local markets and business practices (Li et al., 2008; Steensma et al., 2008), especially in BOP markets (Hahn & Gold, 2014).

Prior studies suggest that collaboration drives firm performance (Krasnikov & Jayachandran, 2008; Morgan et al., 2009). In BOP markets, collaboration helps orient firms within local norms, thus enabling firms to offer clients more meaningful products (Subramanian & Gopalakrishna, 2001). Collaboration with suppliers and clients improves firm performance (Kulp et al., 2004) by helping firms collect information about potential opportunities and risks (Hoyt et al., 2007), providing firms with valuable market resources, and assisting firms in overcoming key regulatory challenges (Sheng et al., 2011). Consistent with prior research, we expect positive direct effects of client business collaboration and supplier business collaboration on firm performance. Our study focuses on differences between foreign and domestic firms in terms of how they leverage IT-SCII for supplier business collaboration and client business collaboration, and ultimately firm performance. Next, we develop our hypotheses (key arguments are summarized in Table 6).

**Table 1. Definitions of Constructs or Concepts**

| Construct/concept   | Definition  | References   |
|---|---|--|
| IT-enabled supply chain information integration (IT-SCII) | The extent to which the information systems used by a firm in the supply chain management context help the firm to identify and access data, connect to data sources, and combine data within and outside the firm. | (Prajogo & Olhager, 2012)  |
| Client business collaboration                             | Collaboration between the focal firm and its clients in broad business activities such as research & development, product & process improvements, new product development, and market and business research.        | (Andrade Rojas et al., 2018; Baum et al., 2005; Borgatti & Halgin, 2011; Lin et al., 2009) |
| Supplier business collaboration                           | Collaboration between the focal firm and its suppliers in broad business activities such as research & development, product & process improvements, new product development, and market and business research.      | (Andrade Rojas et al., 2018; Baum et al., 2005; Borgatti & Halgin, 2011; Lin et al., 2009) |
| BOP market  | BOP market consists of people who live on less than \$2/day.  | (Prahalad, 2012)   |
| Domestic firm   | Firm domiciled in the same country as the focal BOP market.   | (Khuntia et al., 2019)   |
| Foreign firm  | Firm domiciled in a country different from that of the focal BOP market.  | (Khuntia et al., 2019)   |

<sup>4</sup> Supply chain literature refers to supply chain collaboration as “two or more autonomous firms working jointly to plan and execute supply chain operations” (Cao & Zhang, 2011). Examples of supply chain collaboration include collaboration in areas such as inventory planning or replenishment. Business collaboration includes such

collaboration activities that are typically subsumed under supply chain collaboration. For example, inventory planning is considered a process improvement. Business collaboration goes beyond supply chain collaboration to also include business activities such as R&D, market and business research, product improvement, and development.

### 3.1 Hypotheses

Drawing on the OLI framework, we suggest that IT-SCII offers a relative  $O_t$  advantage because IT-SCII provides an ability to work efficiently and coordinate with suppliers and clients to encourage productive business collaborations (Dunning & Wymbs, 2001). Such collaborations include collaboration on product, process, and market improvements. We theorize that foreign and domestic firms differ in the extent to which they leverage IT-SCII as an  $O_t$  advantage for client business collaboration and supplier business collaboration because of ownership-related advantages of foreign and domestic firms. Specifically, we theorize that IT-SCII is a more effective  $O_t$  advantage for foreign firms in relation to supplier-side business collaboration, whereas IT-SCII is a more effective  $O_t$  advantage for domestic firms in relation to client-side business collaboration.

First, domestic firms may tailor IT-SCII systems towards more effective client business collaboration because of their greater local market knowledge, a form of L advantage. Domestic firms may develop and use IT-SCII systems in a manner that is adapted to the BOP context and expectations of local clients because domestic firms are more knowledgeable about clients' IT usage preferences and constraints. Prior studies suggest that local market knowledge is vital for client business collaboration (Zaheer, 1995). We build on these arguments to suggest that domestic firms may contextualize their IT-SCII systems by adjusting their systems to be compatible with the local environment (Sabherwal & King, 1995). This provides a more contextualized and fruitful IT-based setting for collaboration in areas such as product and process improvement. For example, domestic firms may localize the inputs and outputs of IT-SCII systems. Such localizations, such as formats, standards, designs, and language, that result from local market knowledge of domestic firms, may increase the use and adoption of such systems by clients. Hence, clients would share more meaningful information regarding market opportunities and collaborate to mutually benefit from such information. Therefore, a profound understanding of the local market and clients enables domestic firms to utilize IT-SCII more effectively than foreign firms for developing relationships and enhancing client business collaboration (Li et al., 2008).

Second, domestic firms may have an advantage in collaborating with local clients, with whom they have more familiarity. As a result, IT-SCII could spur more productive client interactions for domestic firms because of higher familiarity (Pavlou & Dimoka, 2006), which can spawn collaboration in business areas such as market research and process and product improvements. For example, domestic firms can utilize their familiarity with local norms, customs,

preferences, and the work timing of clients to better exploit the information sharing, scheduling, and collaboration features of IT-SCII systems. For instance, in order to spur increased collaboration opportunities, domestic firms can encourage clients to capture and share information regarding the end use of BOP products, such as digital photographs and video recordings of product installation and usage. In contrast, foreign firms face challenges in reaping the benefits of IT-SCII for client business collaboration because of a lack of familiarity arising from a relatively poor understanding of clients and the unique needs of BOP end customers (Ghemawat & Hout, 2008), which is an L disadvantage.

Third, foreign firms are, by definition, culturally different (or distant) from clients in BOP markets. The culture of the environment in which a foreign firm operates can significantly influence its business activities. Cultural distance dampens collaboration because of differences in perceptions and barriers to communication (Beugelsdijk et al., 2018). Since cultural distance creates these types of barriers for foreign firms, IT-SCII may not be as effective in fostering client business collaboration for foreign firms. In contrast, domestic firms do not face such barriers. Instead, domestic firms may take more significant advantage of information provided by IT-SCII and strengthen their client business collaboration because of an L advantage arising from cultural similarity with clients in the local BOP context (Hillman et al., 2004). Cultural differences may hinder both sharing and assimilation of information because of different frames of reference, thereby impeding collaboration. To illustrate, though IT-SCII systems may enable firms to track inventory levels of clients in real time, domestic firms are better able to understand and utilize this information for collaboration because of their rich contextual understanding. In BOP markets, instead of implying high demand, low inventory levels may suggest that clients require working capital or that end customers need microcredit facilities—circumstances that offer collaboration opportunities.

In sum, domestic firms typically contextualize their IT-SCII systems by accounting for the local environment, are more familiar with local clients and BOP end customers, and face fewer barriers arising from cultural differences. Hence, domestic firms would be more adept at leveraging IT-SCII as an  $O_t$  advantage for collaborating with clients in business areas such as product and process improvements and market and business research. Thus, we hypothesize:

**H1a:** The positive influence of IT-SCII on client business collaboration is stronger for domestic firms than for foreign firms in BOP markets.

Next, we argue that the influence of client business collaboration on firm performance is stronger for domestic firms than for foreign firms. First, domestic firms have more local market knowledge of end customer needs in BOP markets (Ghemawat & Hout, 2008). Local market knowledge serves as an  $O_a + L$  advantage that helps domestic firms more effectively leverage their business collaborations with clients. For example, local market knowledge can help domestic firms identify opportunities and offer products developed via client collaboration that are more in line with BOP market needs. Conversely, foreign firms do not have the same level of market knowledge of the local BOP market as domestic firms do, resulting in difficulties in identifying opportunities or developing products that meet local market needs. Foreign firms may face challenges in developing and marketing their products because of the different institutional characteristics of BOP markets (Shan & Hamilton, 1991). Because of their lesser local market knowledge, products developed by foreign firms in collaboration with clients may be distant from local end customer needs or may not fully account for the consumption habits of end customers (Anderson & Markides, 2007). For example, the introduction of guacamole in China by a Mexican avocado producer in collaboration with a Chinese supermarket was a failure, partly because of the Mexican firm's lack of knowledge related to the cuisines and tastes of Chinese consumers and a failure to market the product in alignment with these tastes (Moreno, 2015). Thus, foreign firms' relative lack of knowledge of the local market may ultimately hinder the effectiveness of their client business collaboration.

Second, domestic firms could have more successful business collaborations with clients because of similarity in managerial styles (Nachum, 2010), an  $O_i$  advantage (Eden & Dai, 2010). The similar managerial and work styles of domestic firms and clients fosters better mutual understanding and alignment of goals in the collaboration (Li et al., 2008). The similar work styles of domestic firms and clients may lead to more effective resource sharing and ultimately enhanced business collaboration outcomes. Moreover, domestic firms are more likely than foreign firms to develop personal connections with clients. Since personal connections can assist in overcoming weak institutional infrastructures of BOP markets (Rivera-Santos & Rufin, 2010), domestic firms are better positioned to reap the benefits of client business collaboration based on their connections with clients (Sheng et al., 2011). For

example, similarity of managerial styles makes it possible for domestic firms to pursue product and process improvements more efficiently and effectively. In contrast, foreign firms may be unfamiliar with social institutions in BOP markets (Dunning & Lundan, 2008), relying more on societal norms of their home countries. This may result in less effective business collaborations with clients (Luo & Tung, 2007), an  $O_i$  disadvantage, relative to local firms. Our reasoning is consistent with the notion that it is difficult for foreign firms to succeed in BOP markets without a deep understanding of the informal institutions and relationships that affect clients (Seelos & Mair, 2007; Wright et al., 2005).

Third, domestic firms tend to have a better understanding than foreign firms of the culture-based characteristics and norms of local clients (Asmussen & Goerzen, 2013), an  $O_i$  advantage (Eden & Dai, 2010). Foreign firms' lack of familiarity and understanding of clients in BOP markets may contribute to the difficulty of fully leveraging client business collaborations. As such, the cultural distance between foreign firms and local clients increases the costs and difficulties of coordination and communication (Zaheer, 1995). Cultural differences between foreign firms and local clients may create conflict when implementing strategic decisions related to market and business research or product improvements, ultimately reducing the benefits that foreign firms derive from client business collaboration (Tihanyi et al., 2005), putting foreign firms at a relative disadvantage in terms of client business collaboration benefits.<sup>5</sup>

In sum, we argue that Client Business Collaboration has stronger firm performance advantages for domestic firms, specifically arising from domestic ownership as domestic firms have better local market knowledge of end customer needs, similar managerial styles as clients, and better understanding of cultural characteristics and norms of local clients. Hence, we posit:

**H1b:** The positive influence of client business collaboration on firm performance is stronger for domestic firms than for foreign firms in BOP markets.

We theorize that the influence of IT-SCII on supplier business collaboration is stronger for foreign firms than for domestic firms. First, because of their tendency to enforce their global practices on suppliers, foreign firms are more likely than domestic firms to use IT-SCII as an  $O_i$  advantage that serves as a precursor for greater collaboration opportunities with

known in supply chain literature that end customer knowledge is of more value downstream in the supply chain than upstream in the supply chain (Zhao et al., 2008). Therefore, superior local market knowledge of domestic firms is more impactful in client-side collaboration than in supplier-side collaboration.

<sup>5</sup> Although it can be argued that similarity of managerial styles and understanding of cultural values are also applicable on the supplier side, the nature of business in BOP markets (e.g., India) suggests that firms generally have more close-knit relationships with clients than with suppliers. In addition, while it can be argued that end customer market knowledge is also applicable on the supplier side, it is well



suppliers in broader business areas. Prior research and anecdotal evidence suggest that foreign firms establish global IT-based practices in their international markets and bring these practices into the BOP market as part of their operations (Kirca et al., 2011). Foreign firms generally compel their suppliers to adhere to these global practices, which involve sharing information useful for collaborations through IT-SCII systems. For instance, Honda requires its suppliers in India to adhere to its practice of using an online system to receive orders and share information regarding production and inventory planning. Foreign firms support the use of IT-SCII systems by local suppliers through actions such as facilitating setup of systems at supplier facilities and training the supplier workforce to use the systems. This ensures adherence to global practices involving the exchange and sharing of information between the foreign firm and its suppliers that is richer and better oriented toward building deeper relationships by design. Relationships fostered by such mechanisms, in turn, open opportunities for collaboration in broad business areas (e.g., product development) because frequent and more productive communication can offer an effective platform for foreign firms and their suppliers to engage in collaboration.

Second, compared to domestic firms, foreign firms may have more global experience in IT-based supplier interactions and can apply this experience to improve their business collaborations with suppliers in BOP markets. Global experience (an  $O_a + L$  advantage) with IT-based systems allows foreign firms to exploit IT-SCII for facilitating effective decision-making and jointly identifying opportunities with suppliers for product development and process improvements (O'leary, 2003). For example, IT-SCII enables firms to integrate the tracking and replenishment of supplier inventory in real time. Foreign firms with experience utilizing such information toward collaborative efficiency improvements in other markets can collaborate with suppliers for similar purposes in BOP markets. Thus, since foreign firms may have already developed IT-SCII systems in other markets, they have insight into how to use IT-SCII in a manner that helps them to pursue business collaborations with suppliers in BOP markets. Conversely, domestic firms lacking this IT experience in global partnerships may have a limited ability to develop supplier business collaborations (Sheng et al., 2011).

Third, foreign firms have access to a global network of suppliers (Nachum, 2010). Many foreign firms with preexisting relationships with global suppliers have established supplier partnerships for sourcing inputs from other global firms. Foreign firms' experience with collaboration through such partnerships in the global network may easily transfer to the local BOP market. For example, Jabil uses pre-established global

supplier partnerships in India and is therefore better able to use IT-SCII to set up rich collaborative relationships with suppliers because of its prior experience of doing so with those suppliers in other contexts. Hence, foreign firms are better positioned to use IT-SCII to build productive collaboration-based relationships with their suppliers. In other words, foreign firms' partnerships with global networks of suppliers engender built-in routines that foreign firms can draw on to leverage IT-SCII as an  $O_t$  advantage for supplier business collaboration.

In sum, IT-SCII is a more effective  $O_t$  advantage for supplier business collaboration for foreign firms compared to domestic firms because of foreign firms' established global practices, global experience with IT-based supplier interactions, and global networks of suppliers. Hence, we posit:

**H2a:** The positive influence of IT-SCII on supplier business collaboration is stronger for foreign firms than for domestic firms in BOP markets.

Finally, we argue that the influence of supplier business collaboration on firm performance is stronger for foreign firms than for domestic firms. First, via supplier business collaboration, a firm can access knowledge regarding new production methods or co-develop processes with suppliers (Hsieh et al., 2018). However, firms need to bring in complementary knowledge as a prerequisite to such benefits from collaborating with suppliers (Menguc et al., 2014). Foreign firms have a vast trove of such complementary knowledge because of the experience and knowledge accumulated from operating in a global environment (Aulakh et al., 2000). The knowledge base of foreign firms is further amplified and extended via supplier business collaboration in product development because "by collaborating with suppliers, firms extend their range of valuable knowledge regarding new technological specifications" (Hsieh et al., 2018, p. 657). Thus, the knowledge base of foreign firms serves as an  $O_a$  advantage (Dunning & Wymbs, 2001) that benefits foreign firms in terms of supplier business collaboration. Conversely, domestic firms are less endowed with knowledge based on global operations, which is needed in order to effectively benefit from supplier business collaboration. Therefore, supplier business collaboration results in greater firm performance benefits for foreign than for domestic firms.

Second, although foreign firms may be new to a specific BOP market, they may have already developed supplier collaborations in other global markets, giving them the necessary experience to leverage supplier business collaboration. The experience of operating in global environments is an  $O_t$  advantage because it represents the ability to work efficiently and coordinate with suppliers to effectively

identify or utilize business opportunities derived from market or business research (Dunning & Wymbs, 2001). Conversely, domestic firms with relatively less experience with supplier collaborations in global markets may not leverage supplier business collaboration as effectively.

Third, business collaboration with domestic suppliers grants foreign firms with access to trusted information in BOP markets that is often unavailable in the public domain (Sahin & Robinson, 2002; Uzzi, 1997). Moreover, collaboration with domestic suppliers may provide foreign firms with information about local regulations. Such collaborations were prevalent in China during the early stages of its economic transformation from a BOP to a middle-income country (Nolan, 2015). For example, a foreign auto manufacturing firm, as part of its collaborations on R&D and product improvements with its suppliers, may provide training customized to the needs of its suppliers to its suppliers' field agents. In exchange, the suppliers may provide information about the local BOP market, which the foreign firm could then leverage to improve its performance. Thus, information from supplier business collaboration serves as an  $O_a$  advantage for foreign firms. Conversely, domestic firms already possess advanced local market information and hence benefit less from information obtained via business collaboration with local suppliers.

In sum, we argue that supplier business collaboration has stronger firm performance advantages for foreign firms, specifically those arising from foreign ownership, because foreign firms have a larger base of complementary knowledge, global experience in leveraging supplier collaborations, and hence benefit more from local environment knowledge gained from suppliers. Therefore, we hypothesize:

**H2b:** The positive influence of supplier business collaboration on firm performance is stronger for foreign firms than for domestic firms in BOP markets.

## 4 Methods

### 4.1 BOP Context, Sampling, and Data Collection

We conducted a cross-sectional matched-pair field survey of the senior-most business executives and IT executives of automotive parts manufacturing firms serving BOP markets in India from February to May 2015. India provides a rich context for our study because of its large BOP market (Pralhad, 2012). India has seen substantial inflows of foreign direct investment (FDI), driven by government financial incentives for foreign firms to locate in India and

expand existing Indian production. We chose the automotive parts manufacturing sector because there are minimal policy differences between foreign and domestic firms in this sector, and FDI regulation in the automotive parts sector is negligible. As noted on the Government of India website (IBEF, 2018), "100% FDI [is] allowed under automatic route for auto component sector".

Figure 2 presents how firms sampled for this study are embedded in the BOP market in the Indian automotive parts manufacturing sector. Although a portion of India is wealthy, a significant proportion of Indian end customers belong to the BOP market (Fawcett & Waller, 2015). The automotive parts manufacturing sector serves both BOP and non-BOP markets. The automotive industry in India, which includes two-, three- and four-wheeled vehicles, has an annual production of more than 30 million vehicles and is the largest in the world. India is the world's third-largest automotive market and is expected to grow 9% every year, reaching US\$300 billion in annual revenue by 2026. The largest and fastest-growing segment of this market, attracting many domestic and foreign manufacturers, is entry-level vehicles aimed at BOP end customers. Within this segment, two-wheelers have an 81% market share. Two-wheelers are the first and aspirational mode of personal transportation for BOP end customers. Low-cost cars, in a price bracket of US\$3,000-\$4,000 are also targeted at BOP end customers.

The automotive parts manufacturing sector, which is the focus of our study, has different supply chains catering to two-wheelers and low-cost car segments of the Indian auto industry (see Figure 2). Our study consists of a sample of 172 domestic and foreign small- and medium-scale automotive parts and accessories manufacturers. These firms supply parts to two- and three-wheeler auto manufacturing companies such as Bajaj Auto, Piaggio, and companies that manufacture low-cost cars such as Tata Motors' Nano and Maruti Suzuki. An example of an automotive parts manufacturing firm is Amtek Auto, which supplied engine parts for the Tata Nano. These firms also sell parts in retail markets to end customers for auto repairs.

To minimize confounding factors caused by uneven economic development in India, we developed a sample pool of 771 organizations by merging multiple directories across automotive industry associations in the states of Gujarat and Maharashtra. These two states have concentrated BOP markets and contribute 22.5% of India's gross domestic product (Government of India, 2015). Several foreign and domestic firms such as Bajaj Auto, Mahindra & Mahindra, Piaggio, Tata Motors, and Suzuki have manufacturing centers and Tier 1, 2, 3, and 4 suppliers based in these states.

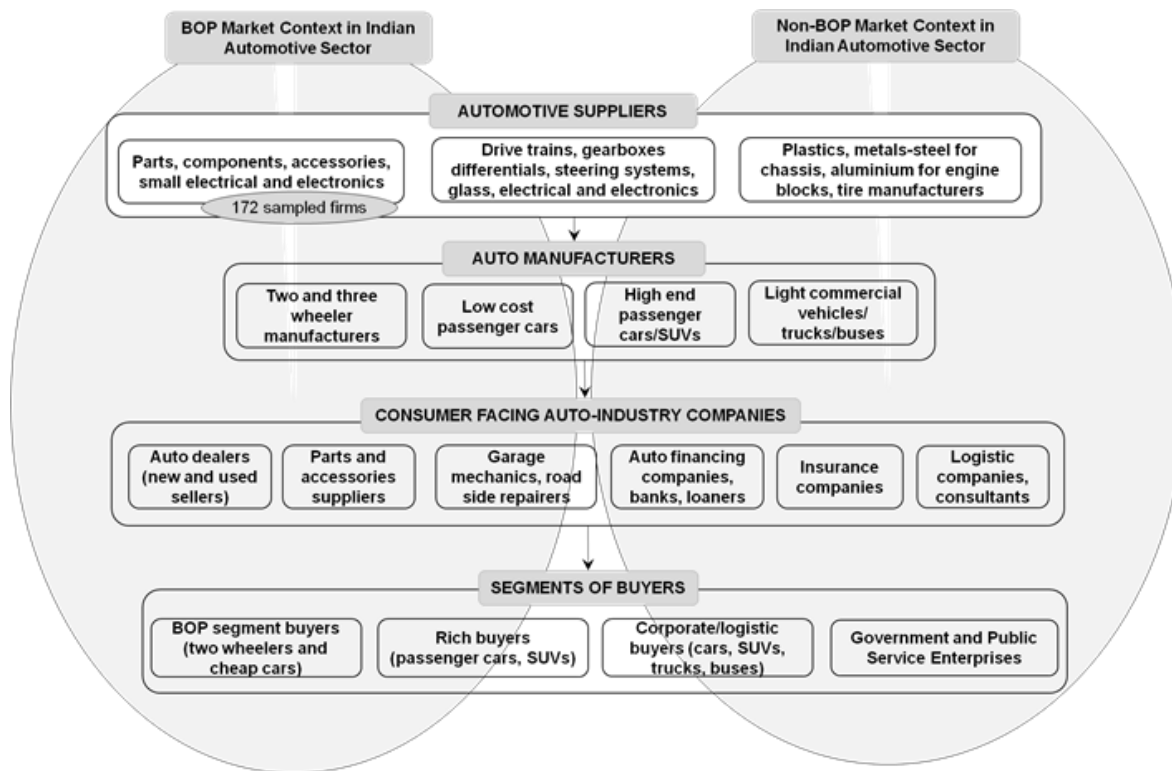


Figure 2. Context of Firms Sampled for this Study

To ensure that the sampled firms served BOP markets, we focused on automotive part manufacturers supplying parts to companies manufacturing two-wheelers, three-wheelers (e.g., Bajaj, Mahindra, Piaggio), and affordable four-wheelers (e.g., Bajaj Auto's Qute, Tata Motor's Nano, and Maruti Suzuki's Alto and Omni) (George et al., 2012). The owners of these vehicles constitute the BOP market.

We developed two survey instruments by adapting questions from existing scales after a thorough review of relevant literature (see details in Table 2). After cross-validating the initial instrument items with researchers and industry respondents, we employed the back-translation method to localize the English language used in the questionnaires and ensure conceptual equivalence. A multilingual research assistant translated the questionnaires into local languages (Marathi and Gujarati) and another translated them back into English. To ensure content validity, we interviewed four senior executives and asked them about their interpretation of the questionnaire items. Revised items were used to conduct a pretest with 15 senior industry executives and a pilot test with a small sample from the targeted population. The instruments were refined and finalized after assessing reliability, convergent and discriminant validity, and predictability.

We then contacted organizations in our sample pool and offered them an executive summary of our findings and a gift card as a participation incentive. We assured

organizations of the confidentiality and anonymity of individual responses. Following prior research recommendations for data collection in India (A. Kathuria et al., 2018; R. Kathuria et al., 2018; Khuntia et al., 2019), trained interviewers were recruited to administer the questionnaires on-site using a dual online-offline mode. Specifically, we solicited participation through corporate email addresses (i.e., online mode) to ensure that the organization has access to basic IT resources. Then, interviewers administered in-person surveys (i.e., offline mode) to ensure the veracity of the company and increase the response rate and reliability of the data. Response rates to online surveys in India are low because of confidentiality concerns. Further, the authenticity of organizations and respondents needed to be ascertained because legal and institutional environments and tough bankruptcy laws result in many inactive or shell companies.

We received matched-pair responses from 172 firms, corresponding to a response rate of 22.3%, similar to that of other published studies (e.g., Tiwana & Kim, 2015). Of the 172 auto parts manufacturing firms, 87 were foreign firms, and 85 domestic firms. All of the domestic firms in our dataset were purely domestic with no foreign operations, whereas all of the foreign firms had operations in multiple countries. Forty-three firms were 20 years or younger in age, and 89 firms were small or medium in size (less than 1000 employees). Response bias is not a significant concern because there were no significant differences between participating

and nonparticipating firms. We also contacted firms that did not respond to our surveys. Most indicated lack of time or company policies as reasons for not participating, suggesting a further absence of nonresponse bias.

In addition to the surveys, we conducted interviews with respondents from ten representative auto parts manufacturing firms. Four firms were Tier 1 suppliers, four were Tier 2 suppliers, and two were Tier 3 suppliers to auto manufacturers. An equal number of the firms were domestic and foreign. The interviewees comprised senior executives such as general manager, plant manager and managing director. The objective of this exercise was not to develop a theory based on qualitative data; rather, we sought to gain deeper insights into our empirical results. We refer to specific interviews to provide insights and additional context in the discussion section.

## 4.2 Addressing Common Method Bias

We followed multiple steps as part of a comprehensive research design aimed at minimizing the threat of common method bias. First, we used different scales to measure the independent variable (5-point Likert scale) and other variables (7-point Likert scale). Note that “although use of similar scale formats and anchors requires less cognitive processing, this may increase method bias because of consistency in scale properties. Using scales with different anchors reduces common method biases caused by commonalities in scale endpoints and anchoring effects” (A. Kathuria et al., 2018, p. 770). Therefore, following norms, we used 7-point scales for constructs when there was a precedent in prior work, while 5-point scales were used for new constructs (Podsakoff et al., 2003).

Second, we used a matched-pair design, ensuring that the IT-related variables (including IT-SCII) were collected from the top-ranking IT executive in the firm, whereas the mediating variables and dependent variables, which are related to business outcomes, were collected from the senior-most business executive in the firm. This approach of collecting independent variables from one respondent and other variables from another respondent in the same firm is well-established and has been adopted in several prior IS studies (A. Kathuria et al., 2018; Tiwana & Kim, 2015). Research has demonstrated that, in emerging economies, senior business managers are well aware of strategies and firm performance, while several IS studies indicate that IT executives are well aware of IT-related implementations and investments (e.g., A. Kathuria et al., 2018; Rai et al., 2006). Further, interviewers administered the two questionnaires separately. This process eliminates common method bias by separating the sources of information and helps collect valid, high-quality data on emerging economies.

Third, although our use of 5- and 7-point scale anchors and matched-pair data collection process reduced the common method bias threat, we performed two additional analyses to assess it after the data were collected (Podsakoff & Organ, 1986): (1) Harman’s one-factor test, in which no single major factor emerged, and (2) the partial correlation method, in which the highest factor from a factor analysis was added to the PLS model as a control variable and did not produce a significant change in variance explained. Results from both tests suggest that common method bias is not a concern. Overall, our comprehensive approach consisting of research design considerations (e.g., different scale anchors) followed by two post hoc analyses helps mitigate concerns regarding common method bias as much as possible given the constraints of primary data collection in BOP markets.

## 4.3 Variables

We developed a multi-item formative construct for IT-enabled supply chain information integration by adapting questions from relevant prior research (Mithas et al., 2011; Patnayakuni et al., 2006; Rai et al., 2006). Client business collaboration and supplier business collaboration were each measured by two objective items that capture the number of collaboration projects in research and development, product and process improvements, new product development, market research, and business research that the firm participated in during the last three financial years with its three main clients and suppliers, respectively, in the BOP market. Our measures of client business collaboration and supplier business collaboration are similar to those in prior studies (Andrade Rojas et al., 2018; Baum et al., 2005; Borgatti & Halgin, 2011; Lin et al., 2009).

Our approach of using the number of collaboration projects is also a commonly used measure in strategy and international business literature (e.g., Joshi & Nerkar, 2011). Firm performance was measured using a four-item formative construct (Hult et al., 2005) with scales adapted from prior research that capture three years of competitive performance, sales growth, and profitability (Kim et al., 2010; Powell & Dent-Micallef, 1997).

We modeled our four focal variables as formative constructs since they meet the criteria of coverage of construct domain and lack of covariance among indicators (Diamantopoulos & Winklhofer, 2001). First, each item makes unique contributions to the constructs and can be viewed as “forming” them. For example, items for client business collaboration capture collaboration in areas such as product and process improvement, R&D, and market and business research. Second, an increase in any one item does not necessarily increase others. For example, a sales growth increase does not necessarily imply an increase in profitability. Finally, items comprising each construct are distinct and not interchangeable.

**Table 2. Measures**

| Variable  | Survey questions with retained items.<br>(Scale: 1 strongly disagree to 7 strongly agree where applicable)  | References   |
|---|---|--|
| Firm performance  | Please indicate the extent to which you agree or disagree with the following statements about your organization's performance over the past 3 years: (1) Our financial performance has been outstanding. (2) Our financial performance has exceeded our competitors'. (3) Our sales growth has been outstanding. (4) We have been more profitable than our competitors.   | (Kim et al., 2010; Powell & Dent - Micallef, 1997)   |
| IT-enabled supply chain information integration (IT-SCII) | Please indicate the extent to which the following statements describe your organization's information systems used in a supply chain management context. (1) Are designed to enable our organization to easily identify and access data and information that resides within and outside the firm. (2) Connect to multiple internal and external sources of data and information. (3) Enable our organization to easily combine data and information that resides within and outside the firm. | (Mithas et al., 2011; Patnayakuni et al., 2006; Rai et al., 2006)                          |
| Client business collaboration                             | (1) State the number of collaboration projects in research & development, product & process improvements, and new product development that your organization has participated in during the last three financial years with your organization's three main clients. (2) State the number of collaboration projects in market and business research that your organization has participated in during the last three financial years with your organization's three main clients.              | (Andrade Rojas et al., 2018; Baum et al., 2005; Borgatti & Halgin, 2011; Lin et al., 2009) |
| Supplier business collaboration                           | (1) State the number of collaboration projects in research & development, product & process improvements, and new product development that your organization has participated in during the last three financial years with your organization's three main suppliers. (2) State the number of collaboration projects in market and business research that your organization has participated in during the last three financial years with your organization's three main suppliers.          | (Andrade Rojas et al., 2018; Baum et al., 2005; Borgatti & Halgin, 2011; Lin et al., 2009) |
| Domicile  | Please select the response that best describes the ownership structure of your company: (1) foreign subsidiary, (2) joint venture between domestic and foreign companies, (3) joint venture between domestic companies, (4) public domestic company, (5) privately held domestic company  |  |
| Firm age  | Please state the year your organization founded its domestic operations.  | (Jansen et al., 2009)  |
| Firm size   | Please approximate the number of full-time employees in the domestic operations.  | (Jansen et al., 2009)  |

**Table 3. Descriptive Statistics and Correlations**

|                               | Mean  | S.D.  | Firm performance | Client collaboration | Supplier collaboration | IT-SCII   | Age       | IT stock |
|-------------------------------|-------|-------|------------------|----------------------|------------------------|-----------|-----------|----------|
| <b>Firm performance</b>       | 5.3   | 1.04  | 1                |                      |                        |           |           |          |
| <b>Client collaboration</b>   | 4.65  | 1.08  | 0.752 ***        | 1                    |                        |           |           |          |
| <b>Supplier collaboration</b> | 2.96  | 1.56  | 0.082            | 0.088                | 1                      |           |           |          |
| <b>IT-SCII</b>                | 5.1   | 1.28  | 0.758 ***        | 0.611 ***            | 0.225                  | 1         |           |          |
| <b>Age</b>                    | 32.84 | 20.77 | 0.292 ***        | 0.309 ***            | -0.291 **              | 0.211 *** | 1         |          |
| <b>IT stock</b>               | 0.075 | 0.048 | 0.105            | 0.126 *              | 0.027                  | 0.096 *   | 0.065     | 1        |
| <b>Size</b>                   | 1261  | 1177  | 0.299 ***        | 0.31 ***             | 0.016                  | 0.265 *** | -0.104 ** | 0.076    |

We include three control variables—IT stock, firm size, and firm age—to account for extraneous effects on firm performance. We measured IT stock as the prior year's investment in IT, firm size as the number of full-time employees, and firm age as number of years since the start of the firm's India operations. Firm firm size and firm age account for scale and resource availability, which may influence performance (Tanriverdi, 2005). We conducted *t*-tests to assess whether domestic and foreign firms in our sample differed significantly in IT-SCII, IT stock, firm size, and firm age. These tests indicated no significant differences ( $p > 0.10$ ) between domestic and foreign firms. Table 2 shows the variables

and survey questions; Table 3 shows descriptive statistics and correlations.

To categorize a firm as foreign or domestic, we followed IS and international business literature that refers to a firm as foreign if it is domiciled abroad (e.g., Khuntia et al., 2019; Krug & Hegarty, 1997). In our study, we defined foreign firms as those domiciled (headquartered) outside India, the country of the focal BOP market. Firms domiciled in India operate in their home country and were thus treated as domestic in this context. For joint ventures, we classified a firm as foreign if the majority of the venture was owned by a foreign firm, in line with prior research (Filatotchev et al., 2008).



#### 4.4 Analysis and Results

We performed partial least squares (PLS) analysis using Smart-PLS 3 to validate the measurement model and test the hypotheses (Ringle et al., 2015). We used PLS because PLS makes no prior assumptions about data normality, enables assessment of measurement model within the context of the theoretical model, and caters to the existence of multiple data groups. Despite the ability of PLS to handle small sample sizes, an adequate sample size is required to achieve statistical power. The power analysis rule suggests that for our model, in which the largest number of paths directed at any construct is three, a minimum sample size of 83 is needed to achieve a statistical power of 80% for detecting a minimum  $R^2$  value of 10% with a 10% probability of error. Hence, our sample size of 172 responses, with subsamples of 87 and 85, is sufficient.

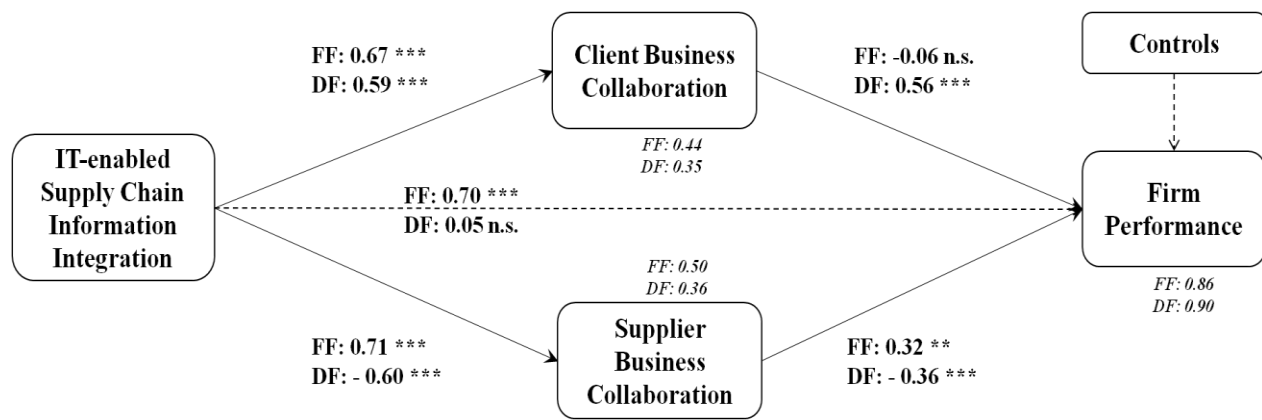
**Measurement model assessment and construct validity:** We assessed the measurement model using PLS to examine convergent validity, discriminant validity, and the reliability of our measures. Assessing the convergent validity and discriminant validity of formative constructs using criteria developed for reflective constructs is not meaningful. Instead, following the methods roadmap from prior research (A. Kathuria et al., 2018), we followed the procedures established for formative constructs and evaluated convergent validity by performing redundancy analysis. We compared the correlations of the formative constructs measuring IT-SCII and firm performance with global items summarizing the same constructs. Path coefficients were all above the suggested value of 0.70, as required. Variance inflation factors for the variables and all indicators were less than the threshold of 5, indicating that multicollinearity is not a concern. Finally, we assessed outer weights, signs, and magnitudes for each indicator. Weights for all indicators, except for the second indicator of supplier business collaboration, were significant. However, since the item weight was relatively high and enhanced content validity, we retained the indicator. Overall, the model provides satisfactory fit for the data across all indices and shows adequate reliability, convergent, discriminant, and construct validity.

**Structural model assessment:** To assess the structural model, we conducted a bias-corrected and accelerated bootstrapping procedure with replacement using 5,000 subsamples to calculate the statistical significance of the parameter estimates. For the analysis, we created two data groups, one containing data from domestic firms and the other containing data from foreign firms. We also conducted PLS multigroup analysis (PLS-MGA) to test whether the data groups had significant differences in their group-specific parameter estimates (Henseler et al., 2009; Sarstedt et al., 2011). Figure 3 shows the results of the structural model assessment and Table 4 provides details.

H1a proposes that IT-SCII has a stronger positive influence on *client business collaboration* for domestic firms compared to foreign firms. However, while we observe a significant, positive relationship between IT-SCII and *client business collaboration* for both foreign ( $\beta = 0.67$ ,  $t$ -value = 8.71,  $p < 0.001$ ) and domestic firms ( $\beta = 0.59$ ,  $t$ -value = 5.12,  $p < 0.001$ ), there is no statistically significant difference in the path coefficients (difference = 0.10,  $p > 0.10$ , not significant) across the two groups. Hence, H1a is not supported. Hypotheses H1b posits that *client business collaboration* has a greater positive influence on *firm performance* for domestic firms as compared to foreign firms. The PLS results demonstrate a significant, positive relationship between *client business collaboration* and *firm performance* for domestic firms ( $\beta = 0.56$ ,  $t$ -value = 4.67,  $p < 0.001$ ) and a statistically nonsignificant relationship for foreign firms ( $\beta = -0.06$ ,  $t$ -value = 0.58,  $p > 0.10$ , not significant). PLS-MGA results show a statistically significant difference in the path coefficients (difference = 0.64,  $p$ -value < 0.001) across the two groups. Hence, H1b is supported. Hypotheses H2a predicts that IT-SCII has a stronger positive influence on *supplier business collaboration* for foreign firms compared to domestic firms. IT-SCII has a significant, positive relationship with *supplier business collaboration* for foreign firms ( $\beta = 0.71$ ,  $t$ -value = 12.15,  $p < 0.001$ ), which statistically differs from the significant negative relationship between IT-SCII and *supplier business collaboration* for domestic firms ( $\beta = -0.60$ ,  $t$ -value = 5.39,  $p < 0.001$ ). Hence, H2a is supported.

Finally, H2b proposes that *supplier business collaboration* has a greater positive influence on *firm performance* for foreign compared to domestic firms. We find a significant, positive relationship between *supplier business collaboration* with *firm performance* for foreign firms ( $\beta = 0.32$ ,  $t$ -value = 2.25,  $p < 0.01$ ), and a negative relationship for domestic firms ( $\beta = -0.36$ ,  $T$ -value = 3.04,  $p < 0.001$ ). We find a significant difference in path coefficients across domestic and foreign firms for the relationship between *supplier business collaboration* and *firm performance*. Since the effect of *supplier business collaboration* is more positive for foreign firms, H2b is supported.

Although we did not hypothesize a difference in the direct relationship between IT-SCII and firm performance for foreign and domestic firms, we report interesting results. We observe that IT-SCII has a significant, positive direct relationship with firm performance for foreign firms ( $\beta = 0.70$ ,  $t$ -value = 7.01,  $p < 0.001$ ), but no significant relationship for domestic firms ( $\beta = 0.05$ ,  $t$ -value = 0.54,  $p > 0.10$ ). We discuss plausible reasons for this in the discussion section.



Note: Variance explained in italics. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .  $N = 172$  matched-pair responses. FF = foreign firms, DF = domestic firms

Figure 3. Structural Model Results

Table 4. Significance Test Results for Structural Model Assessment

| Path  | Hyp. | Path coefficient |       | t-Value |      | p-value |      | 95% confidence intervals |                  | f <sup>2</sup> -value |      | Effect size |       |
|---|------|------------------|-------|---------|------|---------|------|--------------------------|------------------|-----------------------|------|-------------|-------|
|   |      | For.             | Dom.  | For.    | Dom. | For.    | Dom. | For.                     | Dom.             | For.                  | Dom. | For.        | Dom.  |
| IT-SCII → Client business collaboration             | H1a  | 0.67             | 0.59  | 8.71    | 5.12 | 0       | 0    | [0.50 to 0.75]           | [0.28 to 0.68]   | 0.88                  | 0.63 | Large       | Large |
| IT-SCII → Supplier business collaboration           | H2a  | 0.71             | -0.6  | 12.15   | 5.39 | 0       | 0    | [0.57 to 0.78]           | [-0.72 to -0.34] | 1.11                  | 0.64 | Large       | Large |
| Client business collaboration → Firm performance    | H1b  | -0.06            | 0.56  | 0.58    | 4.67 | 0.28    | 0    | [-0.25 to 0.09]          | [0.35 to 0.75]   | 0.03                  | 1.23 | Small       | Large |
| Supplier business collaboration → Firm performance. | H2b  | 0.32             | -0.36 | 2.25    | 3.04 | 0.01    | 0    | [0.08 to 0.56]           | [-0.54 to -0.15] | 0.22                  | 0.59 | Med.        | Large |
| IT-SCII → Firm performance                          | -    | 0.7              | 0.05  | 7.01    | 0.54 | 0       | 0.29 | [0.53 to 0.86]           | [-0.06 to 0.24]  | 1.91                  | 0.06 | Large       | Small |

This analysis yields additional insights. First, the relationship between IT-SCII and client business collaboration has a large effect size for both foreign ( $f^2 = 0.88$ ) and domestic firms ( $f^2 = 0.63$ ). Similarly, the relationship between IT-SCII and supplier business collaboration has a large effect size for both foreign firms ( $f^2 = 1.11$ ) and domestic firms ( $f^2 = 0.64$ ). However, supplier business collaboration and firm performance have a large effect size for domestic firms ( $f^2 = 0.59$ ) and medium effect size for foreign firms ( $f^2 = 0.22$ ) since the  $f^2$  value is between 0.15 and 0.35. Finally, the relationship between client business collaboration and firm performance has a small (and non-significant) effect size for foreign firms ( $f^2 = 0.03$ ) and a large effect size for domestic firms ( $f^2 = 1.23$ ).

To assess the possibility of multiple mediations, we bootstrapped sampling distributions of all potential mediators simultaneously. Appendix B details our approach to test mediation. We considered the values and significances of indirect effects and compared indirect effects with direct effects (Table 5). This analysis verified the prior reported structural model path coefficients. For foreign firms, there is no mediation of the influence of IT-SCII on firm performance via client business collaboration and partial complementary mediation via supplier business collaboration. For domestic firms, there is full mediation via both client business collaboration and supplier business collaboration, and IT-SCII does not have a direct effect on firm performance; the effect of IT-SCII on firm performance via client business collaboration is more substantial in effect size.

**Table 5. Analysis and Comparison of Direct and Indirect Effects**

|  | <b>Foreign firms</b>             | <b>Domestic firms</b>         |
|--|----------------------------------|-------------------------------|
| <b>Direct effect of IT-SCII on firm performance</b>        | 0.70***                          | 0.05                          |
| t-value  | 7.01                             | 0.54                          |
| <b>Indirect Effect via client business collaboration</b>   | -0.04                            | 0.32***                       |
| t-value  | -0.56                            | 4.59                          |
| Larger Effect?   | Direct effect                    | Indirect effect               |
| Type of Mediation  | Direct only, no mediation        | Indirect only, full mediation |
| <b>Indirect effect via supplier business collaboration</b> | 0.23**                           | 0.21***                       |
| t-value  | 2.26                             | 2.49                          |
| Larger effect?   | Direct effect                    | Indirect effect               |
| Type of mediation  | Complementary, partial mediation | Indirect only, full mediation |
| <b>Combined indirect effect</b>                            | 0.18***                          | 0.54***                       |
| t-value  | 2.21                             | 6.34                          |
| Larger effect?   | Direct effect                    | Indirect effect               |
| Type of mediation  | Complementary, partial mediation | Indirect only, full mediation |
| <b>Total effect</b>  | 0.88***                          | 0.59***                       |
| t-value  | 21.35                            | 4.77                          |

#### 4.5 Robustness Tests and Additional Analyses

We conducted several robustness tests. First, to address concerns of reverse causality, we tested alternate model specifications by assessing whether client business collaboration and supplier business collaboration drive IT-SCII; these reverse relationships are not supported. Two additional reasons further affirm the directionality of our model. The literature suggests that IT-enabled information integration leads to stronger supply chain relationships, which promote supply chain collaboration (Lee, 2004; Tippins & Sohi, 2003). IT helps disseminate information on customers and suppliers, enabling decision makers to develop collaborations with supply chain members (Fawcett et al., 2011; Klein et al., 2007). Also, business collaboration objectively captures realized rather than intended collaboration. Hence, collaboration is more likely to occur after IT-SCII is implemented. Senior industry executives reinforced this assertion during our interviews and explained that IT-based integration is a prerequisite to collaboration. Thus, given our measure and arguments in the extant literature, the direction of causality is from IT-SCII to business collaboration, not vice-versa.

Second, we assessed the sensitivity of our PLS results through econometric analysis using ordinary least squares (OLS) regressions. Results (see Appendix Table C1) are substantively similar to the PLS results. Third, for robustness, we tested our hypotheses through an alternate regression-based approach using the full sample of 172 firms—i.e., both foreign and domestic firms. We created a binary variable named

*Foreign* to indicate whether a firm is foreign (1= foreign; 0 = domestic). We used *Foreign* as a moderator and tested the significance of the interaction terms in the models. In the client business collaboration model (Column 3 in Appendix Table C2), we observe a non-significant interaction between IT-SCII and *Foreign*, consistent with the lack of support for H1a. In the supplier business collaboration model (Column 4), we find a positive and significant interaction coefficient of IT-SCII and *Foreign*, consistent with H2a. In the firm performance models (Columns 7-12), we observe a negative interaction between client business collaboration and *Foreign*, consistent with H1b. Similarly, we find a positive and significant interaction between supplier business collaboration and *Foreign*, consistent with H2b. Together, these results are similar to our main results in Table 4.

Fourth, we used two-stage least squares (2SLS) models, a well-recognized approach to account for potential endogeneity. To account for the endogeneity of IT-SCII, we used two variables (*accounting* and *billing*) as instrumental variables for IT-SCII, which respectively indicate whether accounting systems and billing systems are functional and actively used in the firm. The criterion for a good instrument is that it should be highly correlated with the endogenous independent variable but not correlated with the error term. The accounting and billing variables are good instruments for IT-SCII since accounting and billing IT systems are likely to be correlated with IT-SCII because firms that use IT-SCII may also invest in other IT systems to keep track of transactions. Further, accounting and billing are unlikely to directly influence supplier business collaboration, client

business collaboration, or firm performance except potentially through the effect of IT-SCII on these outcomes. This is because, in the contemporary business environment, accounting and billing systems are unlikely to be major sources of performance enhancements or differentiation. Correlations between both accounting and IT-SCII, as well as between billing and IT-SCII are positive and significant ( $p < 0.01$ ), suggesting that these variables are appropriate instruments for our study. Also, coefficients of these variables in the first stage are significant ( $F$ -statistics significant at  $p < 0.01$ ), further supporting use of these variables as instruments and suggesting that there is unlikely to be a problem of weak identification in our estimation (Bound et al., 1995).  $F$ -statistics of the excluded instrument variable in the first stage are larger than 10, suggesting that we can reject the null hypothesis of weak instruments (Staiger & Stock, 1997).

Since we have more instruments than endogenous variables, i.e., the equation is overidentified, we tested the validity of instruments. The Sargan test yielded  $p$ -values much larger than 0.10, implying that the overidentifying restrictions tests support the validity of instruments. Appendix Table C3 (Columns 1, 2, 7, and 8) show 2SLS results that are similar to the regression results in Appendix Table C1 and PLS results in Table 4. Further, we estimated 2SLS models with firm performance as the dependent variable where we treated client business collaboration and supplier business collaboration as endogenous and instrumented them using the variable *TechnologyTransfer*, indicating the extent to which the firm has transferred technology to other organizations. “Technology” does not refer to information technology but instead refers to manufacturing or product technology. This is a good instrument because a firm that transfers technology to other organizations may also be more likely to collaborate with its external stakeholders such as suppliers and clients. Also, since *TechnologyTransfer* captures unidirectional transfer of technology from the focal firm to other organizations (i.e., focal firm does not receive technology), it is unlikely to influence the performance of the focal firm significantly. Again, correlations and  $F$ -tests support the validity of this instrument. Results in Appendix Table C3 (Columns 3-6 and 9-12) are qualitatively similar to corresponding regression results in Appendix Table C1 and PLS results in Tables 3 and 4. Finally, we used 2SLS specifications to estimate moderated regression models. These results (omitted for brevity) are similar to regression results in Appendix Table C2 and PLS results in Tables 3 and 4. Overall, our robustness tests and research design suggest that our findings are robust to alternate estimation approaches, reverse causality, endogeneity, and common method bias.

## 5 Discussion

### 5.1 Findings

To summarize our results (Table 6), we find that foreign and domestic firms differ in the mechanisms by which IT-SCII influences firm performance. In particular, the effect of IT-SCII on supplier business collaboration and the effect of supplier business collaboration on firm performance are stronger for foreign firms than for domestic firms. In contrast, the effect of IT-SCII on firm performance through client business collaboration is stronger for domestic firms than for foreign firms. Our findings suggest that foreign firms are better equipped to leverage IT-SCII on the supplier side, whereas domestic firms are better equipped to leverage IT-SCII on the client side.

There are two potential explanations for the negative relationship between IT-SCII and supplier business collaboration for domestic firms. First, domestic firms are part of relatively fewer global supplier networks and have lesser experience in global partnerships. This limits their ability to develop business collaborations with suppliers. Second, as domestic firms in BOP markets often rely on traditional and informal ways of conducting business with suppliers that may be more conducive to collaboration, IT-SCII may change those traditional communication practices.

For example, domestic firms that are more accustomed to communicating with suppliers through face-to-face meetings may reduce forms of communication based on the use of IT-SCII. Thus, IT-SCII may effectively reduce domestic firms’ opportunities for productive collaboration with suppliers. Moreover, IT-SCII may result in information sharing beyond the processing capacity of domestic firms, which may cause information overload, thus decreasing collaboration (Villena et al., 2011). Together, these mechanisms offer plausible explanations for why IT-SCII may reduce supplier business collaboration for domestic firms. Finally, the negative effect of IT-SCII on supplier business collaboration is along the lines of prior research, which either finds unconventional results in the Indian context (Karahde & Kathuria, 2020; Kathuria et al., 2020) or suggests that IT may cause adverse effects (Saldanha et al., 2013), implying caveats to digitization (Saldanha et al., in press).

There are two plausible explanations for the negative effect of supplier business collaboration on firm performance for domestic firms. First, recall that supplier business collaboration represents collaboration in broader business activities (e.g., R&D), which can be resource intensive. It is possible that the fewer resources of many domestic firms may hinder the extent to which they can devote necessary efforts into supplier business collaborations, to such an extent that those resource-intensive supplier collaborations may be counterproductive and thus damage firm performance.



**Table 6. Summary of Hypothesized Relationships, Results, and Explanations**

| Influence   | Hypothesized relationships and supporting arguments   | Findings/results and additional explanations   |
|---|---|--|
| IT-SCII on client business collaboration (H1a)          | <p><i>H1a: Stronger positive relationship for domestic firms than for foreign firms</i></p> <ol style="list-style-type: none"> <li>Domestic firms may develop and use IT-SCII in a manner that is adapted to the context and expectations of clients since domestic firms are more knowledgeable of clients' IT usage preferences and constraints. [L].</li> <li>Local clients may have a preference for domestic firms with whom they have greater familiarity. IT-SCII may spur further interactions and richer collaborations because of higher familiarity (Pavlou &amp; Dimoka, 2006) and spawn collaboration in business areas. [L].</li> <li>Since barriers caused by cultural distance create organizational impediments for foreign firms, IT-SCII may not be effective in fostering client business collaboration for foreign firms. In contrast, domestic firms do not face such barriers. [L].</li> </ol> | <p><i>H1a is not supported:</i> Although positive for foreign and domestic firms, the difference is not statistically significant.</p> <ol style="list-style-type: none"> <li>Domestic and foreign firms benefit from IT-SCII. Executives confirmed that client business collaboration increases once the focal firm and client shared a common information base for greater visibility and openness. IT-SCII enables the relationship to move beyond contractual or historical terms and instead inculcates a genuine feeling of “partnership.” Thus, regardless of the ownership of the focal firm, clients are more willing to collaborate with firms on design and development once they can integrate information with the firm.</li> <li>Executives explained that IT-SCII also enables foreign firms to receive market and environment-related information from clients, thereby enabling them to navigate the BOP market better and acquire similar advantages as the ones leveraged by domestic firms.</li> </ol> |
| IT-SCII on supplier business collaboration (H2a)        | <p><i>H2a: Stronger positive relationship for foreign firms than for domestic firms</i></p> <ol style="list-style-type: none"> <li>Foreign firms have global practices in their international markets and bring these practices into the host country as part of their operations. These global practices fuel richer and deeper utilization of IT-SCII, opening up collaboration opportunities. [O<sub>i</sub>].</li> <li>Foreign firms have more global experience in IT-based supplier interactions, and foreign firms can apply this experience to improve their business collaborations with suppliers. [O<sub>a</sub> + L].</li> <li>Foreign firms have access to a global network of suppliers. Foreign firms' experience with collaboration in such partnerships in the global network are often transferred to the local market. [O<sub>i</sub>].</li> </ol>   | <p><i>H2a is supported:</i> Positive for foreign firms and negative for domestic firms, with a statistically significant difference.</p> <p>Two potential explanations for the finding of a negative relationship between IT-SCII and supplier business collaboration for domestic firms:</p> <ol style="list-style-type: none"> <li>Domestic firms lack global supplier networks and experience in global IT partnerships, which limits their ability to develop business collaborations with suppliers.</li> <li>As domestic firms may often rely on traditional and informal ways of conducting business with suppliers (e.g., via meetings), which may be more conducive to collaboration, IT-SCII may replace those forms of communication and thus reduce domestic firms' collaboration with suppliers. It is also possible that IT-SCII results in information sharing beyond the processing capacity of domestic firms, which may cause information overload, thus decreasing collaboration.</li> </ol>            |
| Client business collaboration on firm performance (H1b) | <p><i>H1b: Stronger positive relationship for domestic firms than for foreign firms</i></p> <ol style="list-style-type: none"> <li>Domestic firms have more local market knowledge of end customer needs in BOP markets (Ghemawat &amp; Hout, 2008). Local market knowledge serves as an O<sub>a</sub> + L advantage, which enables domestic firms to more effectively leverage business collaborations with clients. Foreign firms do not have the same level of market knowledge as domestic firms [O<sub>a</sub> + L].</li> <li>Domestic firms can have more successful business collaborations with clients because of their similarity in managerial styles. Because of similar managerial</li> </ol>  | <p><i>H1b is supported:</i> Positive for domestic firms and nonsignificant for foreign firms, with a statistically significant difference.</p> <ol style="list-style-type: none"> <li>To benefit from collaboration with clients, firms need to be able to build relationships with clients that help firms meet the needs of end customers.</li> <li>Foreign firms that operate in BOP markets are more familiar with transaction-based and impersonal interactions. Domestic firms are more accustomed to coordinating their actions with clients through connections and interpersonal processes.</li> </ol>  |



|  |  |  |
|--|--|--|
|  | <p>and work styles, there is better mutual understanding and alignment of goals of the collaboration [O<sub>i</sub>].</p> <p>3. Domestic firms have a better understanding of culture-based characteristics and value systems of local clients than foreign firms do. Cultural differences between a foreign firm and BOP clients create conflict in client business collaboration [O<sub>i</sub>].</p>  | <p>3. As the executives explained, domestic firms “understand the pulse” of the consumer and hence can direct collaborative efforts towards the development of products that is valued by customers. Foreign firms lack this understanding of the “psyche of BOP Indian consumers.”</p>  |
| <p>Supplier business collaboration on firm performance (H2b)</p>   | <p><i>H2b: Stronger positive relationship for foreign firms than for domestic foreign firms</i></p> <p>1. Foreign firms have a vast trove of complementary knowledge because of their experience and knowledge accumulated from operating in a global environment. [O<sub>a</sub>].</p> <p>2. Foreign firms may have already developed supplier collaborations in global markets, giving them the necessary experience to leverage supplier collaboration as an O<sub>i</sub> advantage (Dunning &amp; Wymbs, 2001). Local firms may not leverage supplier business collaboration as effectively because of a lack of experience with supplier collaboration in global markets. [O<sub>i</sub>].</p> <p>3. Business collaboration with domestic suppliers grants foreign firms access to trusted information in BOP markets that is often unavailable in the public domain and enables access to trustworthy information (Uzzi, 1997). On the other hand, domestic firms already possess advanced information related to BOP markets and hence benefit less from information obtained via collaboration with local suppliers. [O<sub>a</sub>].</p> | <p><i>H2b is supported:</i> Positive for foreign firms and negative for domestic firms, with a statistically significant difference.</p> <p>Two explanations for the negative effect of supplier collaboration on performance for domestic firms.</p> <p>1. It is possible that lack of capabilities and resources for domestic firms may be hindering the extent to which domestic firms may be able to devote necessary efforts into supplier business collaborations, to such an extent that such resource-intensive supplier collaboration may be counter-productive and thus hurt firm performance.</p> <p>2. Since domestic firms lack a global network of suppliers, suppliers of domestic firms may perceive that their business interests are secured and may devote fewer resources to collaboration with domestic firms (Villena et al., 2015). This may negatively affect performance benefits that domestic firms derive from collaboration with suppliers.</p> |
| <p><i>Note:</i> The parentheses at the end of each argument in Column 1 refer to the O<sub>a</sub>, O<sub>i</sub>, O<sub>e</sub>, and/or L advantages.</p> |  |  |

For example, the operations and strategy literatures discuss the adverse effects of collaboration because of reasons such as lack of capabilities and resources as well as increased overheads, which lead to the waste of collaboration efforts and resources that were invested in collaboration.

Second, since many domestic firms have no global network of suppliers, suppliers of domestic firms may perceive that their business interests are secured, and so may devote fewer resources to collaboration (Villena et al., 2015). This may negatively affect performance benefits that domestic firms derive from business collaboration with suppliers. Nevertheless, our findings of a negative effect of IT-SCII on supplier business collaboration and a negative effect of supplier business collaboration on firm performance for domestic firms in BOP markets, albeit not inconsistent with prior literature (as noted above), represent an opportunity for future research (e.g., via case studies) to explore underlying mechanisms that explain these findings.

A supplementary finding from our analysis is that IT-SCII has a positive direct effect on firm performance for foreign firms but a non-significant effect for domestic firms. One plausible reason for this non-significant direct effect may be that domestic firms

have preferences for local communication norms and protocols, which may not yet have been integrated into IT-SCII systems.

## 5.2 Interview Findings

As noted above, we conducted interviews with executives from ten auto parts manufacturing firms. Four distinct insights emerged regarding the effect of IT-SCII on supplier business collaboration. First, supplier business collaboration is contingent on suppliers being either ready or willing to adopt the next generation of information-based supply chain management. Suppliers of domestic firms in BOP markets may be resistant to move away from legacy ways of operating, thereby resulting in a negative influence of IT-SCII on supplier business collaboration for the focal domestic firm.

Second, the executives revealed that suppliers to most domestic firms had been partners with the firms for many years, if not decades. In many of these “generational relationships”, the operating practices of suppliers towards the focal domestic firms are based on relationships rather than contractual enforcement. Also, most suppliers conduct business with multiple firms and face conflicting delivery commitments.

Many regularly make more delivery commitments than they can achieve. These conflicting requirements are “managed” by the parties through expending relational capital in the form of obfuscation, bargaining, monetary and nonmonetary rewards, and threats.

Third, when domestic firms use IT-SCII, it may deter suppliers from collaborations since suppliers are more accustomed to legacy-based methods of collaboration. Similar reasons were attributed to the negative effect of supplier business collaboration on performance for domestic firms. Fourth, suppliers are incentivized to work with foreign firms because of better payment terms and reputational effects. However, these relationships are based on contractual enforcement. Thus, it is in the interest of suppliers to incorporate IT-SCII into their work with the focal foreign firm. An executive at a leading domestic Tier 1 components firm that supplies both domestic and foreign firms acknowledged that, in absence of personal relationships, information visibility, and integration are key means by which foreign firms develop confidence in suppliers and collaborate with suppliers. IT-SCII is critical for developing such information visibility and integration.

Contrary to expectations, we did not find a significant difference in the ability of foreign and domestic firms to leverage IT-SCII for client business collaboration. However, while domestic firms experience a significant effect of client business collaboration on firm performance, foreign firms do not experience a statistically significant effect. Our interviews with industry executives yielded two further insights to interpret these findings. First, executives confirmed that client business collaboration increases once the focal firm and client shared a common information base for greater visibility and openness. IT-SCII enables the relationship to move beyond contractual or historical terms and instead inculcates a genuine feeling of “partnership.” Thus, regardless of the focal firm’s ownership type, clients are more willing to collaborate with firms on design and development once they can integrate information with the firm and thereby have greater perceived control over its use and distribution. Second, IT-SCII also enables foreign firms to receive market and environment-related information from clients, thereby enabling them to navigate the BOP market and acquire similar advantages as those held by domestic firms.

The interviews also provided insight into the stronger positive effect of client business collaboration on firm performance for domestic firms. To benefit from client business collaboration, firms need to build relationships with clients that help meet the needs of end customers. Foreign firms in BOP markets are less familiar with local norms and more familiar with transaction-based and impersonal interactions. Domestic firms “understand the pulse” of end

customers and can direct their collaborative client efforts to the development of products valued by end customers. In one executive’s words, “foreign firms lack understanding of the psyche of India’s BOP end customers.”

### 5.3 Theoretical Contributions and Implications

Our study offers three main theoretical contributions. First, we contribute to IT business value literature (e.g., Khuntia et al., 2019; Mithas et al., 2017) by highlighting how ownership matters when firms leverage IT. Limited research has paid attention to how the advantages of IT differ based on whether IT is used by foreign or domestic firms (e.g., Khuntia et al., 2019). We extend the literature by revealing ownership as a mechanism that drives differences in benefits accrued from IT. In addition, from a theoretical perspective, our study sheds light on the tension of global experience versus local market knowledge to the extent that global experience and local market knowledge are key distinguishing advantages of foreign and domestic firms, respectively. Addressing the tension (i.e., advantages of foreign and domestic firms) sheds light on the unresolved theoretical question of whether global experience (possessed by foreign firms) or local market knowledge (possessed by domestic firms) is more advantageous to achieve better performance from IT via business collaboration in BOP markets. A key implication for future research is to not consider foreign and domestic firms as monolithic; rather, researchers should assess how various IS phenomena may apply differently based on ownership of the firm. While our study focused on differences between foreign and domestic firms in the context of BOP markets, future work can study whether such differences in leveraging IT apply beyond the context of the BOP.

Second, our study contributes to the vast IT-enabled supply chain literature that has addressed a number of issues such as IT-enabled inter-process integration (Rai et al., 2015), digitally enabled integration capability (Dong et al., 2009), and IT-induced relation-specific responses (Wang et al., 2013). More recently, scholars have highlighted how emerging technologies such as analytics (Dutta et al., 2017) and Internet of Things (Pang et al., 2015) can be applied in the context of the supply chain. While this literature has contributed important insights, we know little about how ownership matters in the context of the application of IT in the supply chain in BOP markets, barring few studies that are largely conceptual in nature or based on descriptive statistics (e.g., Sodhi & Tang, 2014). Our study contributes to this literature by integrating IS and the OLI framework to uncover IT-enabled supply chain information integration as an ownership-related advantage. We highlight how

pathways from IT-SCII to firm performance via supplier business collaboration and client business collaboration are different for foreign firms and domestic firms.

Our key theoretical contribution is that the realization of ownership advantages depends, in part, on the transferability of advantages to the BOP context (Verbeke & Yuan, 2010). In particular, when using IT-SCII, foreign firms can transfer their advantages related to global experience and global networks on the supplier side (for supplier business collaboration and ultimately firm performance). Conversely, these advantages may not be as transferable on the client side (for client business collaboration and ultimately firm performance) because foreign firms generally have less local market knowledge and familiarity with established norms and values. Overall, we contribute to IT-enabled supply chain literature by suggesting that the answer to the question of whether global experience (possessed by foreign firms) or local market knowledge (possessed by domestic firms) in BOP markets is more advantageous depends on whether these advantages are considered for client business collaboration or supplier business collaboration. Another theoretical implication is that when firms operate in BOP markets, it is not just end products that need to be adapted but also IT-SCII systems that are used on both the client and supplier sides. The kind of adaptation that is needed may be different for foreign and domestic firms. For example, while foreign firms may need to adapt their global IT-SCII systems to the local market context, domestic firms may need to ensure that their IT-SCII systems implement best practices to make up for their relative lack of established global practices and global network of suppliers. Thus, our study of IT-SCII in BOP markets shows the applicability of ownership advantages in the context of IT, thereby advancing our understanding and use of the OLI framework in IS. We also contribute to the IT-supply chain literature by suggesting how ownership advantages can be enhanced or reduced by firms. For example, domestic firms seeking to incorporate IT-SCII in supplier business collaborations may end up reducing existing  $O_a$  advantages because of the shift to contractual and formal arrangements instead of relational capital. Conversely, foreign firms need to incorporate locally bound market knowledge to enhance the transferability of the potential  $O_t$  advantages of IT-SCII.

Third, there is scant research on IS phenomena at the firm level in BOP markets (Appendix Table A4 and Figure A1 show the conceptual space of our study). As prior research notes, BOP markets are different from developed markets, and the lack of experience of foreign firms in BOP markets calls for distinct approaches in these markets (Prahalad, 2012). Only specific types of abilities are transferable from

developed to BOP markets (Van den Waeyenberg & Hens, 2012). While prior research suggests that foreign firms' advantages related to global experience with partners are applicable in BOP markets (e.g., Faulconbridge, 2013), a theoretical insight from our study is that these advantages do not apply uniformly to the supplier and client sides. We contribute to the literature in IT and BOP markets by showing that to leverage IT-SCII in BOP markets, firm ownership matters. We complement studies that explicate how firms adapt IT in BOP contexts more generally (Berger & Nakata, 2013). Moreover, by focusing on how IT drives collaboration, our study addresses calls for research on understanding the "operational and relational domains" needed to successfully operate in BOP markets, as exemplified by Fawcett and Waller (2015, p. 233). Finally, our theorization engages with the context specificity of the OLI framework by drawing on the concepts of  $O_a$ ,  $O_t$ , and  $L$  advantages to explicate how the implications of IT-SCII vary across foreign and domestic firms in the BOP context.

In sum, our study contributes to theoretical understanding by highlighting the intertwined nature of ownership-related (foreign and domestic) advantages and IT, thus taking a step toward a more nuanced understanding of the OLI framework within the domain of information systems.

## **5.4 Managerial Contributions**

Our study can assist foreign and domestic firms in developing effective approaches to leveraging IT-SCII in BOP markets. For foreign firms, the implications of our findings are twofold. First, because foreign firms are typically further away from the informational environment and lack local market knowledge in BOP markets, foreign firms need to be aware of the relatively lower returns provided by IT-SCII in enabling client business collaboration and firm performance. Foreign firms may follow alternate strategies to overcome their lack of local market knowledge. For example, Amazon reinvented the way it conducted business in India by combining IT-SCII with local practices to enable client collaboration (Govindarajan & Warren, 2016). Second, our findings imply that foreign firms benefit more by concentrating their IT-SCII and business collaboration efforts on the supplier side where they have a greater advantage, relative to domestic firms.

For domestic firms, our findings are also twofold. First, domestic firms should be aware that client business collaboration leads to superior performance relative to foreign firms. Thus, domestic firms should leverage their closeness to the informational environment and superior local market knowledge such that they use IT-SCII to build effective business collaboration with clients. Second, using IT-SCII for supplier business collaboration may not deliver commensurate performance benefits, and

domestic firms should follow alternate strategies to leverage IT-SCII.

More broadly, managers often have high aspirations and expectations in BOP markets (R. Kathuria et al., 2018). Firms often deploy IT systems from developed markets to BOP markets, expecting similar effectiveness and efficiency. Our results suggest nuances that need consideration, along with contextual factors of the BOP market in order to implement effective IT-enabled supply chain information integration strategies. Our findings suggest that implementing IT-SCII systems for business collaboration with both suppliers and clients without considering the BOP context may not work. Instead, a more differentiated approach is called for, where firms consider their ownership-related advantages in the BOP market and make calculated efforts on how to use IT-SCII for business collaboration. For example, one approach for foreign firms to overcome the relative disadvantage on client-side business collaborations could be to adapt the features or settings of IT-SCII systems to local clients' preferences, which may assist them with their client business collaboration.

### **5.5 Limitations, Future Research, and Concluding Remarks**

Our study has limitations that may serve as starting points for future research. First, our data are from firms in an Indian BOP market, which is a GREAT (growing, rural, eastern, aspirational, transitional) domain (Karhade & Kathuria, 2020). Though this approach enhances internal validity, it limits generalizability to other domains, such as developed, Western economies. Future work could extend the analysis to BOP markets in such domains. Second, we use cross-sectional data and call for future studies to use longitudinal data to further assess causal and temporal ordering. Nonetheless, our use of methods such as two-stage models substantially mitigates concerns of endogeneity and reverse causality. Third, our study was limited to auto parts manufacturing firms, which may limit generalizability. Future studies could test the applicability of our BOP market findings in other industries, including service industries. Finally, future research could explore how foreign and domestic firms need different types of IT systems on the supplier and client sides to either enrich their respective ownership

advantages or overcome their respective deficiency in ownership advantages.

To conclude, we examined the performance implications of IT-enabled supply chain information integration in a BOP market. Drawing on the OLI framework, we theorized that in BOP markets, the effect of IT-SCII on firm performance via client business collaboration and supplier business collaboration works differently for foreign and domestic firms. We contribute to the understanding of IT-enabled supply chain information integration, a key supply-chain related IS issue in BOP markets, and shed light on differential performance implications of IT-SCII for foreign and domestic firms.

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## Appendix A: Prior Literature

**Table A1. Representative Literature on OLI in Strategy and International Business**

| Study                          | Independent variables   | Dependent variable                               | Theoretical base  | Role of OLI/ eclectic paradigm   | Data source   | Key findings  |
|--------------------------------|---|--|---|--|---|---|
| (Aulakh et al., 2000)<br>Q     | Cost leadership strategy, differentiation strategy, marketing standardization, export diversification, foreign market focus   | Export performance                               | Internalization theory, dunning eclectic paradigm, organizational learning perspective. | Foreign direct investment allows firms to exploit firm-specific ownership and internalization. The country-specific location offers advantages to develop knowledge about foreign markets.                   | <i>Primary data</i><br>Survey of firms in Brazil, Chile, and Mexico   | Cost-based strategies enhance export performance in developed country markets, and differentiation strategies enhance performance in other developing countries.  |
| (Lu & Ma, 2008)<br>Q           | Transition phase, global industry, Japanese parent's equity ownership, Japanese parent's technological capability, Japanese parent's local experience, Japanese parent's keiretsu affiliation | IJV exit (survival likelihood), IJV sales growth | Liability of foreignness, institutional framework                                       | Multinational enterprises (MNEs) are exposed to a "liability of foreignness," which is exacerbated when the institutional distance between home and host countries is large.                                 | <i>Secondary data</i><br>The State Information Center's database, 563 Japanese IJVs                               | A local partner's affiliation to a regional business group enhances the performance of an IJV when its location restricts foreign direct investment (FDI).  |
| (Rickleby, 2018)<br>Q          | Previous international experience, count of previous international experiences, variety of international experience, liabilities of foreignness, cultural distance, MNC multinationals        | Duration of previous international experience    | Literature on liabilities of foreignness, International experience, Subsidiary staffing | An international experience by executives of foreign firms helps to overcome the potentially detrimental effects of liabilities of foreignness arising from an institutional distance.                       | <i>Secondary data</i><br>50 subsidiaries of US and European banks, 2005- 2010.                                    | MNCs recognize individuals' exposure to broader, more disparate sets of international experiences as a positive signal in institutionally distant host environments.  |
| (Clougherty et al., 2017)<br>Q | Acquirer-experience, Merger-tendency, DC→DC, EM→EM, EM→DC   | Dependent construct (cross-border acquisitions)  | Internalization theory, IB theory, the theory of the MNE                                | Underpinning the theory of the MNE is that multinationals possess ownership – or firm specific –that allow compensating for the additional costs incurred when operating in foreign markets (Dunning, 1998). | <i>Secondary data:</i><br>Thomson Reuter's "Worldwide Mergers & Acquisitions" series database, 4,361 cross-border | Cross-border investments undertaken by emerging-market MNEs in both developed and emerging markets tend to involve substantial efficiency effects and minimal market-power effects when compared with the cross-border investments undertaken by developed-country MNEs in both developed and emerging markets. |

|   |  |  |  |   |   |   |
|---|--|--|--|---|---|---|
|   |  |  |  |   | transactions,<br>year 1986-2010   |   |
| (Singh & Kundu, 2002)<br>C              |  |  | Oligopolistic reaction theory, network theory, resource-based view, eclectic paradigm, electronic brokerage effect, Bowtie theory            | According to Dunning (1988, 1993), location-specific advantages, unlike ownership advantages, are external to the firm. Internalization advantages according to Dunning (1993), arise directly from greater ease with which an integrated firm can leverage and monitor its distinctive assets. |   | This framework extends the explanatory power of the eclectic paradigm not only by interpreting the paradigm in the context of e-business but also by including an element of network-based advantages to the OLI configuration.   |
| (Dunning, 2001)<br>C                    |  |  | Eclectic theory, economic/organizational theory, location theory, Aliber's theory, internalization theory, neoclassical theory, trade theory | This article describes the origins and traces the subsequent evolution of the eclectic paradigm from the mid-1950s to the present day.  |   | The recent technological and economic events, and the emergence of new explanations of MNE activity have added to, rather than subtracted from, the robustness of the paradigm.   |
| (Dunning & Lundan, 2008)<br>CS          |  |  | The economic theory of the determinants of IB, Theory of the MNE, the knowledge-based theory of the firm, theory of internalization          | This paper examines how an institutional dimension can be incorporated into the three components of the OLI paradigm.   |   | Formal institutions cannot be studied apart from the motivations and belief systems that underlie them. Static comparisons of institutional forms have ignored the fact that functionally equivalent institutions can take on many different forms, and that in the long run, it is the underlying informal institutions that determine sustainable outcomes. |
| (Dunning & Lundan, 2008)<br>CS          |  |  | The economic theory of the determinants of IB, theory of the MNE, The knowledge-based theory of the firm, theory of internalization          | This paper examines how an institutional dimension can be incorporated into the three components of the OLI paradigm.   |   | Formal institutions cannot be studied apart from motivations and belief systems that underlie them. Static comparisons of institutional forms ignored the fact that functionally equivalent institutions can take on different forms and that in the long run, underlying informal institutions determine sustainable outcomes.                               |
| (Stentoft Arlbjørn & Lüthje, 2012)<br>C |  |  | Supply chain performance, Dunning's eclectic paradigm: the OLI model   | Establish the interaction between supply chain performance and the OLI model.   | Primary data:<br>Four case studies with data collection in 2011, interviews | The OLI model provides an increased consciousness of the managerial challenges related to supply chain performance based on the chosen globalization strategy.  |

|                                  |   |   |   |  |  |   |
|----------------------------------|---|---|---|--|--|---|
| (Chen & Kamal, 2016)<br>Q        | Types of ICT, intrafirm trade share, intrafirm export share, intrafirm import share   | ICT   | Transaction cost theory,  | Fort (2013) primarily focuses on the effect of ICT on domestic vs. foreign sourcing decisions, thus highlighting the spatial location choice of the firm, this argument used by authors can be related to OLI framework under location.                | Secondary data:<br>The US Census Bureau—ASM, CNUS, LFTTD, and the Longitudinal Business Database (LBD), 5850 firms | ICT adoption influences foreign boundary decisions by lowering coordination costs both internally and externally for the firm. The heterogeneity in the technology's characteristics, namely complexity and the production processes' degree of codifiability, moderate this influence.         |
| (Tahir & Larimo, 2005)<br>Q      | R&D intensity, firm size, international experience, cultural distance, wage rate, corporate tax rate, inflation rate, country risks, exchange rate fluctuations | Market-seeking FDI, efficiency-seeking, knowledge-seeking FDI, risk-reduction-seeking FDI | Eclectic theory   | The present study combines OLI and strategic advantages of manufacturing FDI in one analytic framework. These arguments are used by authors who are related to the OLI framework.  | <i>Secondary data</i><br>135 firms, countries from 1980 to 2000.   | Large firm size, larger international experience, large target market, low cultural distance, and low wage rates increased the probability of MS and ES FDI. The low inflation rate, low-risk level and high exchange rate fluctuations in target country increased the probability of RRS FDI. |
| (Yuan & Verbeke, 2010)<br>C      |   |   | Dunning's eclectic paradigm   | Ownership, location, and internalization advantages are keys to explaining scope, geography, and impacts of MNE activities. Dunning's ownership advantages do not contribute to understanding resource combination challenges within established MNEs. |  | Proposed new topology of ownership advantages which distinguishes among four types, based on the geographic source of such advantages and their transferability across borders.   |
| (Brouthers & Hennart, 2007)<br>C | Asset specificity and uncertainty, global integration strategy, differentiation strategy, market position strategy  | Entry mode  | Transaction cost theory, institutional theory, internalization theory, eclectic framework | Examination of the empirical literature on four most commonly employed theoretical perspectives on entry mode selection: transaction cost, resource-based view, institutional theory, and Dunning's eclectic framework.                                | <i>Secondary data</i><br>review the international entry mode choice literature                                     | The choice of foreign entry mode is influenced by a multiplicity of variables driven by complementary theories.   |



**Table A2. Representative Literature on IS and OLI**

| Study  | IT- related measure               | Independent Variables  | Dependent Variable  | Theoretical base  | Role of Eclectic paradigm/OLI  | Data source  | Key finding   |
|--|-----------------------------------|--|---|---|--|--|---|
| (Su, 2013)<br>CS   | Technical capability              | Market characteristics, respondent background, internationalization strategy | Suppliers' internationalization behavior and decision rationale | The Uppsala models (U-M), monopolistic advantage theory, internalization theory, eclectic paradigm, transaction cost economics (TCE), the resource-based view (RBV) | The analysis of internalization strategy uses concepts of internalization and location to further comprehend country selection for operations.                                     | <i>Primary and secondary data</i><br>From 2006 to 2011, 95 interviews were conducted with thirteen suppliers. Some secondary data collected includes suppliers' internal documents, public information, such as press releases and annual reports. | The entry and growth in different markets is a highly dynamic activity that combines a strategically planned resource-seeking process and a flexible, opportunistic bricolage process based on existing operation capabilities and client relationships.                          |
| (Loh & Venkatraman, 1992)<br>Q   | IT cost structure, IT performance | Business cost structure, business performance, financial leverage.           | Degree of IT outsourcing  | Henderson and Venkatraman's model of aligning business and IT domains, code analytic, design analytic, and function analytic.                                       | Business cost structure can be considered as part of OLI as it plays an important role in business profitability because firms try to produce their output below the average cost. | <i>Secondary data</i><br>A sample (57 firms) from the list of companies in US Data was collected from Standard and Poor's Compustat II and Lotus' CD/Corporate on CD-ROM   | They have empirically identified a set of important determinants—reflecting both IT and business contexts—of IT outsourcing, and thus they offer the first empirical assessment of a set of widely held assertions and beliefs as to why firms outsource their IT infrastructure. |
| <p><i>Note:</i> This table is not exhaustive and lists only a few representative studies to show the uniqueness and novelty of the current study about relevant prior work. Abbreviations: Q = Quantitative; CS = Case study. Data sources: Can be classified as primary and secondary. Some of the content of this table has been taken verbatim from the papers.</p> |                                   |  |   |   |  |  |   |

Table A3. Representative Literature on IT-Enabled Supply Chain

| Study and type           | IT-related measure  | Independent variables   | Dependent variable  | Theoretical base   | Data source   | Key findings   |
|--------------------------|---|---|---|--|---|--|
| (Rai et al., 2015); Q    | Interfirm IT modularization, Intrafirm IT modularization, IT customization, IT infrastructure | Market sourcing intensity, interfirm process integration capability, intrafirm process integration capability | Return on assets (ROA)  | Transaction cost economics (TCE), coordination costs, IT capabilities          | <i>Secondary data</i> : Firm financial and operational reports filed with US Energy Information Administration and Federal Energy Regulatory Commission | The fit between market sourcing intensity and the development of IT-enabled interfirm process integration capability improves firm profitability.  |
| (Wang et al., 2013); Q   | IT-enabled planning and control   | Supplier's relation-specific business process investments, flexibility, normative contracts                   | Buyer's manufacturing goals achievement   | Information processing view, resource-based view, transaction cost theory      | <i>Primary data</i><br>Firm surveys   | As buyers and suppliers utilize the IT and relational solutions, they induce relation-specific responses, which lead to positive buyer outcomes.   |
| (Banker et al., 2011); Q | Number of digital transactions  | Commodity grades, sell transactions, buy Transactions,  | The price difference between digital and physical trading                           | Increased bargaining power, information asymmetry, structural difference       | <i>Secondary data</i> from a digital platform for coffee trading, data from Coffee Board of India publications  | Producers obtain significantly higher prices when they sell the commodity through a digital platform rather than at the farm-gate through brokers. |
| (Klein & Rai, 2009); Q   | Buyer IT customization  | Strategic information flows, buyer dependence on supplier, trusting beliefs                                   | Buyer relationship-specific performance, supplier relationship-specific performance | Collaborative interorganizational relationships, relational view of the firm   | <i>Primary data</i><br>91 buyer-supplier logistics relationships, client and vendor account managers,   | Buyer and supplier strategic information flows positively impact the relationship-specific performance of both sharing and receiving parties.      |
| (Yao & Zhu, 2012); Q     | IT in the focal industry (IT)   | Electronic linkage use with buyer industry (ELB), electronic linkage use with supplier industry (ELS)         | Inventory-demand variance ratio (IDVR)  | Transaction cost economics (TCE)   | <i>Secondary data</i><br>Dataset from the US Census Bureau and the US Bureau of Economic Analysis (BEA)   | ELS reduces bullwhip effect, ELB increases it, mitigated by IT.  |
| (Ray et al., 2009); Q    | Information technology (IT)   | Demand uncertainty, industry concentration, vertical integration  | Coordination cost, production cost  | Demand uncertainty, industry concentration, coordination cost, production cost | <i>Secondary data</i><br>InformationWeek 500, COMPUSTAT, the Bureau of Economic Analysis (BEA)  | IT is associated with a decrease in vertical integration when demand uncertainty is high, or industry concentration is low.                        |

|  |  |   |   |   |  |   |
|--|--|---|---|---|--|---|
| (Dong et al., 2009); Q   | Backend integration  | Managerial skills, and partner support                          | Process-level performance, competitive position | The resource-based view (RBV), transaction cost economics (TCE) | <i>Primary data:</i> from a survey designed to investigate Internet-based value chain activities | Development of digitally enabled integration capability is manifested at process level along the supply chain.  |
| (Xia & Xia, 2008); C   | E-Market adoption, e-market quality uncertainty  | N/a   | Supplier-buyer relationships                    | Non-cooperative bargaining model                                | N/A  | E-markets stimulate supplier's relationship-specific investments, lower procurement prices, and improve buyer profitability and supply-chain efficiency.                                  |
| (Dedrick et al., 2008); Q  | % of custom & standard parts and materials for production purchased via e-procurement                                | Buyer-supplier transactions, standard goods versus custom goods | Number of suppliers                             | Transaction cost economics                                      | <i>Primary and secondary data</i><br>The firm-level survey, COMPUSTAT                            | The use of electronic procurement is associated with buying from more suppliers for custom goods but fewer suppliers for standard goods.  |
| (Wu et al., 2008); C   | Increasing reach of the electronic channel, the different types of product information offered in different channels | N/a   | Manufacturer's distribution problem             | Game theory   | N/A  | Manufacturer uses electronic channel in addition to physical channel when product information is very valuable and about digital attributes, or when product information is not valuable. |
| <p><i>Note:</i> This table is not exhaustive and lists only a few representative studies to show the uniqueness and novelty of the current study about relevant prior work. Abbreviations: Q = Quantitative, C =Conceptual. Data sources: Can be classified as primary and secondary</p> |  |   |   |   |  |   |

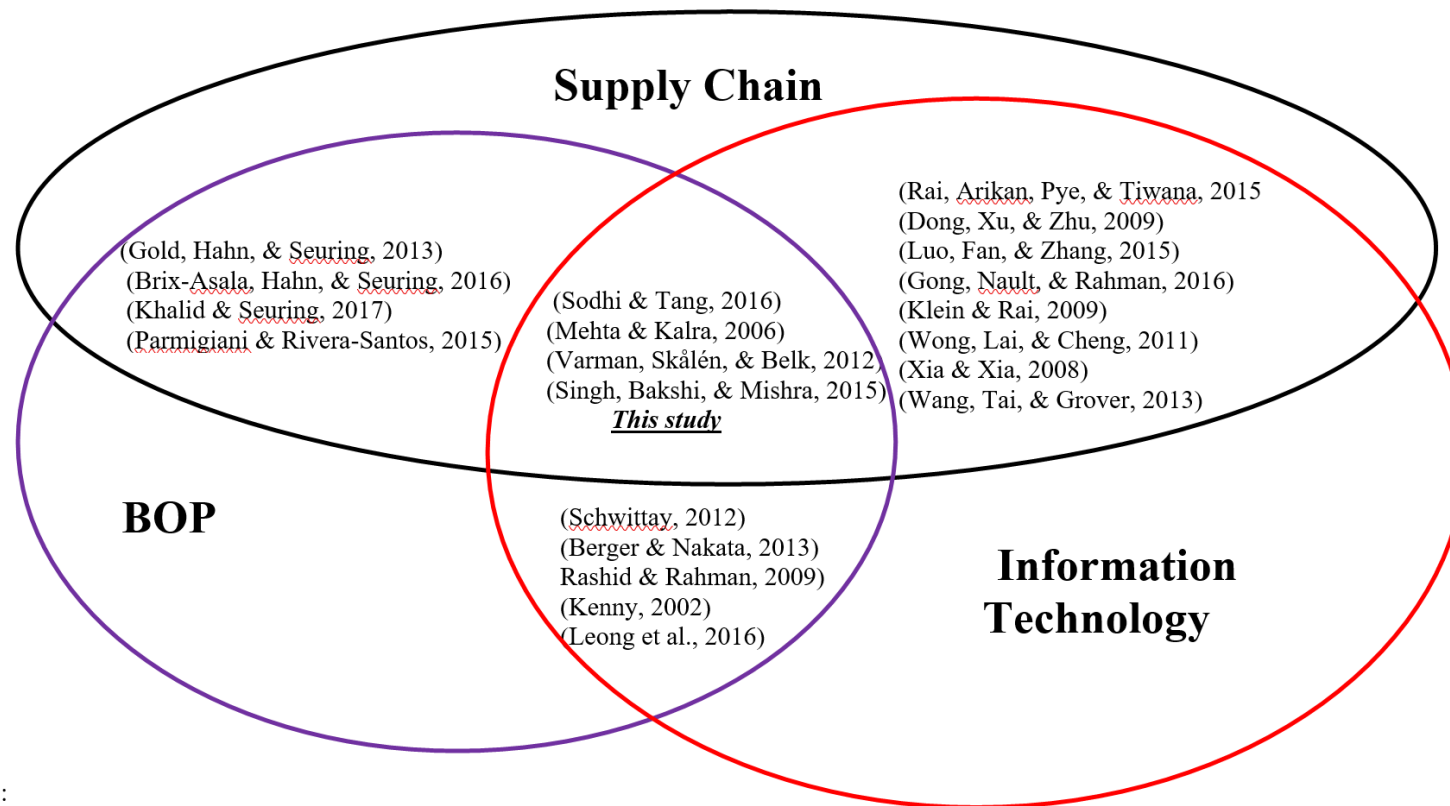
Table A4. Representative Literature on IT, BOP, and Supply Chain

| Study and type                                  | Key independent variables (if applicable)  | Key dependent variables (if applicable)                                       | Domestic and foreign firm comparison (yes/no)? | Country   | Key findings  |
|---|--|---|--|---|---|
| <b>Panel A: Studies on BOP and supply chain</b> |  |   |  |   |   |
| (Gold et al., 2013)<br>CS                       | Corporate orientation to sustainability, features of supply chain design, operation            | Sustainability performance/integration of sustainable supply chain management | No   | Developing countries: France, India, Pakistan, Germany, Cambodia, Switzerland, Pakistan | Applying sustainable supply chain management (SSCM) to BOP projects can complement economic, social, and environmental dimensions of sustainability.  |
| (Brix-Asala et al., 2016)<br>CS                 |  | Ecological environment and Reverse logistic activities                        | No   | Ghana   | The integration of base of the pyramid into the end-of-life supply chain of water sachets can indeed help to reduce the ecological footprint of this typical BOP product, which is used to overcome an insufficient public water supply in rural areas or urban settlements.  |
| (Khalid & Seuring, 2017)<br>Q                   |  |   | Yes  |   | Linkages between base of the pyramid (BOP) research and sustainable supply chain management/supply chain management (SSCM/SCM) constructs. The highest number of links was found between the supply chain management constructs of strategic purchasing and long-term relationships and the sustainable supply chain management constructs of supplier integration and communication and coordination with suppliers. |
| (Parmigiani & Rivera-Santos, 2015)<br>Q         | Product market void, Labor market void, Capital market void, Contracting void, Regularity void | Impact of institutional voids on supply chain                                 | No   |   | A multinational corporation (MNC) entering subsistence markets must resolve institutional voids in the product, labor, and capital markets. Managers should consider the impact of each type of institutional void as this will be unique to the firm's situation.  |
| (Khalid et al., 2015)<br>Q                      | Orientation, Continuity, Collaboration, Risk management, Pro-activity management               | Sustainable supply chain management   | No   | Southeast Asia (India and Bangladesh), Latin America, Africa, North America, Europe     | Technological integration emerges as the core sustainable supply chain management practice frequently identified and is contingent on several other practices.  |

|                                       |   |  |     |  |   |
|---------------------------------------|---|--|-----|--|---|
| (Sodhi & Tang, 2014)<br>C             |   | Value of direct purchase and direct market access, Value of search cost reduction, impact of price information, and an alternative channel | No  | India, Africa, China                     | The result shows examples of supply-chain operations with the poor as suppliers of goods or services and those with the poor as distributors of finished goods identified opportunities for operations management (OM) research and provided some illustrative models as potential seeds for further analytical research.   |
| <b>Panel B: Studies on BOP and IT</b> |   |  |     |  |   |
| (Cecchini & Scott, 2003)<br>C         | Information isoquant ( $q_2$ ),<br>Information isoquant ( $q_2$ ) | Amounts of user time combined with different amounts of capital  | No  | India                                    | Low-cost access to information infrastructure is a necessary prerequisite for successful use of information and communications technology (ICT) by the poor, but it is not sufficient. Further, grassroots intermediaries and the involvement of the community are identified as key factors that foster local ownership and availability of content and services that respond to pressing needs of the poor. |
| (Schwittay, 2012)<br>CS               |   |  | No  | India                                    | While the bottom of the pyramid highlights the importance of new markets for high-tech companies, the discourse of digital corporate citizenship creates an enabling environment in which transnational high-tech companies can gain political access to new consumers at the bottom of the pyramid.  |
| (Berger & Nakata, 2013)<br>CS         | Mobile banks,<br>POS systems,<br>M-banking                        | Effective implementation of Information Communications Technology  | No  | Ghana, Kenya, Malawi, Mozambique, Uganda | Implementation is effective when the unique sociohuman, governmental-regulatory, and market conditions of the BOP are accounted for, such that fit is achieved between the technologies and environments they are situated in.  |
| (Rashid & Rahman, 2009)<br>CS         |   |  | Yes | Bangladesh                               | Instead of focusing on untapped low-income markets for profit-generation only, a business model that integrates local people and considers the local socioeconomic context of the target markets is a more sustainable way to successfully penetrate the BOP markets.   |
| (Kenny, 2002)<br>CS                   | The cost of installation,<br>The population density.              | Fixed costs of provision per capita  | No  | Sub-Saharan Africa,<br>South Asia        | A policy promoting access to as wide a range of radio (and television) broadcast options as possible is important for the development of opportunities for the poor. Opportunities for private, competitive provision of radio content will expand choices and development impact.  |



|   |         |  |     |               |   |
|---|---------|--|-----|---------------|---|
| (Leong et al., 2016); C   |         |  | No  | China         | The paper identifies the critical actors who help to create social change, and their interactions with ICT. The paper enhances understanding of the interaction between ICT and underprivileged communities.  |
| <b>Panel C: Studies on BOP, IT, and supply chain</b>  |         |  |     |               |   |
| (Sodhi & Tang, 2016)<br>CS  |         |  | No  | India, Africa | Measuring the alleviation of the targeted social problem across different time frames and scopes requires field study by way of so-called “impact” studies. The BOP provides many opportunities to exploit as well as to extend supply chain research.  |
| (Dao et al., 2011)<br>C   |         |  | No  | N/A           | The research introduces an integrated theoretical model for sustainability that includes IT resources, human resources, and supply chain management as critical components in helping firms develop sustainability capabilities.  |
| (Mehta & Kalra, 2006)<br>Q  |         |  | No  | India         | Information and communication technologies can enable them to achieve sustainable development in a more efficient and cost-effective manner. Information technologies have the potential for assisting people at the bottom of the pyramid in meeting their basic human needs.                                      |
| (Varman et al., 2012)<br>CS   |         |  | No  | India         | e-Choupal, an Indian BOP initiative, is hampered by a divide between poverty alleviation and profit-seeking, which is inadequately reconciled by the neoliberal government policies that dominate contemporary India.   |
| (Singh et al., 2015)<br>CS  |         |  | No  | India         | Market development is enhanced using corporate social responsibility (CSR) route by making the BOP development less risky, making the CSR project look like a BOP pilot project to get more internal traction inside the organization.  |
| <b>This study</b>   | IT-SCII | Supplier business collaboration, client business collaboration, and firm performance | Yes | India         | Influence of client business collaboration on firm performance is stronger for domestic firms than for foreign firms. In contrast, the influence of IT-SCII on supplier business collaboration, and influence of supplier collaboration on firm performance are stronger for foreign firms than for domestic firms. |
| <i>Note:</i> This table is not exhaustive and lists only a few representative studies to show the uniqueness and novelty of the current study about relevant prior work. Abbreviations: Q = Quantitative; C = Conceptual; CS = Case study |         |  |     |               |   |



Notes:

1. This figure is not meant to be exhaustive and lists only some illustrative studies to show where the current study fits the relevant prior framework.
2. This figure only shows case studies and quantitative studies. It does not show conceptual studies in Panel A (e.g., Sodhi & Tang 2014), Panel B (e.g., Cecchini & Scott, 2003), and Panel C (e.g., Dao, Langella, & Carbo, 2011).

**Figure A1. Representative Literature on IT, BOP, and Supply Chain**

## **Appendix B: Details on Mediation Analysis**

We use mediation analysis methods that leverage the latest approaches as per recent research (Hair et al., 2017). Earlier, the Sobel test for the product of coefficients approach would be used to assess the significance of mediation relationships. However, recent advances in methods suggest that this may not be a valid method for several reasons. We used an alternate, advanced method to assess mediation in our PLS analysis, which is on the lines of recently published PLS-based IS studies in top IS journals (e.g., Benitez et al., 2018; Kathuria et al., 2018; Khuntia et al., 2019). In this advanced method, the sampling distributions for the indirect effects are bootstrapped and multiple mediation analysis is conducted. Such an approach has also been forward in a regression context (Hayes, 2009; Preacher & Hayes, 2008) and implemented by Hayes in SPSS. This method ensures that our analysis does not suffer from the following deficiencies from the product of-coefficients approach. First, the product of coefficients approach was developed for evaluating simple mediation, consisting of a single mediator. Structural models that contain more than one mediator will need a series of separate simple mediation analyses. Doing so in our study may lead to biased and inaccurate results (Hair et al., 2017). Second, the product of coefficients approach identifies only two types of mediation. In our models, we may have and indeed find additional types of mediation and non-mediation. Recent advances propose three types of mediation and two types of non-mediation. Third, the Sobel test needs unstandardized coefficients as inputs. Fourth, the Sobel test assumes that the data for each variable follow a normal distribution. This is inconsistent with PLS and the rest of our analysis. Fifth, the parametric assumptions of the Sobel test do not hold for indirect effects. Since our results suggest indirect effects, this is a key concern for our study. Sixth, the Sobel approach suffers from low statistical power for small sample sizes such as our two subsamples.

## Appendix C: Details on Regression Analysis

**Table C1. Regression Results as Robustness Test**

| Variables                   | Domestic firms                |                                 |                     |                      |                     |                      | Foreign firms                 |                                 |                     |                     |                     |                     |
|-----------------------------|-------------------------------|---------------------------------|---------------------|----------------------|---------------------|----------------------|-------------------------------|---------------------------------|---------------------|---------------------|---------------------|---------------------|
|                             | (1)                           | (2)                             | (3)                 | (4)                  | (5)                 | (6)                  | (7)                           | (8)                             | (9)                 | (10)                | (11)                | (12)                |
|                             | Client business collaboration | Supplier business collaboration | Firm performance    | Firm performance     | Firm performance    | Firm performance     | Client business collaboration | Supplier business collaboration | Firm performance    | Firm performance    | Firm performance    | Firm performance    |
| IT-SCII                     | 0.321***<br>(0.095)           | -0.385***<br>(0.096)            |                     |                      | 0.124**<br>(0.056)  | 0.116<br>(0.071)     | 0.600***<br>(0.085)           | 0.638***<br>(0.080)             |                     |                     | 0.775***<br>(0.061) | 0.687***<br>(0.059) |
| Client bus. collaboration   |                               |                                 | 0.819***<br>(0.059) |                      | 0.771***<br>(0.062) |                      |                               |                                 | 0.635***<br>(0.085) |                     | 0.146**<br>(0.062)  |                     |
| Supplier bus. collaboration |                               |                                 |                     | -0.714***<br>(0.070) |                     | -0.664***<br>(0.075) |                               |                                 |                     | 0.747***<br>(0.075) |                     | 0.276***<br>(0.061) |
| Age                         | 0.468***<br>(0.092)           | -0.418***<br>(0.093)            | 0.140**<br>(0.059)  | 0.220***<br>(0.070)  | 0.117*<br>(0.059)   | 0.200***<br>(0.070)  | 0.034<br>(0.083)              | 0.102<br>(0.078)                | 0.087<br>(0.081)    | 0.019<br>(0.071)    | 0.038<br>(0.047)    | 0.015<br>(0.044)    |
| Size                        | 0.263***<br>(0.091)           | -0.195**<br>(0.091)             | 0.035<br>(0.052)    | 0.106*<br>(0.062)    | 0.006<br>(0.053)    | 0.079<br>(0.063)     | 0.134<br>(0.086)              | 0.190**<br>(0.080)              | 0.158*<br>(0.084)   | 0.073<br>(0.075)    | 0.081<br>(0.049)    | 0.049<br>(0.046)    |
| IT Stock                    | -0.053<br>(0.082)             | 0.015<br>(0.082)                | 0.067<br>(0.046)    | 0.032<br>(0.055)     | 0.049<br>(0.046)    | 0.018<br>(0.056)     | 0.139*<br>(0.082)             | -0.010<br>(0.077)               | -0.032<br>(0.081)   | 0.060<br>(0.069)    | 0.015<br>(0.047)    | 0.038<br>(0.043)    |
| Observations                | 85                            | 85                              | 85                  | 85                   | 85                  | 85                   | 87                            | 87                              | 87                  | 87                  | 87                  | 87                  |
| R-squared                   | 0.482                         | 0.478                           | 0.834               | 0.757                | 0.843               | 0.765                | 0.467                         | 0.529                           | 0.496               | 0.619               | 0.832               | 0.857               |
| Adjusted R-sq.              | 0.456                         | 0.452                           | 0.825               | 0.745                | 0.833               | 0.750                | 0.441                         | 0.506                           | 0.472               | 0.600               | 0.822               | 0.848               |

Table C2. Moderated Regression Results for Robustness

| Variables                         | (1)                           | (2)                             | (3)                           | (4)                             | (5)                 | (6)                 | (7)                 | (8)                  | (9)                  | (10)                 | (11)                 | (12)                 |
|-----------------------------------|-------------------------------|---------------------------------|-------------------------------|---------------------------------|---------------------|---------------------|---------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                                   | Client business collaboration | Supplier business collaboration | Client business collaboration | Supplier business collaboration | Firm performance    | Firm performance    | Firm performance    | Firm performance     | Firm performance     | Firm performance     | Firm performance     | Firm performance     |
| IT-SCH                            | 0.500***<br>(0.065)           | 0.109<br>(0.083)                | 0.412***<br>(0.090)           | -0.560***<br>(0.090)            | 0.669***<br>(0.053) | 0.423***<br>(0.049) |                     |                      |                      | 0.429***<br>(0.048)  | 0.382***<br>(0.051)  | 0.338***<br>(0.046)  |
| Client bus. Collaboration (CBC)   |                               |                                 |                               |                                 |                     | 0.508***<br>(0.050) | 0.821***<br>(0.073) |                      | 0.589***<br>(0.087)  | 0.624***<br>(0.064)  |                      | 0.513***<br>(0.076)  |
| Supplier bus. Collaboration (SBC) |                               |                                 |                               |                                 |                     | -0.065<br>(0.039)   |                     | -0.780***<br>(0.069) | -0.376***<br>(0.085) |                      | -0.581***<br>(0.066) | -0.252***<br>(0.076) |
| IT-SCH × Foreign Firm             |                               |                                 | 0.165<br>(0.119)              | 1.262***<br>(0.118)             |                     |                     |                     |                      |                      |                      |                      |                      |
| CBC × Foreign Firm                |                               |                                 |                               |                                 |                     |                     | -0.179*<br>(0.094)  |                      | -0.486***<br>(0.133) | -0.234***<br>(0.078) |                      | -0.477***<br>(0.115) |
| SBC × Foreign Firm                |                               |                                 |                               |                                 |                     |                     |                     | 1.516***<br>(0.100)  | 1.050***<br>(0.133)  |                      | 1.071***<br>(0.105)  | 0.761***<br>(0.122)  |
| Foreign Firm                      | 0.000<br>(0.118)              | -0.000<br>(0.152)               | 0.000<br>(0.118)              | -0.000<br>(0.117)               | -0.000<br>(0.097)   | -0.000<br>(0.077)   | -0.000<br>(0.091)   | -0.000<br>(0.088)    | -0.000<br>(0.078)    | -0.000<br>(0.075)    | -0.000<br>(0.076)    | -0.000<br>(0.068)    |
| Control variables                 | Included                      | Included                        | Included                      | Included                        | Included            | Included            | Included            | Included             | Included             | Included             | Included             | Included             |
| Observations                      | 172                           | 172                             | 172                           | 172                             | 172                 | 172                 | 172                 | 172                  | 172                  | 172                  | 172                  | 172                  |
| R-squared                         | 0.421                         | 0.043                           | 0.428                         | 0.434                           | 0.608               | 0.759               | 0.656               | 0.679                | 0.752                | 0.768                | 0.761                | 0.814                |
| Adjusted R-sq                     | 0.404                         | 0.0146                          | 0.407                         | 0.413                           | 0.597               | 0.749               | 0.643               | 0.668                | 0.740                | 0.758                | 0.751                | 0.804                |

Note: Standard errors in parentheses. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.10$ . All models include a constant.



**Table C3. Two-Stage Least Squares Regression Results Accounting for Endogeneity**

| Variables   | Domestic firms                |                                 |                                   |                                   |                                   |                                   | Foreign firms                 |                                 |                                   |                                   |                                   |                                   |
|---|-------------------------------|---------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-------------------------------|---------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
|   | (1)                           | (2)                             | (3)                               | (4)                               | (5)                               | (6)                               | (7)                           | (8)                             | (9)                               | (10)                              | (11)                              | (12)                              |
|   | Client business collaboration | Supplier business collaboration | Firm performance                  | Firm performance                  | Firm performance                  | Firm performance                  | Client business collaboration | Supplier business collaboration | Firm performance                  | Firm performance                  | Firm performance                  | Firm performance                  |
| IT-SCII   | 0.444***<br>(0.152)           | -0.454***<br>(0.151)            |                                   |                                   | 0.130**<br>(0.055)                | -0.263<br>(0.166)                 | 0.544***<br>(0.138)           | 0.516***<br>(0.131)             |                                   |                                   | 0.755***<br>(0.062)               | 0.686***<br>(0.075)               |
| Age   | 0.416***<br>(0.104)           | -0.389***<br>(0.103)            | 0.142**<br>(0.060)                | -0.193<br>(0.146)                 | 0.125**<br>(0.059)                | -0.211<br>(0.172)                 | 0.041<br>(0.082)              | 0.119<br>(0.078)                | 0.081<br>(0.079)                  | 0.001<br>(0.071)                  | 0.037<br>(0.045)                  | 0.015<br>(0.043)                  |
| Size  | 0.215**<br>(0.100)            | -0.169*<br>(0.100)              | 0.036<br>(0.052)                  | -0.138<br>(0.109)                 | 0.010<br>(0.052)                  | -0.114<br>(0.123)                 | 0.150*<br>(0.089)             | 0.226***<br>(0.085)             | 0.141*<br>(0.082)                 | 0.037<br>(0.077)                  | 0.077<br>(0.048)                  | 0.048<br>(0.047)                  |
| IT Stock  | -0.070<br>(0.082)             | 0.024<br>(0.082)                | 0.067<br>(0.044)                  | 0.004<br>(0.082)                  | 0.048<br>(0.044)                  | 0.032<br>(0.095)                  | 0.142*<br>(0.080)             | -0.005<br>(0.076)               | -0.041<br>(0.079)                 | 0.058<br>(0.068)                  | 0.010<br>(0.046)                  | 0.038<br>(0.041)                  |
| Client bus. collaboration                             |                               |                                 | 0.816***<br>(0.064)               |                                   | 0.753***<br>(0.068)               |                                   |                               |                                 | 0.690***<br>(0.089)               |                                   | 0.180***<br>(0.068)               |                                   |
| Supplier bus. Collaboration                           |                               |                                 |                                   | -1.425***<br>(0.206)              |                                   | -1.647***<br>(0.322)              |                               |                                 |                                   | 0.844***<br>(0.095)               |                                   | 0.277***<br>(0.097)               |
| Observations  | 85                            | 85                              | 85                                | 85                                | 85                                | 85                                | 87                            | 87                              | 87                                | 87                                | 87                                | 87                                |
| R-squared   | 0.471                         | 0.474                           | 0.834                             | 0.440                             | 0.843                             | 0.261                             | 0.464                         | 0.516                           | 0.494                             | 0.611                             | 0.832                             | 0.857                             |
| F-statistic   | 17.470***                     | 16.277***                       | 90.533***                         | 26.934***                         | 76.831***                         | 16.311***                         | 9.178***                      | 10.582***                       | 20.350***                         | 26.478***                         | 80.285***                         | 94.382***                         |
| Sargan test of overidentifying restrictions (p-value) | 0.798                         | 0.406                           | N/A (Equation exactly identified) | N/A (Equation exactly identified) | N/A (Equation exactly identified) | N/A (Equation exactly identified) | 0.886                         | 0.887                           | N/A (Equation exactly identified) | N/A (Equation exactly identified) | N/A (Equation exactly identified) | N/A (Equation exactly identified) |

Note: Standard errors in parentheses. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.10$ . All models include a constant. The Sargan test is based on the null of the validity of instruments (Sargan, 1958)

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