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International Supply Chain Management: How Information and Communication Technologies Drive the Globalization of Firms in Asia/Pacific

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Abstract: Globalization includes four subprocesses: (1) Global foundation covers the emergence of global firms from the start. (2) Internationalization captures changes in the scope and spread of international activities. (3) Global networking and covers the integration and coordination of activities on global level. (4) Global evolutionary dynamics are driving the globalization process. Twenty case studies from the Asia/Pacific region serve to explore the role of ICT in the globalization of SMEs from this vibrant region. This paper aims to capture the influence of ICT on the globalization process and of individual firms beginning with the very foundation of the respective firms. In order to sustain such a processual view, 20 histographic case studies of SMEs founded after 1980 were analyzed in China, India, New Zealand, and Singapore in order to identify both similarities and differences in the use and contribution of ICT within the globalization process across the sample firms.

Key words: globalization; evolutionary dynamics; SMEs; ICT; Asia/Pacific; histographic case studies
JEL codes: A1, F6, Z00

1. Introduction

In the early 2000s, it became clear that the Internet and the Web were having a profound effect on how business was conducted throughout the world. A new type of organization was possible through ICT and the Internet referred to as an e-business (Kazanis, 2004, p. 1). E-business technologies are a collection of technologies, such as websites, browsers, electronic procurement software, desk-top video conferencing tools, intelligent database search engines, computer supported cooperative working packages, and many other technologies, as well as the Web-enabling of more traditional and familiar software such as Enterprise Resource Planning (ERP), Supply Chain Management (SCM), and Customer Relationship (CRM) systems (Sharma, Gupta, 2004, p. 1; Chang, Wang, 2008, p. 259). This case-based study has the objective to illuminate the role of ICT in the globalization process of small and medium-sized firms in China, India, New Zealand, and Singapore, representing both small and large, developed and developing markets.

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2. Literature Review

A major stream of early research studying impacts of ICT on Management was its impact on efficiency. After one-dimensional models (e.g., measuring the impact of ICT on performance) clearly showed their limits multi-factor global IT impact measurement models addressed the complexity of causalities (e.g., Palvia, 1997; Mahmood, Soon, 1991; Sethi, King, 1994; Whitworth et al., 2005). These studies show that enterprise expansion and globalization, global supply chain management effectiveness, global resource co-ordination, and cost management reflect more significantly the global IT impact than the firm's financial performance. A study by Whitworth et al. (2005) provided evidence that managers assess the influence of ICT on the dimensions "corporate growth and globalization" and "global co-ordination of resources and cost management" to be twice as high as the influences on financial results. These results indicate that ICT particularly have an influence on the dynamics in the development of global activity structures.

Increasingly, implementation of ICT takes place within an interorganizational context (Timmers, Veer, 1999). Studies have shown that relationships between established trading partners will influence adoption and implementation depending on size and power position (Benbasat et al., 1993; Dos Santos, Peffers, 1998). The most direct external pressure on an SME comes from customers requiring conformance to their supply management practices (Johnston, Wright, 2004, p. 233). In such interorganizational networks, good relationships and trust between trading partners are important to successful implementation (Chan, Swatman, 2000). Organizational culture plays an important role in the effective implementation of IS integration in interorganizational networks (Weber, Pliskin, 1996, p. 88).

E-business enabling technologies infrastructure should be flexible, reliable, scalable, and quickly deployed to keep up with the ever-changing, unpredictable advances in technology (Sharma, Gupta, 2004, p. 4). A flexible e-business infrastructure should include universal connectivity through the use of open standards and integration with internal and external services. Universal connectivity through the use of open standards implies that companies must allow customers, business partners, suppliers, and influencers to have access to systems and applications with a variety of access devices available.

Doing e-business puts new strains on the whole organization, which can have both internal and external effects. In case of a failure, orders or goodwill may be lost and back office services or internal communication may break down. In fact, the whole SC may break down. Further risks specifically attached to e-commerce are client/server, data transfer, transaction, and virus risks (Kaynak et al., 2005, p. 627). Because meaning is context sensitive and institutions can vary dramatically from one environment to another, differences between source and receiver institutions can lead to the source not understanding key factors of the receiver's environment due to missing contextual information (Szulanski et al., 2003, p. 144). Effective use of ICT to communicate knowledge requires an organization sharing an interpretive context. When communicators share similar knowledge and experience, they can more effectively communicate knowledge via electronically mediated channels (Zack, 1999, p. 50). Effective capture and re-use of tacit, contextual knowledge may be achieved by utilizing a well-structured "common and shared vocabulary" (Dzbor et al., 2004, p. 342).

A major advantage of the Internet is the instant global dissemination of information. However, this also means an instant global exposure of firms in the case of bad news. Therefore, Prahalad (2008, p. 225) states that "*Any blogger can start a global crisis for a large company*". A major downside in the use of Internet resources in general

may be that seekers have no way of assessing the information provider's expertise and the reliability of information. On balance, literature on the influence of ICT on the management of firms in general first focused on the potential to generate competitive advantages. Some authors even promoted the 'magic bullet' theory that ICT even fires itself as a strategic weapon. However, this basically proved to be an illusion and empirical studies provided evidence that ICT can contribute to the generation of competitive advantage but only in the context of other organizational resources. Research has shown that ICT provide a huge potential to contribute to a firm's success but also that this has to be seen in the wider context of other organizational resources and contextual attributes.

2.1 Internationalization

Increasingly, internationalization theories are picking up the influence of ICT on globalization processes. For example, Sharma (2001) developed a "resource-based model of internationalization", based on the logic of incremental stage models (e.g., Johansen, Vahlne, 1977). In this model, internationalization is a continuing process of resource creation, accumulation, and subsequent exploitation by the firm. A disruption of this process in a firm will terminate its internationalization process. The resource-based view is increasingly being used by ICT researchers although it is not ideally suited to studying ICT (Wade, Hulland, 2004, p. 109) because they do not constitute a strategic resource themselves. Rather, institutional environment, technological complexity, and dynamic capabilities interact synergistically to impact the growth and performance of ICT-enabled firms (Singh, Kundu, 2002, p. 694).

A recent development more closely linked to ICT is the perspective focusing on the internationalization of the supply chain ("SC"). Research in the field of internationalization and particular linked to ICT has emerged from different perspectives on operations management. Studies on international marketing, production, logistics, and other operations span the whole value chain and cumulated in the strategic perspective on the whole international supply chain. Overby, Min (2001) hence claim that a more pragmatic theoretical explanation of internationalization post-internet stems from supply chain management (SCM).

The combination of the evolution of cross-border networking and the increasing use of ICT also has far-reaching implications for the study of industry dynamics as the structures of SCs are changing and even boundaries between industries are blurring (Ernst, Kim, 2002, p. 147). The Internet is enabling greater integration of businesses and a blurring of traditional organizational boundaries (Overby, Min, 2001, p. 392). The tremendous advances in ICT are leading to an entirely different type of industrial structure with mutually beneficial co-operations and networking (Roche, 2000, p. 82). In most industries, SCs become more elastic and flexible. The reconstitution and diffusion of the core activities across a number of global industries (e.g., automotive, financial services) are marked by ICT-induced dynamics. However, ICT will not eliminate the importance of distance and location, and in fact in some cases makes proximity and clustering even more important (De la Torre, Moxon, 2001, p. 630). Nonetheless, ICT can provide the strongest link in the SC of partners, products, and suppliers, and is the basis for doing business around the clock and around the world (Deans, Kane, 1992, p. 1). Using ICT can lead to a greater use of network organizations, making them easier to establish, operate, and grow.

The Internet enables improvements throughout the entire SC by easing and speeding the exchange of real-time information. It is the most powerful tool available today for enhancing operational effectiveness. In general, ICT has a pervasive influence on the SC because every activity involves the creation, processing, and communication of information (Porter, 2003, p. 389). New sets of capabilities required for managing the innovation between the old and new economies will be largely relational (Birchall et al., 2001, p. 85) with ICT constituting the nervous system of firms, which are adapting to the marketplace in a "sense and respond" fashion (Kazanis, 2004, p. 19). Nonetheless,

the impact of ICT will be highly differentiated across elements of the SC (De la Torre, Moxon, 2001, p. 629).

By far the greatest contribution ICT can make to an international business is to support a global view of business processes. However, processes may be dependent on local culture or legislation and growth through acquisition can also make it hard to integrate ICT systems. Firms acting on an international level thus have a higher demand to adopt E-business applications to protect or expand their business processes (e.g., Pohjola, 2002). Upstream activities are more global in nature. B2B e-commerce can be applied in a standardised way on a global basis and thus benefits from economies of scale, while B2C requires significant local adaptation. Instead, local firms may have inherent advantages over global firms in doing business online with costumers (Kraemer et al., 2005, p. 334).

ICT facilitates product standardization, internationally integrated production planning systems, integrated warehouse systems, and the co-ordination of geographically remote work processes (Schober, 1993, p. 215). ICT allows for the co-ordination of R&D labs dispersed across regions and time zones and thus innovation processes around the clock based on knowledge from all locations. Externally, by linking intranets to the Internet, organizations are beginning to integrate their internal operations more closely with their vendors, partners, and customers (Bollier, 1998, pp. 2-3). ICT can support vertical quasi-integration, outsourcing, and quasi-diversification (all co-operative modes) (Clemons, Row, 2001, p. 12). The value of the network even increases with network size due to increasing economies (Clemons, Row, 2001, p. 19). Due to the globalization of local markets and the emergence of the global electronic markets, also worldwide acquisitions and co-operation strategies gain importance (Bicak, 2005, p. 14).

Considering an E-business strategy, the entire SC of a business should be addressed (Sharma, Gupta, 2004, p. 3). The fully integrated SC would drastically reduce the time it would take to place orders by eliminating the need for manually entering or placing orders (Apigian et al., 2005, p. 137). ICT is permeating the SC, transforming the way value activities are performed and the nature of the linkages among them. A main area studying influences of ICT on global value chains is the literature on outsourcing. This applies to the both to the perspective of ICT as a driver of outsourcing and to the outsourcing of ICT activities themselves. From the latter perspective, managerial concepts for global ICT outsourcing incorporate structural variables (control mechanisms, contract mechanisms), compensation variables (incentive mechanisms), and process variables (communication mechanisms, conflict resolution mechanisms) (Kumar, Palvia, 1997, p. 60). Regarding the role of ICT as a driver of outsourcing, Hall (2000, p. 56) even states that "*the outsourcing trend is happening due to advances in ICT*".

ISCM may even be viewed as an "emergent" theory of internationalization, having roots in different functional perspectives, particularly in logistics, production, purchasing, and marketing. For example, similar to Overby, Min (2001), Mathews/Healy (2008, p. 182) suggest that the "theory of international supply chain management" extends the current understandings of network theory (of internationalization). The authors propose that ISC as the implementation of international networks provides a better explanation of internationalization in an Internet commerce environment. According to Mathews, Healy (2008, p. 182), the Internet has re-emphasized the importance for a resource-based network orientation through ISC relationships while the traditional stages process advocates an ultimate goal of vertical integration. The authors build on a prior article of Overby, Min (2001, p. 392) who propose a network orientation to encourage more integrated levels of E-commerce adoption, which, in turn, further strengthens the relationship between a network orientation and its implementation. From this perspective, ISCM is proposed as a process of internationalization representing the implementation of a global uncertainty driven network orientation. The authors suggest that the ISC is an alternative mode of global

distribution structure that does not correspond with traditional internationalization. Internet commerce is a potential antecedent to this new mode of internationalization (Overby, Min, 2001, p. 393). E-commerce may induce more tight integration with customers and suppliers, up and down the SC, spanning organisational boundaries (Zhu, Kraemer, 2002, p. 292).

With SC visibility, communications can be real-time, allowing SC partners to simulate operations and design new responsive collaborative processes (Salcedo Grackin, Overby Min, 2001). Visibility across the ISC through information sharing helps reduce uncertainty—a key determinant of transaction costs (Barua et al., 2004, p. 592). Enterprise resource planning (ERP) systems via extranets connect not only different functions and units within a firm but also link the firm's SC partners, enabling the partners to share information such as order status, product schedules, and sales records, to integrate major SC processes, and to plan production, logistics, and marketing promotions. Any technology utilized must co-ordinate activities across the entire SC around the world (Overby Min, 2001, p. 411). ICT plays an important role in SME internationalization—both as a channel for opportunity identification and as a powerful tool in the execution of an international strategy. In general, the degree of internationalization is positively correlated with the degree of electronic commerce (Jaw Chen, 2006, p. 168). The Internet provides several advantages for the internationalization of SMEs. The Internet makes it possible for firms to instantaneously position themselves on many foreign markets (Petersen et al., 2002). From this perspective, the location of the firm or customer becomes less relevant (Loane Bell, 2002), since by launching a website a firm may become global simply by virtue of being available to anyone using the Internet (Chrysostome Rosson, 2004; Lituchy Rail, 2000). Another unique pattern identified is the temporal density of expansion. Unlike offline businesses the Internet firms enter multiple markets around the strategic locus in a fairly short period of time, e.g., several markets at a time.

On balance, the ISCM perspective may not represent a theory in a strict sense but rather a point of crystallization for emerging studies from a more functional perspective. On the other hand, it is just this quality, which makes such approaches so valuable. Despite a unifying theoretical basis (beyond the ISC or value chain), studies adopting this perspective are still much closer to the real impact of ICT on the globalization of firms than those trying to apply normative theories of internationalization to the impact of ICT on it. For example, processual internationalization theories provide a dynamic perspective but do so without a conceptualization of an evolutionary motor or mechanism, leading to a basically predefined course of internationalization.

2.2 Global Network Development

Processes of global network development create growing interdependencies on a global scale and a growing integration of communication, activities, and structures. There are several levels on which network formation can be observed. Interorganizational networks from local to global level dominate the external network context of a firm. A cornerstone in the management of a geographically complex international network lies in a firm's specialization in ICT. The enhanced expertise in ICT seems to provide a company with greater flexibility in the management of its geographically dispersed network, and an enhanced ability to combine distant learning processes in formerly separate activities. Affiliate networks are increasingly used to source new technology. Global learning has become an important mechanism for corporate technological renewal within MNEs (Cantwell, 2002, p. 238). Common to all interorganizational network approaches are the central concepts of positioning and strategic role in a network. ICT offer the possibility to co-ordinate value chains and interorganizational networks on a global basis. MNEs such as Nike or Dell organize their value chains on the basis of ICT and succeed in outsourcing most parts of their ISC, with a focus on product development and brand management. The empirical

study will provide evidence that SMEs co-ordinate their external networks and their whole ISC by using ICT.

The globally differentiated pursuit of competitive advantages may also be facilitated by the formation of global intraorganizational networks. Global network formation emerges in the course of initial internationalization but is traditionally the subject of MNE research (e.g., Doz Prahalad, 1987; Hedlund, 1986; Bartlett Ghoshal, 1987; 1989). From this perspective, MNEs are conceptualized as global networks due to their internal differentiation and the global dispersion of organizational units and co-operations. Along with the dispersion emerge interdependencies between the MNE units. In this context, cross-unit learning and structural flexibility are crucial in the evolutionary interplay of strategy and structure. In the co-ordination of intraorganizational networks, ICT provide a very powerful basis in order to harmonize and sustain relations between organizational units that may be dispersed on a global scale. ICT allow for the exchange of information, communication, and interactive decision-making across borders. ICT brings extended connectivity with speed and expands boundaries of firms and networks (Samii, 2004, p. 15). Emphasis on connectivity is nowhere as evident as in globally operating firms (King Sethi, 1992, p. 231). There is a progressive transformation of business into relations of information exchange, leading to globalization and network building (McMahon, 2002, p. 142). Thus, a cornerstone in the management of a geographically complex international network lies in a firm's specialization in ICT.

2.3 Evolutionary Dynamics: Speed of Internationalization

The Internet is an important tool that contributes to a more rapid internationalization of SMEs (Moen et al., 2003, p. 129; Quelch, Klein, 1996). Jaw Chen (2006, p. 168) even suggest that the Internet will revolutionize the dynamics of international commerce and lead to a more rapid internationalization of SMEs. The Internet reduces the costs incurred by SMEs and provides them with considerable information that helps to significantly reduce the uncertainties of foreign markets, even though it does not eliminate risk (Ibid, p. 171). Karavdic Gregory (2005) nonetheless identified two conflicting schools of thought concerning the impact of e-commerce on the exporting process: one predicting little or no impact, based on the persistent key role of experience and commitment in internationalisation efforts, while the other is predicting a speeding up of export processes through an expansion of communication and distribution channels. The limited empirical evidence about the link between e-commerce adoption and internationalisation also shows mixed results. Some authors find a positive link (Rask, 2002; Daniel et al., 2002; Lal, 2004) while other studies do not provide a clear answer (Raymond et al., 2005; Morgan-Thomas Patons, 2007).

In terms of speed, research suggests that the internationalization process is accelerated by ICT (Mathews Healy, 2008, p. 179). Advances in location-insensitive ICT, and particularly the rapid evolution of the Internet's market space could significantly impact upon the process of internationalization (Berry Brock, 2004, p. 188). The Internet facilitates knowledge accumulation, which in turn can alter the firm's progression through the internationalization stages. According to Danford (2008, p. 390), "*The ultimate impact is accelerated internationalization*".

SMEs have limitations such as limited resources and size. A major aspect in the study of ICT in SMEs is the degree of adoption despite these constraints. Most studies suggest that SMEs are followers in the adoption of ICT due to these constraints but on the other hand, studies also suggest a "*leveling of the playing field*" in international business (Kazanis, 2004, p. 18). The truth is probably in between these two extremes. On the one hand, studies indicate that ICT simply lower costs and the time to gather information, indicating no structural changes. Such studies also indicate that SMEs have a more operational rather than strategic view on ICT, leading to a perception of a potential influence of ICT, which is still restricted in practice (due to the scarcity of resources). On the other hand, studies provide evidence that by simply having a website, unsolicited orders increase and the networking

capability provided by ICT facilitates to a large extent what is suggested by the network perspective on internationalization: increasing international activities. The extended connectivity of SMEs allows expanding boundaries of both activities and networks. As suggested by the born global or international entrepreneurship literature, founders and managers of SMEs have a strong impact on the adoption and use of ICT, Their orientation also has a strong influence on the outlook on business as some managers tend to focus on exploring and exploiting local market potential first while others have a global outlook from foundation. A further influence is theoretically introduced but not tested in the realm of culture.

3. Methodology

The study is based on case studies, including 20 small and medium-sized firms from China, India, New Zealand, and Singapore. The choice of at least four firms from each country allows for both a within-country and an across-country comparison. For example, Eisenhardt (1989), stated that number of four case studies provides a robust basis for cross-case analysis. All firms were founded after 1980 and thus it was possible to capture retrospectively the whole globalization process of each firm as either the founder or a senior manager who joined the firm at foundation were interviewed. The interviews were taped, transcribed, and analyzed with NVivo8, providing the basis for histographic (retrospective) case studies, triangulated by the use of different sources of data (e.g., publications, reports) and the use of different theoretical lenses (e.g., internationalization theories, dynamic organization theories, system/evolutionary theories). Multiple histographic case studies with a longitudinal perspective serve to explore characteristics of the four subprocesses of globalization and their facilitation by ICT. Interviews with the founders and/or top managers provide an overview on the globalization processes from (pre-) foundation to the current activity profile. The interview design was pretested and adapted with experts from practice and academia. The interviews were taped, transcribed, and analyzed on the basis of open, axial, and selective coding. The reliability of the data was increased by triangulation with other sources of information, e.g., publications or company reports. Particularly conducting interviews with founders and managers who have been experiencing the whole globalization process from the start increases the reliability.

Research objects are SMEs with international activities. All sample firms are local SMEs from the respective countries. The influence of ICT on the globalization of firms has been pervasive since the 1980s and thus firms that were founded after 1980 are included into the sample, as the whole history of their globalization shall be explored. During the late 1980s and early 1990s the development of global information and transportation networks had started the reach of even smaller players (SMEs), which makes this period valuable to study SME international growth (Paavilainen, Raukko, 2008, p. 10). The explorative character of the study is amplified by the selection of SMEs from different countries in Asia/Pacific. An analysis of articles published in the Journal of International Business Studies between 1984 and 1993 concludes that IB consists mostly of research "*conducted by scholars from the United States, Canada, and Western Europe about the United States, Canada and Western Europe*" (Thomas, 1996, p. 492). Chao et al. (2003, p. 481) hence advocate the need for a greater focus on Asia-Pacific research projects, including a (re)examination of existing and new concepts and theories to validate them within Asia/Pacific contexts. This study follows the advice and is based on research of two large and two small economies in that region. Empirical findings uncover close links between ICT and indicators of development including income per capita (Roy, 2005, p. 118; Kenny et al., 2000). The "Index of Technological Progress" used by the World Bank (2008, p. 19) embodies five components: personal computers, Internet hosts,

fax machines, mobile phones, and televisions. More specifically, Aubert Reiffers (2003, p. 11) suggest that a dynamic information infrastructure can be operationalized with 3 variables: telephone lines, computers, and Internet access, all per thousand inhabitants of a population.

The selection of the countries in this study is based on an index with the three criteria: "size" (population, gross national product), "international embeddedness" (export volume, FDI) and "ICT intensity" (users of Internet and telephone). For the "large" countries, the selection is based simply on the size of the population because economies of scale and scope have a decisive influence on the globalization of firms from these countries (among other factors). In small countries, the influence on the globalization of firms is more dependent on the intensity in the use of ICT and particularly the embeddedness in global trade and communication networks. Network effects and the degree of the international embeddedness are central.

Table 1 Profiles of Sample Firms

	Industry	Foundation	Staff	Foreign staff	Sales in $US million	Foreign sales in percent	Export markets	Countries FDI
China								
China A	Electronic	2001	35	0	$ 1.1	0	0	0
China F	Packaging	1993	200	0	$ 11.7	75%	8	0
China J	Fashion	2000	450	0	$ 45.6	100%	8	0
China S	ICT	2005	500	0	$ 5.8	5%	0	0
China N	Software	1993	2000	0	$ 17.5	5%	2	0
China P	Trade	1999	1000	0	$ 1000	5%	2	0
China W	Fashion	1994	60	7%	$ 32	100%	9	0
India								
India B	Entertainment	1999	400	0	$ 3	7%	3	0
India G	Pharma	2001	150	0	$ 12	100%	21	0
India N	Gifts	1996	52	0	$ 20	100%	8	0
India Z	Freight	1986	150	0	$ 8	80%	50	0
NZ								
NZ R	Construction	1984	205	17%	NZ$ 200	54%	3	1
NZ D	DIY, Paints	1986	110	0	NZ$ 50	20%	8	0
NZ E	ICT	2001	97	35%	NZ$ 17	98%	25	4
NZ A	Fashion	1992	150	0%	NZ$ 10	20%	2	1
NZ S	Services	1981	75	60%	NZ$ 22	50%	4	4
Singapore								
SG P	Power supply	1997	40	62,5%	S$ 7.9	95%	22	4
SG A	Car parts	1983	40	60%	S$ 5	60%	10	1
SG S	Pharma, food	2000	94	30%	S$ 100	30%	3	3
SG U	Lubricants	1999	117	66%	S$ 80	50%	30	4

By definition, countries with less than 10 million inhabitants are "small" (Dedrick et al., 1995, p. 21). Selection of the small countries from this pool is based on an index with the indicators "international embeddedness" and "ICT intensity" on a per capita basis. The resulting sample of countries thus includes India and China as large emerging countries while Singapore and New Zealand enter as small developed countries with a high degree of globalization and ICT use in the Asia-Pacific region. The choice of India and China as large countries has the additional appeal that they are the two "BRIC" economies with the highest growth rates and hence the highest rates of change within which the globalization of firms takes place. On the other hand, New Zealand and Singapore are both developed economies with a high entrepreneurial spirit, which facilitates the

observation of globalization processes from foundation.

On balance, the case studies provide a complex and in-depth picture of the globalization processes of the firms in the Asia-Pacific sample. The generated data are coded and serve to explain the influence of ICT on the globalization process of SMEs.

4. Empirical Results

All sample firms operate their supply chain on the basis of ICT. Depending on size, strategy, business model, industry, and mindset of the managers, firms use ICT either rather isolated in individual functional areas, integrating those units through e-mail based or personal communication or integrate the whole supply chain through ERP and CRM.

Table 2 Key Results of the (Internal) System Perspective

System	Influence of ICT	Influence on ICT	Quotations
ISC	Automatic ordering, replenishment E-payment Outsourcing E-business/commerce	Implementation of ERP, CIM, MIS, interorganizational systems	"*I think this is the basic requirement of any operation these days. I don't think any organization can work without the basic Internet services.*" (India A)
Central services	Back office functions Intranet, training, learning	Development and implementation of ICT	"*…we will handle the back office administration and infra-structure*." (NZ S)
Organization	Organizational links become "*very strong"* Changes in processes Flattening hierarchies Empowerment	Development and integration of ISs "ICT follows organizational structure"	*"… it has changed dramatically our workflow processes and requirements … the knowledge basis. Prior competitors that didn't embrace technology … are no longer with us.(NZ D*)
Strategy	MIS New business models Flexibility	"ICT must fit strategy"	"*It helps us make decisions … it's absolutely in terms of how we plan the business*." (NZ E)
Communication	MIS, ERP, CRM, Inter-/Intranet Collaborative tools B2C, B2B, Portals	Development, refinement, customizing, and out-sourcing of ICT	*"If there is no electricity in the company they will shut down for the day*." (China P)
Structure Strategy ICT	ICT follows strategy and organization structure versus mutual influence	ICT follows strategy and organization structure versus mutual influence	"*If your business strategy is to expand globally but you don't have an ICT infrastructure to support that thing you can have a problem*." (NZ E)

4.1 Best Practices in ICT Management

On balance, the intensity of ICT usage among the sample firms is very different and ranges from assessing a website as being very important to find customers and suppliers at SG A to the complete integration of the value chain through ERP at firms such as China P or India N. Many firms are to a large extent dependent on ICT and thus the failure of ICT is seen as a major risk. The reliability and trustfulness of information and actors in the Internet are seen as further obstacles. The problem of sending rich and contextual information is a source of limited exchange of such information. Due to these potential risks, the selection of reliable and substantive information is a key practice at the sample firms. All sample firms choose an active but cautious approach to the use of ICT rather than "jumping" onto any new available technology. One reason frequently mentioned by the sample firms is the limited resource base of SMEs but also a learning process that resulted in the preference for reliable and sustainable solutions. Table 3 summarizes the key findings of the ICT perspective.

Table 3 Key Results of the ICT Perspective

ICT	ICT issues	Quotations
Function	- Information processing - Communication - Transaction - Integrating activities	"*Basically 100% of our business is using ICT*." (NZ S) NZ D "*have had a lot of teleconferencing and video links … to talk to people that are using our computer system throughout the world*."
Internet	- Changes industry and market structures - Creates dynamics - Integration of ISC - New business models (B2B, B2C)	"*… we wouldn't be able to do the business like we are doing today. I don't think there's a day we could live without the Internet. We are married to the computer*." (India B) "*I would say it is the bloodline of any business. If my Internet stops working for half an hour, I am in a mess. Yes*." (India G)
Institutionalization of ICT	- Inhouse - Outsourcing - "Off-the-shelf" - Customising	*I am a big advocate of that but that does require that you hire people that have ability to learn and grow and evolve with it and that is ostensibly that younger generation, unfortunately*." (NZ A) "*Basically, we are self-taught*." (SG U)
Risks	- Outage/failure - Reliability of information - "Overload" - Few rich information - 'Noise', missing contextual information - Distraction	"*It becomes hard to authenticate all this information around, to verify all this information and how to put it. The reliability of all this information becomes an issue ... Sometimes some people who go out to cheat will get more returns than us who are honestly out to get business.*" (S S) *People behave very differently in a face-to-face environment than ... with e-mail*." (NZ E)
Best practices	- Co-ordination by ERP, CRM, MIS - Cautious adoption - Fast, relevant, and reliable data - Credibility - Reliability - Transparency	"*As an exporter I use ICT best sitting on a chair, sitting on a laptop... it saves a lot of time ... This is the best practice and reliable ... in terms that the data depends again through what organization you are getting the data*." (India N) "*Most people try to change the system bit by bit and in the end it's a nightmare. We try to leave the animal as it is.*" (NZ D)

4.2 Internationalization

The interviews suggest that in addition to the contribution to large ratio of global foundations in the sample, ICT increases the potential for internationalization of the sample firms also at later stages. Even passive globalizers (defined as firms with less than 50% of sales abroad) get increasingly unsolicited orders and requests from interested sales agents or distributors due to the global visibility through the Internet. The options for firms that pursue an active strategy of internationalization are even better. ICT allows firms the entry into foreign markets through exports. This would be impossible for some firms without ICT. On the other hand, ICT reduces the necessity to choose more intensive forms of market entry such as setting up affiliates. Depending on the industry, market entry may also be influenced by the ICT infrastructure of a country. For example, one of the biggest challenges that India B faced in the Middle East was Internet connectivity in banking systems—an obstacle for all firms using e-commerce. The most dominant entry mode among the sample firms is exporting. Particularly, none of the firms from the emergent markets China and India has more intensive forms of serving other markets though some intend to do so in the future. Hence, the influence of ICT on the choice of entry modes is not particularly high as this choice has not occurred to most firms, yet. On the other hand, some firms generate all revenues abroad and this would be almost impossible without ICT. ICT seems to "virtually" exempt most sample firms from the necessity to choose more intensive forms of market entry as the global market is accessible through ICT and exporting. For example, India B realizes that it would either have to set up an affiliate in the Middle East or other markets if there was no Internet. On balance, ICT seems to relieve the sample firms from the necessity to enter foreign markets with more intensive entry modes in downstream activities. Firms with resource-seeking motives or efficiency-seeking motives build up subsidiaries at least for upstream activities.

Table 4 Key Findings of the Internationalization Perspective

Internationalization	Influence of ICT on internationalization	Influence of internationalization on ICT	Quotations
Entry mode	- Visibility/Internet - Longer export stage - Infrastructure - Information	Kind of ICT used is depending on entry mode (B2C, B2B)	Market entries are in between "*lucky accidents*" (NZ A) and *"solid online researches first"* (India N).
Timing	- Speed - Active globalizers	Choice of ICT available	"*This one really lets you think about the timing.*" (SG P)
Initial internationalization	- Mindset of founder - Lead from other players	Business model calls for fit of ICT	"*It is all about opportunity.*" (NZ A)
Actors	- Government - Partners in ISC - Family	- Access to ICT - Adoption of systems	"We *had a lead from an existing client who took us to Australia*". (NZ R)
Events	- Customer projects - Excess capacity - Risk hedging - Trade fairs - Conferences	Introduction of new ISs or ICT	*"... be ready when the possibility comes take it.*" (India Z) *"…take a flight and go there … You can't over night do business." (India B)*
Information	- Internet, RSS, Alert - Trade organizations - Personal networks - Government	Adoption and development of new ICT	"*Most of the information about the world is coming out of the Net ... the world is just in front of you.*" (SG U)
Learning	- Internet - Individual leaning - Organizational learning - KM - E-training - 'Genes'	Adoption and development of more effective and efficient ICT due to global access and benchmarking	"*Everything is through the Internet*" (China W) India B built an Intranet and post "*a lot of data there where anybody can have an idea of fresh, new processes and all share that with each other*".
Best practices	- Differentiation - Risk hedging - Independence - Staff, culture - Customer-driven - Website - Transparency, dignity, reliability	- Choice and adaptation of suitable ICT - Cautious approach - Not "jumping" on new ICT for its own sake	"C*ommunication is everything*" (NZ A) *"... being transparent (and) the experience that kept us going. … We also use dignity."* (India Z) *"To me it is that we are absolutely customer-driven.*" (NZ D)

On balance, ICT facilitates individual learning significantly through web-based media. All sample firms foster organizational learning on a scale from sending e-mails to all or groups of staff to sophisticated intranet solutions including databases, newsletter, knowledge repositories, and web-based learning or training facilities. The extent to which these instruments are used depends again very much on the mindset and knowledge of key decision-makers but also particularly on the kind of business and the size of the firm. Hence, ICT and particularly the Internet facilitate significantly both the individual and the organizational learning process. Nonetheless, this is dependent on the individual mindset of managers and, in the words of one respondent, on "*the genes*" of the firm. ICT has a strong impact on the internationalization of most sample firms. A major factor is that ICT facilitates the development of international activities very early. Particularly the Internet allows for internationalization from the start as the astonishing number of eight "instant" globals (firms founded for international business) in the sample illustrates. The Internet allows for business with foreign markets through exports without the need to set up affiliates abroad to serve these markets. The Internet allows for an earlier build-up of international activities and for a prolongation of the export phase for most sample firms with foreign markets. Among the sample firms, only service firms have own staff and assets in foreign markets for downstream activities while manufacturing firms have upstream activities due to resource-seeking and efficiency-seeking motives.

In addition to more general best practices such as customer orientation, differentiation, or transparency, the sample firms have a clear view of best practices in the internationalization process. Particularly international experiences as well as understanding foreign customers and markets are seen as the most important contributors to international success. All active globalizers in the sample have the same view in the regard. ICT is seen as an important facilitator in building up international knowledge and experience.

4.3 Global Evolutionary Dynamics

Despite different core dimensions that the sample firms use to position themselves in their environment, the rate of change itself is an outstanding dimension for most of the firms.

Table 5 Key Findings of the Evolutionary Perspective

Evolution	Influence of ICT	Influence on ICT	Quotations
Trajectories	- Active vs. passive - National context - Morphing - Timing of entry - Increasing dynamics	Evolution of ISs	*"ICT is a very necessary part to the development of the company and its influence is very strong … It is the most important way." (China A)*
Decision-making	- Information gathering - Reduce complexity - Transparency - Consistency - Speed and quality - Empowerment	Choice of ICT	*"What ICT can do is influence the speed … but when you sit on advanced information and you don't make the decision it's a problem." (India B)* *"Decisions … are made by people." (NZ D)*
Life cycles	- Incremental vs. discontinuous - Accelerating speed - Geographical differentiation - International extension of life cycles - Strongest influence on practices - Cultural influence	Change in ICT and ISs	*"ICT in different countries, different geographics, influences the things differently—different dynamics." (SG S)* *"I think ICT will have a bigger and bigger influence on the practices." (NZ E)* *"Our organizational structure is also learning. It also has a life cycle." (India S)*
Darwinian	- More variations - More ideas - More diffusion - More need to select and to retain	More variety in ICT	*"Things are changing fast … ICT is definitely one way to be in touch … ICT facilitates evolutionary processes of variation: If ICT wasn't there it wouldn't happen." (India S)*
Dialectics	- Dynamic power play - Change of power relations - More efficiency in relations	Power relations impact choice and design of ICT	*"If I am weakly connected I lose." (India G)* *"Yes, it is very significant. It will change some power equations in the industry." (NZ R)*
Sense making	Changing priorities in perception and decision-making:	Mindset and experiences impact the use of ICT and the globalization	*"positive, it accelerates. It is very strong and even increasingly so … This medium is very strong for us to survive—through this we are constantly improving." (India Z)*

Table 5 provides an overview of the evolutionary perspective of globalization. Depending on variables such as the mindset and experiences of the founder and key decision-makers or the context of the home country there are markedly different trajectories in globalization. This also includes the ICT infrastructure. ICT helps to reduce complexity in decision-making through efficient information-gathering and processing as well as by facilitating empowerment in flatter hierarchies. Life cycles are basically shortened, particularly the life cycle of practices and in more complex firms also that of organizational units. Darwinian (incremental) processes of variation and selective retention (VSR) are accelerated due to the availability and diffusion of more variations, information, and ideas through the Internet and other global media. Dialectical processes in power relations are also changing. Depending on the industry such changes vary from just meeting each other on a more complex and dynamic relational level to a complete change in the industry structure. Sense making takes place in terms of changes in

perceptions and priorities in decision-making due to changes in the competitive environment and due to availability of information through the Internet. Change itself and "connectedness" have become a priority in the perception of decision-makers and in organizational behaviour in addition to traditional economic and strategic measures.

4.4 ICT in the Management of Global Evolutionary Processes

The results suggest that ICT and particularly the Internet increase the "resonance capacity" (Luhmann, 1995) of a social system to adapt to changes in the environment. A main indicator for this capability is the speed with which the firm reacts to changes.

ICT provides the potential to better cope with complexity and dynamics per se but most sample firms also actively look for ways how to increase their adaptability and to increase their capability for change.

On balance, ISC co-ordination depends heavily on ICT. Dominant players in ISCs often prescribe the ICT to be used in interorganizational links. ISCs are increasingly designed globally either internally or externally. ICT allows for the establishment of ISC provides their informational backbone

Table 6 Key Findings of Best Practices in ICT Management in the Globalization Process

Capabilities	Influence of ICT	Influence on ICT	Quotations
Adaptability	- 'Resonance capacity' - Speed - Outsourcing - Flexibility	Evolution of ISs and ICT	"*Everything is driving the change because with ICT it is so easy and fast to get everything done.*" (India B) For SG U, ICT "*is one of the biggest ways to react to changes in the market*."
Innovation	- Information - Collaboration - Ideas - Project management	Development and customization of ICT	*"ICTs facilitate India B's global innovation processes totally!"* *"It would be more difficult for us to develop products in more than one place*." (NZ E)
Knowledge management	- Intranet - Repositories - Newsletters - E-learning - Training	Building up and diffusing knowledge through ICT available	"*If you are a company, which is open to ideas and is willing to listen to people, and create an atmosphere, which can be spread across the company, then people use ICT to the right way and you can create this entire infrastructure using ICT.*" (India B)

4.5 Discussion: International Supply Chain Management as an Emergent Perspective in the Internationalization of Firms

All sample firms operate their SC both internally and externally on the basis of ICT, supporting not only the ISC but also the resource and network perspective when studying the link between ICT and the globalization of firms. This direct link, however, should not lead to underestimating the value of incremental and born global or international entrepreneurship models, which complement each other in sketching the internationalization process of firms. The international supply chain perspective provides a valuable view on a more operational level. Global sourcing, foreign market entries, offshoring and international outsourcing directly affect the global profile and the globalization process of supply chains and of firms.

5. Conclusions

The international supply chain perspective addresses a gap in the area of internationalization theories. It is based on the very fundament of international business and emerged from different functional perspectives. The empirical study stresses the practical value of this perspective and the importance of ICT as a driver of globalization processes both on macro-level and of individual firms. However, the paper has also demonstrated, that an emergent perspective does not represent a refined theory and that gaps have to be filled in an approach that

"emerged" rather than being developed with a clear focus.

In addition to the discussion of the contribution of the ISCM perspective to the research of globalization processes, the core of the study provides evidence of the contribution of ICT to the globalization of firms. The results suggest that the formation of born globals is enhanced, that internationalization is facilitated, network building and co-ordination are pronounced, and particularly globalization dynamics are calling for a central role that has to be addressed.

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