The role of technological partnerships in the telecommunications sector

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Abstract

The purpose of the present paper is to verify whether there is any room in theory for the development of local innovation capability in the telecommunications industry inside transition economies. The main argument is brought up around the hypothesis that the telecommunications sector represents a promising environment for the development of local clusters between firms whose main objective is the introduction of innovations on the market, in which Brazilian software entrepreneurs can develop a significant role. The paper starts with a brief historic overview of the changes in the sector at a global level – where software gains more and more importance due to the growing convergence of technologies and services – and at the local level as well – presenting the main characteristics of the evolution of this sector in Brazil. Next comes a summary of the main points in the literature regarding the external linkages as part of the innovation management policy of a given firm, more specifically those related to alliances for technological collaboration between firms. Finally, from a joint discussion regarding transaction costs, internal aspects of the firm and the environment in which it is inserted, this paper suggests that this new system can bring advantages for the creation of partnerships between large transnational companies and local software developers.

Although there could be beneficial spillovers from these partnerships, the relationships between the agents involved in the system of innovation around the telecommunications sector are difficult to establish, which implies that there is no straightforward approach for the policy makers in any given country. The conclusion is that potential spillovers may exist, but further research is needed in order to draw a more complete picture of the Brazilian specific situation.

Keywords: Technological Partnerships, Developing Countries, Telecommunications.
JEL code: O30
1. INTRODUCTION

1.1. A brief retrospective

Many studies sought to demonstrate the drastic changes suffered by the communications industry after the liberalization process that took place in the last decades, initially in the triad Japan-Europe-USA and afterwards in many parts of the world (i.e. Engelstad, 2000; Fransman, 2002a; Frontini, Laurindo & Plonski, 2004). Some of these studies focused on the fact that many countries are able to actively participate in innovative activities, receiving strong investment in R&D labs inside big multinational firms, while others only receive the marketable result of these innovations developed in other parts of the world (Mani, 2004a; Mani, 2004b; UNCTAD, 2005). Other studies from Fransman (2002a; 2002b) brought details on the shift in R&D activities, from the telecommunications service providers towards the equipment manufacturers. In an industry more and more globalized and dominated by a few actors enjoying market dominance, many developing countries are participating in this new value chain in different ways.

In the telecommunications industry until the mid 80's, developing countries found themselves dependent of foreign suppliers from the triad, which were already privileged by their monopolistic service provider partners from developed countries. According to Fransman, the 1990's faced the dawn of the new Infocommunications industry, associated to new technological and learning regimes. The old telecoms industry was marked by: closed innovation system; high entry barriers; few innovators; fragmented knowledge base; medium-powered incentives; and slow, sequential incentives. In contrast, this new Infocommunications industry features: open innovation system; low entry barriers; many innovators; common knowledge base; high-powered incentives; and rapid, concurrent, innovation (new forms of innovation, like concurrent cooperative innovation by remote innovators) (Fransman, 2002b, p. 69).

It is worth to point out the growing importance that software begins to exercise in this new market configuration, in which the knowledge base is now common and the relative low cost to produce many applications leads to the surge of a great amount of software innovators in the Infocommunications industry. This point will be approached later.

1.2. Telecommunications in Brazil: recent history

Let us now describe the evolution of the system of innovation in the telecommunications sector in Brazil, which – after privatization and the generation of an oligopolistic market of service providers, mostly owned by foreign capital – features characteristics until a certain point very similar to the international picture described earlier.

According to Szapiro & Cassiolato (2003), until the mid 1980's technological cooperation in the telecommunications sector was developed by local institutions. Government policies stimulated local creation of value with growing share of local production vis-a-vis equipment imports, along with the development of indigenous technology in cooperation with institutions like CPqD and local universities. In Szapiro & Cassiolato's vision, CPqD was at the center of the system of innovation in the sector, also recalling works from Hobday (1984; 1990) to show that there were interactions between multinational subsidiaries and local institutions, like CPqD. The role of this
institute is seen by the authors as crucial to the evolution of the sector, since the technology developed in Brazil suited Brazilian characteristics and was cheaper than the foreign. For example, CPqD developed for Telebras – former Brazilian state-owned telecommunications holding company – a new technology for digital telephony switches called Tropico. This allowed the final cost per terminal to fall from around US$ 1000 to the level of US$ 200–300 (Loural et al., 2006).

Loural et al. consider the technological development model successful as long as the protectionist economic policy persisted. “When economic and political circumstances could not anymore sustain an import substitution approach, in the 1990-decade, the model fell apart and has not been replaced by any other sectoral policy” (ib., p. 1). Szapiro & Cassiolato (2003) describe two factors as the major drivers in the recent institutional evolution and the regulation model of the sector: (i) commercial liberalization and (ii) institutional and regulatory changes. Liberalization, along with constant economic crisis and an apparent lack of industrial policy, led to a technological downgrade process in the telecommunications sector, marked by a constant pursue for cost reductions through organizational changes inside the firms and, consequently, a reduction of local R&D spending. At the same time institutional and regulatory changes in the late 1990's restructured the system of innovation, with the privatization process of the Telebras system and deregulamentation of the telecommunications sector. Multinational manufacturers gained even more dominance of the sector, importing the great majority of production inputs. As imports raised and exports were limited to only a few products assembled locally, and since the R&D activities in these firms were located in their home countries, the sector as a whole depended solely on foreign technology. Only few mid-sized technology firms remained, focused in parts and components with low technological specialization or concentrated in niche markets, like CPqD, Tropico SA, Daruma, Asga and Parks (Oliva apud Szapiro & Cassiolato, 2003). But at the same time, Brazil watched the rise of local software development firms. This could be fruitful to the country in a moment where telecommunications sector specialists bet on the rise of software purchases from service providers due to the adoption of new systems – like billing, related to new tariff rules and other factors (McMahen and Bassili, 2005) – to the next generation networks implementations – which are software intensive – and the advance of convergent solutions, like IPTV and triple play (Momento Editorial, 2006).

In summary, Brazil presents a picture in which privatized Telebras and current service providers make use of technology partners, in great part multinationals manufacturers with global contracts, to introduce innovations on the market. Before privatization, incumbent service providers delegated R&D tasks to CPqD, but this research institute changed its role drastically after the privatization, relegating itself to investments in short-term innovations related to immediate market demands and not anymore to long-term basic and applied research. Service providers' roles are almost exclusively related to downstream activities, with little or no technological involvement in the development of marketable solutions: their suppliers are the full responsible for the creation of complete innovative solutions. At this point, partnerships between service providers and their solution suppliers plays a fundamental role in the innovation capability of the whole telecommunications sector. These suppliers are also incapable to gather internally all the assets that are needed to offer the solutions to the service providers, for which they use partnerships of all kinds and configurations, mostly idiosyncratic. The next section will approach the growing trend for technological
partnerships between firms.

2. TECHNOLOGICAL PARTNERSHIPS

The goal of this brief discussion is to set the theoretical basis regarding the importance of the firm – like the service provider or the big equipment suppliers – to develop capabilities in activities related to technological innovations, internally or through partnerships with other firms which possess complementary assets, in a way that competition as a whole takes place between value systems instead of isolated firms. This section deals exactly with technological partnerships between firms in general, so that the next section is able to handle the specific case of the telecommunications sector, going through the possible benefits generated by collaboration between multinationals and local firms.

This discussion does not focus on generic partnerships, but on one which involves a strategic-flavored alliance between firms, or in other words, with a clear goal to be reached. There are many ways to define a strategic partnership or alliance and many attempts to classify them were made, but it is not the goal here to discuss these issues. More details can be obtained in works from Bellon & Niosi (1997), Teece (apud Vonortas & Safioleas, 1997), Tidd, Bessant & Pavitt (2001), UNCTAD (2002) and Hagedoorn (apud UNCTAD, 2002)

The literature regarding alliances between firms is vast and offers different ways to approach the subject. Here I will assume specifically some institutionalist theories, which, although conflicting in certain aspects, present many complementary points that help understand the role of partnerships in any sector of economic activity. In order to do that, the main points from Bellon & Niosi (1997) around the theme of complementarities between transaction cost economics (TCE), resource based view (RB) and evolutionary vision of the firm (ET) are presented here. This theme was also approached by Dosi, Teece & Winter (1992), but Bellon & Niosi do it specifically to deal with partnerships between firms. The three institutionalist approaches accept competition as the natural environment for the firm's activities and economic disequilibrium as the rule, not the exception. Moreover, they share many other basic postulates like: (i) alliances are cooperation contracts, thus different from informal short-term cooperation; (ii) assets specificity of the firm; (iii) uncertainty and myopic behavior of the agents; (iv) their bounded rationality; (v) the imperfect mobility and sustainability of the resources and (vi) path dependence. Table 1 presents the similarities and differences between these approaches.

Each theory on its own is not sufficient to understand alliances between firms completely, but offers a vast field for cooperation between them. Alliances, as evolving structures, can not limit themselves to the vision of being only reducers of transaction costs inserted in a transitory process between market and hierarchy, but as something that can also be permanent, inside an evolving process. “Strategic alliance is not only a transition, but more a program for enhancing and broadening the firm's capability, and this may require a complex network of intercorporate links” (Bellon & Niosi, 1997, p. 7). The resource based view from authors like Barney, Hamel and Prahalad states that firms compete based on strategic assets. “It becomes clear that alliances are more than the result of imperfections between markets and hierarchies; they are related to the potential of the firms' resources to generate sustainable competitive advantage through specific assets that are valuable and rare, but also imperfectly imitated and not
irreplaceable (Barney apud Bellon & Niosi, 1997, p. 8). Nevertheless, this vision requires concepts from other theories to explain why the need for cooperation between firms has to be longstanding. This is because technology itself can be copied, “but not the social process involving social relations, culture and tradition” (Bellon & Niosi, 1997, p. 8).

Table 1: Three divergent analysis of the firm and cooperation between firms

<table>
<thead>
<tr>
<th>Variable</th>
<th>TCT</th>
<th>RB</th>
<th>ET</th>
</tr>
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<tbody>
<tr>
<td>Microfoundation</td>
<td>Opportunism</td>
<td>Opportunism / myopia</td>
<td>Myopia / constrained opportunism</td>
</tr>
<tr>
<td>Starting point of analysis</td>
<td>Costs</td>
<td>Resources</td>
<td>Organizations, institutions</td>
</tr>
<tr>
<td>Essence of the firm</td>
<td>Bundle of imperfectly specified contracts</td>
<td>Bundle of assets / resources / competencies</td>
<td>Bundle of organizational routines</td>
</tr>
<tr>
<td>Main role of market competition</td>
<td>Increasing firm efficiency</td>
<td>Struggle for strategic assets</td>
<td>Selection of winners</td>
</tr>
<tr>
<td>Role of management</td>
<td>Write and enforce adequate contracts</td>
<td>Build competencies</td>
<td>Select efficient routines and strategies</td>
</tr>
<tr>
<td>Nature of alliances</td>
<td>Hybrid form between markets and hierarchies</td>
<td>Research of complementary assets</td>
<td>New organizational routine related to environmental change</td>
</tr>
<tr>
<td>Goal of alliances as interfirm contracts</td>
<td>Reduce opportunism</td>
<td>Reduce opportunism / myopia</td>
<td>Reduce myopia, uncertainty</td>
</tr>
<tr>
<td>Firm dynamics</td>
<td>Marginal</td>
<td>Central</td>
<td>Central</td>
</tr>
</tbody>
</table>

Source: Bellon & Niosi (1997, p. 10)

Since all these approaches regard alliances as something that depends on a contractual relation between parts and understand that assets complementarities among partners is the main point in the collaboration between them, it is possible to draw certain aspects from each one of those theories to better understand partnerships between firms. The next section will use aspects from these different approaches to explain how the growing importance of the role played by software inside telecommunications could be an opportunity for knowledge accumulation by Brazilian firms partnering with multinationals.

3. SOFTWARE IN TELECOMMUNICATIONS

3.1. Growing role of partnerships

Partnerships have been growing through time and the telecommunications sector presents one of the greatest numbers of international partnerships. This growth in business relations between firms reflects a greater global interdependency among firms and countries, motivated by four big changes in the international economic environment: (i) globalization with transnational companies; (ii) acceleration in the pace of technological change; (iii) notion of core competency to determine what should be done in-house and what can be outsourced through partnerships; and (iv) economic liberalization and privatization. Technological partnerships are used both for cost
reduction – in those capital and R&D intensive sectors, like telecommunications hardware – and other strategic motivations – whose considerations are more significant in sectors that deals with new high-tech products and great economic risk. Those partnerships that involve equity from collaborating firms, like traditional joint-ventures, have lost space to the new, more contractual forms like joint R&D pacts and mutual development agreements (UNCTAD, 2002). In summary, partnerships can be employed not only to reduce technological development and market entry costs, but also to reduce development risk and market entry risks, to achieve economies of scale in production and to reduce the time frame needed for the development and commercialization of new products (Tidd, Bessant & Pavitt, 2001).

Outsourcing is also a trend in Brazil. For example, the annual business volume in the services sector for the wireline and wireless service providers is around R$ 3.8 billion – approximately US$ 1.3 billion. Brazilian wireline service providers outsource their networks to companies like Siemens and Alcatel – German and French multinationals – traditional manufacturers of the gear used by these service providers (Momento Editorial, 2005). Thus, more and more these service providers are focusing in market-related activities and less in technology itself.

Information and communication technology firms present the largest amount of alliances between industrialized countries and usually they are large multinational firms in the areas of telecommunications, computers, electronic components and consumer electronics. On partnerships involving firms from developing countries, studies show that a great deal of them regards the creation and exchange of technological knowledge, with telecommunications and computers sectors outnumbering alliances in any other field. There are cases of firms from developing countries being able to extract significant benefits from alliances, “not only in terms of accessing superior technology but in terms of acquiring the capacity to create such technologies on their own” (Vonortas & Safioleas, 1997, p. 658). It has been a while that there seems to exist a strong relationship between alliances in telecommunications in developing countries and foreign direct investment. Vonortas and Safioleas conclude that the great share of alliances with developing country firms is motivated by explicit technological content. In summary, the number of technological partnerships involving developed countries has grown in the last decades and is dominated by big transnational companies from the triad (UNCTAD, 2002), specially those from areas such as information and communication technologies, along with a growing participation of developing countries. This suggests that emerging economies are exploring opportunities in the sector.

3.2. Software as an opportunity

As stated earlier in this paper, the telecommunications sector is going through a transformation of its own. The new technological paradigm in IP networks that tend to crystallize through the merge of telecommunications and computers – together with the need for interoperability between services and with the proliferation of multiple content providers and various applications – seems to grow the importance of the software role in this new market configuration. A recent report from UNCTAD (2005) highlights the trend in the R&D effort in the telecommunications sector to migrate to software related activities. For example, in the last 40 years, Swedish Ericsson has migrated its telecommunications gear R&D efforts from hardware to software. Today, the company
spends 85% of its R&D budget in software development (Goldstein & Hira *apud* UNCTAD, 2005). One of its development units is located in Brazil and is responsible for the software embedded in telephony switches implemented all around the world.

To understand whether there is room to strengthen the Brazilian software industry, we can use many points from the multiple approach discussed in the previous section. Tidd, Bessant & Pavitt (2001) explained that there are two complementary factors in the decision making process regarding internal development or outsourcing of any given technology. One of them is related to transaction costs, which influence how technologies not developed internally should be acquired (*ib.*, p. 200). Nevertheless, they say it cannot be considered alone, since it would limit future technological options and reduce long term competitiveness (*ib.*, p. 199). It is then necessary to take into account the strategic implications related to the technological partnership object, such as competitive advantage, market expansion and extension of product portfolio. These implications are the second factor involved in the decision making process and they suggest which technologies should be developed internally (*ib.*, p. 200), since “they better explain the relationship between the management and organization of an alliance and the subsequent outcomes” (*ib.*, p. 237). The authors seek a new resource-based view which emphasizes the learning developed through collaboration (*ib.*, p. 200). This implies the merge between structuralist and behaviorist approaches, because they conclude that no single form of collaboration is optimum in any generic sense, where “in practice technological and market characteristics will constrain options, and company culture and strategic considerations will determine what is possible and what is desirable” (*ib.*, p. 202). The possibility of a union between the two approaches had already been stated by Dosi (1984) and taken further by Malerba & Orsenigo (1996), who tried to relate technological regimes – characterized in terms of conditions of opportunity, appropriability and cumulativity – with the firm’s strategies. According to Tidd, Bessant & Pavitt, alliances could then be a tool for firms in their task to explore conditions of opportunity in a given industry, with the purpose of gathering new market and technological competencies, thus internalizing the knowledge from their partners. If one looks to the new technological and learning regimes that are being shaped in telecommunications, one will see some sectors in this industry that seem to open an opportunity for many new agents to act. More specifically in software, in which Brazil already developed a reasonable competency in information technology\(^2\), there is room for a domestic industry to appropriate knowledge in symbiosis with multinational equipment manufacturers that furnish solutions for local service providers. Since the latter are more and more focused in activities strongly tied to the market and less in technology, as was stated before, it is up to the specialist suppliers to provide the solutions they demand. According to UNCTAD (2005), the main determinant of R&D internationalization by multinational firms is the need to adapt products and processes to market conditions in the host country. Since the Brazilian market has its own characteristics, these multinational firms could use local partners to complement their assets, or decide to perform these adaptations internally in the headquarters.

To better understand whether there are advantages for multinational firms to structure collaboration deals with domestic firms it is necessary to take into consideration the main determinants in decision making between R&D outsourcing and

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\(^2\) A good reference is a study conducted by MIT and Softex Society (Softex, 2002), which is part of a broader study called “Slicing the Knowledge-based Economy in Brazil, China and India - A Tale of 3 Software Industries”. For a specific example, please refer to Bercovich & Swanke (2003).
insourcing (ib., p. 171): (i) the tacit nature of the knowledge and the extension of the necessary coordination; (ii) the need for specialized skills and equipment; (iii) the growing multidisciplinary and multitechnological nature of innovation; (iv) the degree of outsourcing in manufacturing process; (v) the significance of R&D for the firm's main advantages; (vi) the need for expensive test and engineering routines; (vii) the need for cost reduction; and (viii) the need for fast innovation. The establishment of partnerships with domestic firms clearly influence the decision for outsourcing in many of these points.

In the first three points, the growing role of software – as a key element in those new technologies that are based on the new technological paradigm of IP networks, on the need for interoperability among services, on the proliferation of multiple content and application providers, and on many applications – implies a huge effort in case the multinational firm chooses to develop internally all the elements of the solution. And even if it decided to outsource some R&D activities, it would also have to deal with the great coordination effort with the partners, in case these are not adapted to the local market needs to which the new services and contents are targeted. The merge between telecommunications and computer industries by itself would assure the multidisciplinary and multitechnological aspect of innovation, however this is aggravated even more when we take into account the trend on which these industries are penetrating also other sectors of the economy through its services, either in entertainment or vertical markets – like financial, health-care, education, among others – each with its own specificities in technological terms for the compliance of unique needs. It is not possible for the big multinational solution providers to abdicate the need for involvement with local partners, which in turn understand better the local specificities of the country or region where they are located.

In relation to the next four points, analysts in telecommunications and information technology sectors (Engardio & Einhorn, 2005) comment on the growing wave of outsourcing surfed by manufacturers in these sectors. This wave is considered the second outsourcing trend – the first being the one that led to the outsourcing of manufacturing activities – which have the purpose to reduce the costs related to R&D activities and the growing speed in the introduction of new market solutions. Following this line of thought, there would be a trend to restructure the organizational model of innovation, in which the big issue would be to comprehend which R&D activities must be performed internally and which can be outsourced. The kind of decision that is placed in front of executives is extremely risky, since firms may jeopardize themselves by outsourcing crucial innovative activities – which offered competitive advantages – thus becoming hollow firms. To complicate even more this kind of decision, the line that separates critical R&D activities and commodity work changes constantly. Brazil could take advantage of this outsourcing wave, even if initially it may perform only activities that are not considered essential for multinational firms. In order to do that it would need to demonstrate having cost and capabilities advantages to supply capable human resources, which are crucial for software R&D.

All those points above reflect the eighth and last point, which is the need to introduce innovations in a speed higher than it would be possible if the firm did not use local partners. The involvement of domestic firms, as a source of relief in all the points mentioned above, could be crucial for the correct time-to-market for the introduction of solutions specifically binded to local market needs.
3.3. David vs. Goliath?

Turning now the attention to the relative differences between partners, many authors emphasize that there should be no great asymmetries between partner firms. For example, Tidd, Bessant & Pavitt (2001) say that “if learning is the major goal, it is necessary for partners have complementary skills and capabilities, but an even balance of strength is also important. The more equal the partners, the more likely an alliance will be successful” (ib., p. 230). This point is extremely pertinent for the Brazilian case considered here, in which a big multinational decides to reach an agreement with some local firm for the development of communications software solutions. There are great risks involved in this type of partnership for both sides. To discuss this issue deeper it is worth to bring forth some views from both sides.

Brosseau & Quelin (1996) studied the relationship between asset specificity and organizational arrangements in the case of new value added services sector inside the telecommunications industry. The authors consider the relations between the nature of organizational arrangements, the role of firms in these arrangements and their competitive position in the industry in which the cooperation is forged. Their motivation is the fact that firms alone do not have the capabilities to produce or distribute their products, thus rely on relationships with other firms. The premise of their article is that the design of organizational arrangements is an indication of the competitive position of the firms involvement in such agreements.

These two authors argue that transaction cost theory does not take into account that each of the two parties in an agreement may wish to implement distinct arrangements, due to the asymmetries between them. The choice between different arrangements depends on the bargaining power determined by the assets each one possesses. “Organizational arrangements implemented reveal the strengths or weaknesses of the diverse competitors in the industry because of the characteristics of assets belonging to firms involved in the arrangements” (ib., p. 6). When the specificity of an asset in unequal between firms, asymmetries in bargaining power now exist, but what matters is not how specific are the assets, but who dominate such types of assets. “When the asset specificity is asymmetric, the firm owning the less substitutable asset, taking advantage of its stronger bargaining power, will design a specific co-ordination arrangement that can be imposed on its partner. Therefore, contractual arrangement choices will not only depend upon the degree of specificity of the involved assets, but also upon the asset specificity distribution” (ib., p. 8). The authors conclude that the nature of the services offered, the configuration of the governance structure and the characteristics of the firms involved in the partnership and their relative bargaining power, are all intimately related.

For Blomqvist & Hylaheiko (2000), there is a good chance to build a successful collaboration agreement between asymmetric partners. The authors use cost transaction theory to study partnership relations between big established companies and small suppliers, applying their model in telecommunications industry and enriching the theory with the addition of important aspects from the evolutionary tradition of Nelson, Winter, Teece and Pisano. They begin with the idea that routines and capabilities can be static (existent) or dynamic (new) and use the concept of dynamic capabilities from Teece and Pisano to emphasize the differences between firms and their strategies to renew and adapt their core competencies, which open new business opportunities. The concept of dynamic capability is linked to the dynamic routines in a firm, which are the capabilities of a firm to renew, augment and adapt its core competencies in the long run.
This capability generates new organizational and technological capabilities through the combination of joint contributions of tacit internal learning, R&D search routines, complementary assets, and generic knowledge (Blomqvist & Hylaheiko, 2000).

The big question brought by the authors regarding knowledge management is to find out which governance structure – the combination of outsourced, insourced and networked activities and transactions – minimizes the sum of transaction and management costs, at the same time the value obtained through transaction and management benefits is maximized. The firm is seen as a value chain consisting of different activities and transactions. Some can be done internally (“internal capabilities”) and others have to be acquired externally (“outsourced capabilities”). The authors go beyond traditional transaction cost theory by considering in their model not only transaction-related cost, but also the variable benefits that come from the governance structure. Outsourcing has transaction costs related to search, planning, negotiation, monitoring and enforcement, but also brings benefits related to administration, control, monitoring and bureaucratic incentives, and benefits related to management costs.

According to what was stated above, routines and capabilities can be (i) static (existent) or (ii) dynamic (new). In the first case, there are many reasons to opt for insourcing: uncertainty and opportunity risk are high; there are few providers of the complementary capabilities; innovation is systemic by nature and requires great specific investment; appropriability of new knowledge is weak, implying in risk of opportunistic imitation; markets of complementary assets are inefficient; and trust among partners is absent. There are also good reasons for outsourcing: the degrees of uncertainty and complexity and the danger of opportunistic behavior are all small; many providers are available; innovation is autonomous and there is no need for any high specific investment; protection is tight; and markets for the complementary capabilities are competitive. As can be seen from these examples presented by those authors, the same elements that could lead to an insourcing strategy – i.e. appropriability – could also be present in a decision for outsourcing. Hence one could say the choice for partnerships and its governance structure depend on the specific environment around unique firms and their idiosyncratic strategies. In their turn, dynamic transaction and management costs determinants are the transfer costs of capabilities through the firm's boundaries: dynamic transaction costs (to persuade, to negotiate and to teach the providers of external capabilities); and dynamic management costs (to persuade, to negotiate and to teach inside the firm – when one tries to create/develop a new capabilities internally – or external partners – when one tries to sell an activity performed inside the firm). In this case, the many sources of governance costs vary through time and depending on the technology development stage, one or another strategy could be more interesting.

From the transaction benefits point of view, the authors try to explain the growing number of partnerships. These are preferable when there is a specific configuration of static and dynamic determinants. In the first case, when there are determinants both in favor of insourcing (uncertainty, risk of opportunistic behavior, asset specificity, low appropriability of new knowledge) and outsourcing (need for powerful incentives and greater variation of new ideas). In the second case when there is need for scale and scope economies at the same time. Partnerships could develop when trust and reciprocity among partners are extremely necessary to block opportunism. The telecommunications case considered here – which is the possibility of partnerships between small local software firms and large multinational companies – might fit in this
theory, since it clearly shows asymmetry between partners, as the case of a small firm with no references and reputation seeking to create the effective mechanisms to develop trust.

From the analysis done by these authors, summarized above, there is a great challenge in knowledge management in the case of asymmetric partnerships in the telecommunications industry. Small specialist suppliers are marked by: flexibility and risk orientation; entrepreneurial management; vision instead of planning; problems in delegation; fast decision-making; unhierarchy; free communication flows; people-embodied resources; adaptation to the environment; lack of organizational legitimacy; and person-based trust. In their turn, big established firms usually present the following elements: rigidity and risk-averseness; professional management; long-term strategic planning; developed methods and processes; consensus-based decision-making; hierarchical decision-making; restricted communication; capital and know-how; attempt to control the environment; established organizational reputation; and organizational vs. person-based trust (Blomqvist & Kyläheiko, 2000).

According to these authors, the convergence between information technology, telecommunications and content created new potential business areas, where knowledge from different agents became necessary. The big telecommunications partner is motivated by the possibility to gain dynamic capabilities through external linkages and this network structure contains the determinants both for insourcing (market and technological uncertainty and low appropriability) and outsourcing (need for variation; flexibility and high powered incentives). The authors describe in detail the costs and benefits both for a big incumbent and its small partner in the Finnish industry, which could be brought to the Brazilian context of partnerships between local software firms and big multinationals. Recent data from a Brazilian industrial innovation research (IBGE, 2003) seem to suggest that local suppliers are an important source of information for innovative telecommunications firms. Nevertheless, this issue requires further research, which opens space for future investigation involving empiric data from the Brazilian telecommunications sectoral system and its fundamental stones: relevant agents, networks, knowledge and institutions.

4. CONCLUSION

Recent transformations in the telecommunications industry, a consequence from the growing convergence between technologies and services and also from the growing interaction with other sectors of the economy, have created more space for the development of software systems, whose activities have been gaining importance inside the strategies of the agents. This paper sought to enlighten a possible beneficial relation between this opportunity and a higher insertion of local firms in this promising field, through collaboration arrangements with multinational companies. It began with a brief historical background of these transformations, at the global level and at the national level as well, in order to then describe the diverse theoretical approaches regarding partnerships between firms. These approaches, conflicting in certain aspects, have many complementarities that can be employed for a better comprehension of the room that seems to exist for the referred interplay between local and multinational firms.

One of the motivators for R&D internationalization by multinational companies is the need to adapt products and processes to local market conditions from the host country. Nevertheless, the growing R&D by multinationals in developing countries is
guided by the systemic interaction of a complex combination of factors, which could both help and raise difficulties for such advancement (UNCTAD, 2005, p. 172). It remains unknown – and subject to further research – whether the Brazilian system of innovation is capable of fostering the development of internal capabilities, at the same time it grabs the fruits from potentially beneficial spillovers, through the involvement of subsidiaries in R&D activities performed in Brazil. Even though recent data suggests local suppliers are an important source of innovation in the telecommunications sector, multinational companies may have their own strategies, guided also by worldwide and local internal idiosyncratic motivators. Nevertheless, if they are convinced there are benefits from the involvement with local agents, the domestic sector as a whole could enjoy great benefits.

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