

# The Formation of Organisational Competences in the International Telecommunications Production Network

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## Abstract

Competence building and management has been an issue frequently addressed in the literature, but it seldom has been referred to enterprises acting as part of production networks. The literature is still scarcer when the networks are international and include organisational units located in countries classified as “emerging economies”. The main purpose of this study is to develop an analytical framework for the understanding of the configuration of organisational competences in the distinct participants of international production networks: multinationals and their subsidiaries organising local production networks. Different types of subsidiaries create local relationships whenever they act as part of a supply network to serve the local markets (interfirm relationship). At the same time, every subsidiary keeps an internal relationship with its parent company and respective headquarters (intrafirm). This article focuses on the global networks of Telecommunications industry and more specifically in Brazil. The networks are essentially constituted by Telecom Operators and Specialised Equipment Suppliers. The field research was done in a sample of six subsidiaries operating in Brazil. In every firm we studied the way in which competences were built. An analytical framework was built to analyse the subsidiary-headquarters relationships, the role played by the subsidiary in the local supply networks and the specific features of the distinct types of subsidiaries. The outcomes show that, in the Brazilian context, where the lack of regulatory constraints allows that multinational corporations (MNCs) operate under a high level of autonomy, the structure of the local supply chain tends to reflect the structure of the chain at global level. In that case, the way in which the global leader, the MNC that exerts the governance of the chain, considers competence formation at the headquarters and at the subsidiary level, as well as the competences that exist ingrained in firms and institutions at local level, are the main determinants of the overall configuration of competences.

**Keywords:** telecommunications, competence management, strategic management

## Introduction

International production networks encompass multinational corporations (MNCs), their subsidiaries located in different countries and local firms as well. One specific subsidiary responds to headquarters and interacts with sister subsidiaries, connects locally with subsidiaries of other international companies and relate to national companies, aiming to compete in markets usually characterised by idiosyncratic features (Pralhad and Lieberthal, 1998).

The aim of this paper is to develop an analytical framework for the study of international production networks in regards to the way in which participant firms manage their organisational competences.

The subject that will be addressed in this paper concerns the configuration of competences in the network. The research question is: how to understand the formation of competences in firms organised as networks, operating and providing services and products for markets in emerging economies?

The empirical evidence comes from an investigation carried out in the Telecommunications industry, a "fast clockspeed industry" (Fine, 1998), meaning that the rate of evolution of products, processes and organisation is very high. This creates a particularly interesting field for investigation when the subject is related to the evolution of strategies and competences.

The paper is structured as follows. In the next sections we present the theoretical foundations of the analytical model that was developed, and how it was made operational. Then, we detail the research questions and present our methodological choices. The following sections discuss the evolution of the Telecommunications industry, both worldwide and in Brazil. The outcomes of the field research reveal interesting insights about organisational competences at the firm level as well as at the value chain level. In the final section we outline our conclusions.

## About Organisational Competences

The term core competence became influential after the classic paper "The core competence of the organisation" by Prahalad and Hamel (1990). According to the authors, "[organisational] core competences are built on intangible assets [competences and resources] that cannot be easily imitated by competitors, are the source of the company's ability to deliver unique value to its customers, and allow the company to be flexible in terms of markets and products". Core competences are not necessarily related to technologies *strictu sensu*: they can be the outcome of excellence in different business functions. Notwithstanding, to be a core competence in the long run, a company has to manage a systematic process of organisational learning and innovation, which basically relies on human resources development and education.

Mills et al. (2002) clarified the difference between resources and competences. "A resource is something that the organisation owns or has access to even if that access is temporary.... A competence is an ability to do something.... A competence draws on a set of building 'blocks' called resources" (Mills et al., 2002, p. 9-14).

Although there were some attempts to categorise competences (Mills et al., 2002, Zarifian, 1999), we relied on the classic book "Industrial Organisation", by Joan Woodward in 1965, to create a typology. Woodward (1965) built her analytical framework under the premise that every firm has three core functions: Operations (Manufacturing), Product Development (R&D, Engineering) and Marketing (Sales). We assumed that the core competence of the firm is located at the core function of the firm and, in general, they might be considered interchangeable. Those functions would be complemented and supported by other functions specialised in Finance, Information Systems and Human Resources Management, among others.

After Woodward (1965), other authors, such as Slack et al. (2001), adopted the same pattern. Chin and Pun *apud* Pun (2004, p.908) assume that the determinants of strategy formulation are Marketing Strengths, Technology Strengths and Operational Strengths coordinated by Corporate Strengths.

However, Woodward (1965) also observed that depending on the type of product/market that the firm operated, one of the three core functions would be more relevant in strategic terms and more powerful since it would assume a coordinating role with respect to the other two functions. Engineering type of firms would have R&D as coordinating function; in Mass Product firms, Manufacturing would play the key role and, Marketing would be the key function in Continuous Process firms.

In other words, there must be an alignment between the core function or competence and the competitive strategy of the firm. It is in that core function or core competence that the firm has to excel to be competitive. The remaining two basic functions or competences should always be considered in their supportive role, leveraging the competitive strengths of the enterprise by creating the synergies that reinforce the core competence (Fleury and Fleury, 2003).

In synthesis, we are considering that any firm might be analysed as having three organisational competences (Marketing, R&D and Operations), from which one is core due to the fact that it is more relevant for the achievement of the strategic objectives of the firm.

### **The Configuration of International Production Networks**

Since the times when the Japanese companies challenged the existing paradigms of management, there has been a radical change in the way firms organise themselves and interact with other firms. "Firms are moving towards establishing closer relationships with customers, suppliers and even their competitors to tap into new sources of knowledge and

competence sets. They are finding that they are no longer the dominant repository of vital knowledge and competences that are critical to promoting and sustaining innovation.” (Lei, 2003, p.695).

In principle, two basic types of interorganisational networks exist: supply networks and business alliances. “Business alliances are partnerships in which two or more corporations invest resources while retaining individual strategic autonomy” (Dussauge et al., 2001). Thus, alliances involve negotiations between partners of similar sizes and/or strengths in specific products or markets. There is a large spectrum of types of alliances, ranging from technology transfer agreements to joint ventures (Narula and Sadowski, 2002, p.601).

This implies that in business alliances, since the partners possess similar bargaining power, the relationship is symmetric: firms keep their strategic autonomy and combine complimentary competences and/or resources.

Other types of network are vertical. Different frameworks were developed to capture their functioning: supply chains (Slack et al., 1999), supply networks (Harland et al., 2001), global commodity chains (Gereffi, 1994), global value chains (Gereffi et al., 2004) and global production networks (Ernst and Kim, 2001). For the purposes of this study we will adopt the definition made by Harland et al. (2001) for supply networks: “Supply networks encompass the mess and complexity of networks involving lateral links, reverse loops, and two-way exchanges, and include a broad, strategic view of resource acquisition, development, management, and transformation. The supply network concept appears to be more complex than the supply chain concept”.

In vertical networks, power relationships are asymmetric: even if strategies are aligned, one of the participants exerts governance over the rest of the participants of the network. Competences and resources might be complimentary but they do not have the same relevance for the overall functioning of the network: the competence dominated by the leading firm is strategically more relevant for the competitiveness of the whole set of firms. Harland et al. (2001) accept the distinction between parity-based and centralised networks and assume that “this seems to have a clear relevance for the way focal companies can manage their supply networks depending on their relative power”. In their model Harland et al. make the concept of power operational utilising a variable named influence.

Lei (2003) makes this point very clearly when defining “innovation nets as a group of firms that compete and cooperate to develop leading-edge technologies and products that form the basis for new sources of value creation, both within and across industries.... Firms within the innovation net are likely to focus on those distinctive activities that will give them the highest potential for significant influence and bargaining power within the net” (p. 696).

The issue of power in the study of international interorganisational networks is central in studies published by Gereffi (1994) and Gereffi et al. (2004) about the formation of global

commodity chains. In his studies of the footwear and clothing industries, he showed how command is exercised by the large global retailers and marketers.

How do companies approach the process of competence building when they are involved in different types of supply networks? In their classic article on core competences, Prahalad and Hamel (1990) had already paid attention to the potential and eventual handicaps associated to outsourcing: "Few companies are likely to build world leadership in more than five or six fundamental competences. This tends to prompt the search for licensing deals and alliances through which the company may acquire, at low cost, the missing pieces. Outsourcing can provide a shortcut to a more competitive product, but it typically contributes little to people embodied skills that are needed to sustain product leadership" (Prahalad and Hamel, 1990, p.8).

Bogner et al. (1999, p. 284) bring another important characteristic of the relationship among firms in supply chains: "The final product or service for which the firm collects its above-average returns may be an intermediate or an end product in the larger value chain of the economy. When the firm's end product is sold to another firm as an intermediate product in the larger value chain of the economy, the competence trait should be retained when the final product is sold".

Therefore, it seems plausible to admit that the relative position and the bargaining power of a given firm within the network is a function of its competences and resources. The relative position that a given firm occupies or can aspire – parity or asymmetrical, leader or follower, vertical or horizontal – would be a function of the relative importance of its organisational competences for the performance of the whole network.

Aiming to advance in the study of the above mentioned issues, we will firstly develop a framework to support the analytical tasks related to the research work.

## **The Framework**

The point that we want to understand is how competences and strategies are built and evolve in firms which are part of international interorganisational networks. Figure 1, below, portrays one archetypical network, operating in an emerging economy.

Subsidiaries are primarily linked to their headquarters located in a developed country. Second, the behaviour of subsidiaries is influenced by their participation as a member of a local production network. Third, each subsidiary has a specific pattern of interaction with the local markets, that can be more or less regulated by the local Government and local suppliers. The framework also considers that the performance of every subsidiary is dependent upon three core functions or competences: Operations, Product Development and Marketing.

The research question is:

- How to understand the configuration of organisational competences in firms that constitute an international intercompany network?

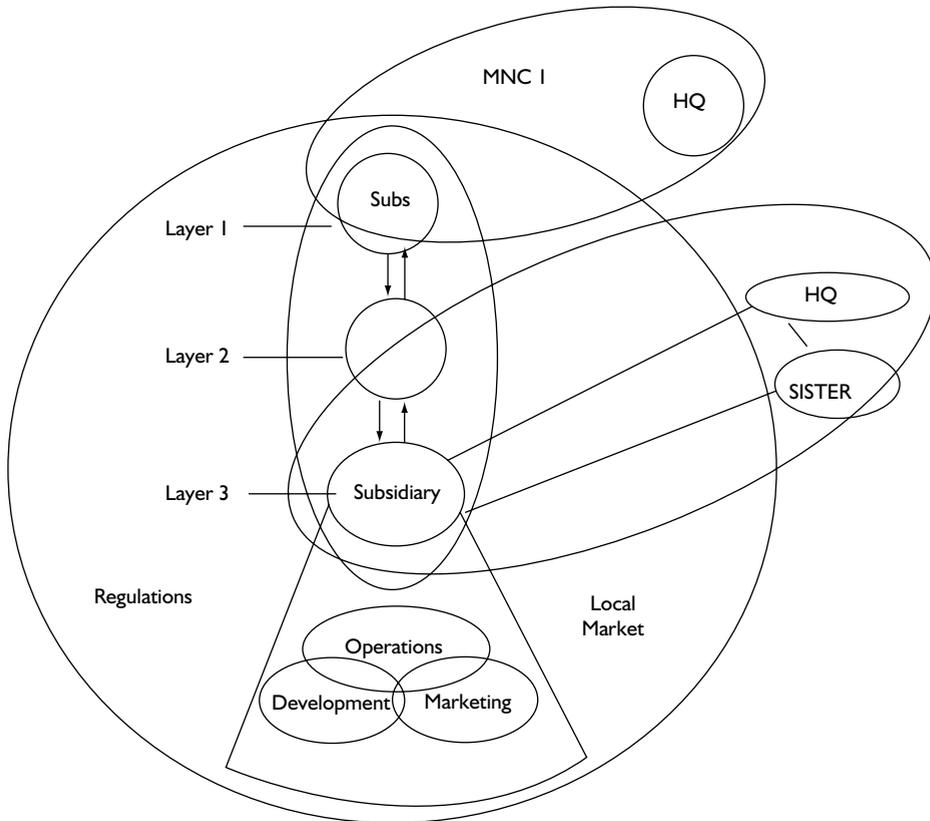


Figure 1 – Schematic representation of an international network as seen from host country HQ stands for Headquarters; Subs for subsidiary.

The more specific questions are:

- How are competences distributed and strategies coordinated in the local chains? Why? and
- How are competences managed from the subsidiary-headquarters perspective?

The field for the empirical research was the Telecommunications industry. The research activities comprised initially an extensive analysis of the literature aiming at a comprehensive view of the evolution of the Telecommunications industry worldwide in what concerns competence formation. This provided the basic framework for a case study research of the international interorganisational network constituted by the subsidiaries of Telecoms multinationals located in Brazil and the supply chains that were structured by them.

In choosing the cases to be studied, we opted for firms that operate in the Mobile Telecommunications sector. It is a more interesting field for research due to the rapid and

profound changes that are observed and usually termed “co-evolution”. In other words, it is not evident for the producers which products and/or services could be developed and made available to the different profiles of consumers and at what price. At the same time, consumers have difficulties in understanding their own needs and assessing the value of the products that are being offered. As a result, both parties learn and evolve while participating in the transactions that are characteristic of those markets.

Three subsidiaries of Specialised Equipment Suppliers (one European, one Japanese and one American) and three Telecom Operators (two European subsidiaries and a Brazilian enterprise) were studied. Seeking a better understanding of the market and technological issues, two large users of Telecommunications services (a bank and a newspaper producer, both Brazilian) and the Centre for Research and Technology in Telecommunications (CPqD), who played a key role when the telecommunications system was still under the governmental jurisdiction, were also interviewed. All in all, a total of eighteen persons were interviewed and in one of the Telecom Operators we had the opportunity of running a workshop for the discussion of the outcomes of the research.

The first step in the study of every one of those firms was the search of secondary type of information, in the specialised media and in companies’ reports. Then, in each of those companies, we interviewed two or three persons from the directive board who were responsible for the enterprise strategy and planning and human resources management. The interview script focused on the following aspects: competitive strategy, critical organisational functions, relationships in the supply network, both upstream and downstream, service and product development, operations management and human resources management. In every firm we searched for the characterisation of the competitive strategy, the role of the three basic functions (Operations, Product Development and Sales & Marketing) and the efforts and investments in organisational competence building.

We consider that the method was a composition of Case Studies and Grounded Theory because, in the very beginning, we had not any theory on which to rely to construct the research instrument. Actually, what we had were separated and independent bodies of theory. Thus, the first case that was analysed was almost a participative type of research in which the researchers were seeking a pattern for the construction of their conceptual framework.

Glaser and Strauss (1967) affirm that the Grounded Theory approach “has much in common with the case study [approach]... its most distinctive characteristic being that, in order to find out what views are underlying the similarities and differences, the researcher is constantly comparing the various items he/she is observing in reality, both with each other and with theoretical starting points”.

According to Verschuren and Doorewaard (1999) the Grounded Theory approach has three main characteristics. The first one would be “an inquisitive attitude” from the researcher, meaning that a theory or theoretical concept materialises slowly but surely

in the course of the research project. Although the researcher does not start with a detailed theory that is subsequently tested, the he or she must attend to the criteria of reliability, validity and imitability by following some specific procedures and techniques. That is why, after the initial case study, the choices of cases and the structure of the questionnaire evolved gradually, as the understanding of the variables and their relationships became more and more evident. Even the decision to study two cases of users of Telecommunications services was done with the aim of clarifying specific aspects of the phenomena.

The second feature of Grounded Theory is “a process of continuous comparison: the researcher is incessantly engaged in a process of comparing findings with previously found phenomena or interpretations, or with the ideas and notions others before him have published on the subject” (*ibid*, p. 172). From the different ways the authors mention as appropriate for comparisons, we utilised: secondary empirical comparison, primary and secondary theoretical comparison during the field work, and deductive comparison for the elaboration of the conclusive framework.

Finally, the third characteristic of the method is a careful and consistent use of specific procedures and techniques. The first one: “sensitising concepts and open coding”, and the second: “Axial coding” corresponds to the choice of basic concepts and organisation of the analytical framework, formerly presented. The third, “Selective coding” would be related to the reduction of “the multitude of phenomena described and the formulated concepts and key words into a concise description of the theory that is to be developed” (*ibid*, p.175). This was done during and after the field research.

### **The Telecommunication Industry**

Studies on the Telecommunications industry are relatively recent in the academic literature. Although specialised equipment suppliers, such as Ericsson, Siemens and AT&T among others, have often been used as case studies in the Innovation and Technology Management literature, major players in the field, as the Telecom Operators, were seldom considered relevant cases. That may be due, in part, to the fact that in most countries, Telecommunications used to be a public service, and as such, those companies were evaluated mainly according to social, more than economic, technological or efficiency-related indicators.

That picture had a dramatic shift after the privatisation process that took place in several countries. On the supply side, the now privately-owned enterprises became responsible for the design and delivery of services in a competitive environment characterised by low entry barriers (Fransman, 2002), which has demanded from them the implementation of sound competitive strategies. At the same time, competition is regulated by national and local governments, to guarantee the availability and quality of the services provided to the general public. Under those circumstances, firm’s performance became intrinsically

dependent of the service they offered in relation to the amount that customers were willing to pay.

In addition, the privatisation processes led to increasing internationalization of the industry. While Specialised Equipment Suppliers were already large multinational corporations adopting multidomestic strategies (Porter, 1986), Telecom Operators, as incumbents, were strictly national or sub-national companies. After privatisation, most of them became multinational corporations.

In each country, the role and importance of foreign enterprises was the outcome of the criteria chosen for the privatisation process. In Brazil (differently from what happened in many advanced countries), Federal and State governments opted for a complete withdrawal from their positions as the major controllers in the industry. As a result, telecommunications services are currently under the control of subsidiaries of large European or North American Telecom Operators.

### **Evolution of Organisational Competences in the Telecom Industry (TI)**

For Fransman (2002, p.4), “a key part of the “engine” driving change in the Telecom industry is the technological regime that exists in this industry. The technological regime is defined by the conditions under which technological knowledge is created – which determine the rate of technical change and the kinds of technologies that are created – and the opportunities and the constraints that exist in the use of that knowledge. The technological regime, in turn, defines the learning regime that determines the kinds of learning paths and patterns in which the firms and other organisations involved in the industry will engage” (p.7). Based on that concept, the author conceptualizes the Old Telecom Industry (to the mid 1980s) and the new Telecoms Industry.

In the Old Telecom Industry, “the engine of innovation was located in the central research laboratories of monopoly telecom operators, such as AT&T’s Bell Labs, British Telecom’s Martlesham Labs, France Telecoms’s NET Labs or NTT’s Electrical Engineering Labs. Typically, after the central research laboratory did the initial research and developed and tested the initial prototypes, the task for further development was handed on to specialist equipment suppliers (SES)” (*ibid*, 10).

By the end of the 1980s, “for different political-economic reasons, Japan, the UK and the US decided to end the monopolies of their monopoly Telecom Operators. The result was the birth of the original new entrants. [DDI, Japan Telecom and Teleway in Japan, Mercury in UK, Baby Bells, MCI and Sprint, in US].... Although liberalising regulatory regimes provided a necessary condition for [the new entrants] rapid and successful entry, they were not sufficient. Equally important were low technological barriers created by the existence of specialist Telecom equipment suppliers. These specialist technology suppliers provided the black-boxed technologies needed to construct and run their own networks....

From the point of view of the specialist technology suppliers, liberalization created new markets for their accumulating knowledge and competences" (*ibid*, p. 14).

Therefore, the SES were facing new times where manufacturing according to the specifications defined by the Telecom Operators was not the only critical success factor: the supply of technology and turnkey projects became another important source of revenues.

The period 1990-1995 witnessed an interesting transition. Although the new entrants were not competent concerning both technology and manufacturing, some of them had a large experience in terms of servicing large household markets. That is the case of Vivendi, in France, that was part of the group Generale des Eaux, responsible for water distribution and sewage, Energis, in UK, the Telecom subsidiary of the English electricity company, and thus, a subsidiary of Scottish power, among others.

The increasing competition in the marketplace justifies another inflection in the trajectory of the Telecommunications industry. "By the end of 1995, the now incumbent Telecom Operators (like British Telecom, France Telecom and Spanish Telefonica) made the decision to leave more and more of the R&D related to the network and its elements to the specialist technology suppliers" (*ibid*, p. 16). With this decision, they were able to concentrate on the development of competences related to better servicing the markets: "Like AT&T, BT also accepted that its main competence lay in operating and developing telecom networks from elements developed by separate specialist suppliers and providing the services that customers wanted over these networks" (Fransman, 2002, p.86).

That implied that a new pattern of technological development, in the strict sense of R&D activities, in the New Telecom Industry would be essentially in the hands of the Specialist Equipment Suppliers and would evolve according to their competitive strategies.

More recently, that pattern is being redefined one more time. Due to changes upstream and downstream, SESs are now considering their strategy as being "Integrated Solution Providers" (Davies et al., 2001). This has two major implications. With the emergence of Manufacturing Contractors (Sturgeon, 1997), the routine associated to Manufacturing and Operations as well as customer care services are now outsourced to newly created global companies such as Celestica, Solectron and others. At the same time, the scope of R&D activity is being redefined in the sense that an SES becomes also a purchaser and assembler of technologies developed by specialist firms. While product and service innovation emerge from the dynamics between Operations and Marketing, the role of R&D is to develop the knowledge and assemble the technologies to make the service available.

In Table 1, below, we synthesise the evolutionary pattern of competence formation in the different layers of the Telecommunications supply network.

Table 1 – The transition in the hierarchy of organisational competences in the TI.

Enterprise	Competences			
	Up to 1990s	1990 - 1995	1995 - 2000	after 2000
<b>Telecom operators</b>	1) R&D and Operations 2) Services	1) Operations and Services 2) R & D	1) Services 2) Operations	1) Services 2) Some Operations
<b>Specialised equipment suppliers</b>	1) Manufacturing	1) Manufacturing 2) Development	1) R & D 2) Manufacturing	1) Integrated solutions (R&D plus Services) 2) Some Manufacturing
<b>Supplier</b>				Manufacturing

### Evolution of Telecom Industry in Brazil

Up to a certain degree, the evolution of the Brazilian Telecommunications industry keeps a strong similarity with the evolution of the international industry, especially in the pre-privatisation period.

Following the global trend, in the early 1990s, Brazil decided to develop a new model based on deregulation and privatisation. But, contrary to what happened in the advanced most countries, the privatisation process in Brazil, as in other South America countries, would allow the buyout, both of the local state companies and mobile telephone concession, without restrictions to the participation of foreign capital. Federal and State governments opted for a complete withdrawal from their positions as the major controllers in the industry. As a result, the large local Telecom enterprises became of an European or North American origin.

The enterprises who took charge of the telecommunications services were recently privatised Telecom Operators of advanced countries or the so called new entrants (as the case of MCI in the USA). The movement of those Telecom Operators was followed by new Specialist Equipment Suppliers such as Motorola, Lucent, Nortel, Bell Canada, who joined NEC, Ericsson and Alcatel (ex-Thomson) who have been in Brazil for a longer time.

The field research to be described in the next section aimed at the characterisation of the competitive strategies and at the identification of the priorities in terms of competence building in those subsidiaries, as an indication of the pattern that the TNCs have been choosing in building their international networks.

### Telecom Operators

The first point to be highlighted is that both Telecom Operators and Specialised Equipment Suppliers are segmenting the market according to three client/service types, their characteristics being similar to those proposed by Silvestro (1999): Mass Services, Service Shop and Professional Services. This is a key aspect for the analysis of the data gathered in the field research because the way in which the firms and the interorganisational networks are being organised keeps a straight relationship with this segmentation.

For the Telecom Operators, the first segment concerns individual customers that demand voice transmission only: it is the Mass Services segment where customers are counted in millions. The second segment encompasses individual clients who, besides voice transmission, demand other types of services like short messages, photo transmitting, broadband, etc. It is the Service Shop business: even though the number of customers cannot be considered small, it is possible to identify a certain number of groups with similar features and preferences to whom the development of products and services is directed. The third is the institutional and corporate market, where large clients, individually treated, are serviced according to their specific demands. This constitutes the Professional Services market for the Telecom Operators.

Therefore, at a first glance, it becomes necessary to look at Telecom Operators as having three distinct business units that share the same physical infrastructure.

In the case of Mass Services, the Telecom Operators act essentially as large scale producers of standard services, operating standard equipment, constrained by the rules issued by the local regulatory agency. The goals of that business unit are the increase in scale and the minimisation of costs, thus optimising the margin per client. As Mobile Telecommunications Operators, the basic technology for services operations is bought from specialised suppliers as well as the software. In their relationship with suppliers in general, Telecom Operators are tough negotiators: they rely to a great extent in their bargaining power and adopt impersonal methods, e-commerce being one of the most promising, to reduce the price of inputs. The cost of the service depends on the efficient use of the infrastructure, interconnectivity costs included. The latter is an issue of primary importance for the financial performance of Telecom Operators since the markets are always becoming broader.

The role of Marketing is fundamental for the increase in scale, following the classic Four Ps: price, promotions, point of sale and publicity. Interestingly, the efforts for capturing new clients are seldom being followed by efforts to retain them, as recommended by the literature. It seems that, as the local market is still growing, concern with retention and loyalty of customers has not a high priority. Front line tasks (call centres) are repetitive and prone to technological substitution. Quality is monitored through aggregated indicators embedded in the software.

Therefore, in this specific market, strategic orientation and competence development were found relatively similar at the three enterprises studied. Operational Excellence is supported by Operations as core competence to deliver the service according to predefined quality standards and as cheap as possible. The competence in Marketing is also critical to create the demand for the large infrastructure that is in place. Relationships are also critical in the negotiations with other operators to ensure connectivity. The less critical function is R&D because the service has universal features and technological decisions are essentially related to the purchasing of equipment.

In the case of differentiated services – the Service Shop -, the goal of the Telecom Operators is to conquer and retain special clients, through the continuous launching and upgrading of services and products. This is expected to increase loyalty and enhance the use of the infrastructure, thus creating new sources of revenues. In Brazil, the introduction of those new services/products is related to the local adaptation of a product/service already in use elsewhere. For example, the pre-paid mobile phone was used in Europe for the tourist market. In Brazil, it was launched for the low income market with a tremendous success. The youngsters and the SOHO (Small Office, Home Office) are also niche markets for the Telecom enterprises. Evidently, there is a lot of trial-and-error due to the difficulties for a thorough understanding of the demands of the local markets, the specific features of the distinct niches, and so the risk for new launchings is not negligible. Under these circumstances, Marketing assumes a critical role related to the identification of clients' profiles, thus guiding the investment decisions.

The relationship with suppliers is cooperative since the introduction of new services is likely to require new equipment or new software. There are cases where the service was firstly identified and developed by some Specialised Equipment Supplier who, in cases like that, are able to negotiate the distribution of margins with the Telecom Operators.

As Service Shops, Telecom Operators create call centres where front line tasks require a more skilled staff, able to assist preferential customers in their specific inquiries. Price policies are more a function of the purchasing power of defined market segments and niches than to the mark-up derived from the total costs incurred. Market segmentation and the possibility of charging different prices are the drivers for the creation of "packages of services".

From the three Telecom Operators studied, one was considered a real innovator, at least in local terms, more than 20% of its total revenues accruing from this type of service. This was the foreign Telecom Operator that operated in the most sophisticated region in terms of educational level and purchasing power. The second foreign Telecom Operator has a national scope and was considered a follower, while the third, the Brazilian Telecom Operator, for having less financial and technological resources, was a distant third.

Corporate service is considered the most incipient but, at the same time, the most promising market segment. For this type of clients the aim is the development of specific solutions and systems according to their specifications. As these, in general, become large and complex projects, involving different types of enterprises – Telecom Operators, Equipment Suppliers, Consulting Firms, Financial Institutions - there is a dispute among them to become the prime contractor. Therefore, this type of service requires a completely distinct set of competences for the Telecom Operators: those are associated to Project Management and Institutional Relationships. In the companies that were studied, specific structures were created for that market. In this case, the competences required from the front line workers are related a profound understanding of the clients' businesses and the

potential applications of Telecommunications. At the time we were doing the interviews there was an explicit policy for the Telecom enterprises to hire executives originated from the business areas in which their main clients operated.

Therefore, the Brazilian Telecom Operators exploit distinct market segments, utilising different strategies supported by specific configurations of competences. Operations is the core competence for the basic services' segment where the Operational Excellence strategy is followed. In the corporate market, the relationship with the client drives the other functions; the strategy is Customer Driven; Marketing is core. And in the Service Shop market a composition between Operational Excellence and Customer Driven is observed: Operations and Marketing must act in a very integrated way to conquer and retain distinct groups of clients.

### **Specialist Equipment Suppliers**

From the three Specialised Equipment Suppliers of our sample, two were already operating in the country during the pre-privatisation period. Even though they relied to a great extent on technological knowledge developed at the headquarters, they were obliged to manufacture products according to the standards and specifications established by Telebras and the CPqD. The third company settled in the country in the first half of the 1990's. This plant was already designed and operated to produce global products, designed elsewhere, exporting world-wide, competing with the sister subsidiaries in terms of price, quality and delivery.

Those three subsidiaries started a transition period just after the privatisation process ended. Two were the main drivers for that transition. First, the high demand for new equipment and infrastructure in general because Telecom Operators had to achieve the contractual targets within a tight timeframe. Second, the restrictions imposed by Telebras associated to the use of locally defined norms and standards came to a halt. Under those circumstances, the long-established Specialised Equipment Suppliers discontinued their local R&D activities. As the new clientele demanded large turnkey projects, the SESs concentrated in the design of networks, utilising global products developed at the headquarters, the delivery and assembling of equipment and, mainly, the development of software to customise the equipment to operate according to local characteristics and regulations.

A second inflection occurred more recently, when the Telecom Operators achieved their targets and drastically reduced their investments in infrastructure. As previously mentioned, their challenges are now associated to operating efficiently and creating new services. This being the case, the SES had to change again. They now characterise their role in terms of the development of solutions and systems to improve the operations of their local clients, the Telecom Operators, often using a partnership with other local suppliers. In the words of Davies et al. (1999) they are becoming Integrated Solution Providers. For example, the

development of software (e.g. billing systems) and systems for the optimisation of network utilisation are in the project portfolio of those companies. A more radical example concerns one of the SES that is currently responding for the operation of a plant that it has designed and built in the South of the country, commissioned by the respective Telecom Operator whom, in doing so, is able to concentrate its competences on services.

The tendency to prioritise servicing is growing fast. One of the SESs is heavily investing in an internal program entitled "Competence Shift", aiming to create a new corporate culture: engineers should "shift from a product mindset to a service mindset". The above mentioned firm opted for an internal development program which included a set of actions in areas such as training, remuneration system and performance evaluation.

In that context, Manufacturing/Operations was repositioned. Following international trends, when the Manufacturing Contractors – Flextronics, Solectron and Celestica – started operations in Brazil, the local SESs, one by one, outsourced their routine manufacturing, logistics and after sales operations, thus becoming more oriented towards the clients.

The organisational competences most valued by the three companies include: i) identification of market needs, in terms of the Telecom Operators and also the end users; ii) identification and assembling of technologies, developed at the headquarters or elsewhere, to create and deliver the best solution – the LEGO analogy was often mentioned; and iii) organisational networking, through strategic alliances and supply chain management.

Therefore, the relative importance of servicing the client is becoming stronger. This indicates a new balance between R&D/Product Development and Marketing and the reinforcement of the Customer Driven strategy.

### **The Configuration of Competences in the Telecom Networks**

The description of the evolutionary configuration of the Telecom industry in Brazil, in the former section, provided a picture of the dynamic relationships among Telecom Operators, Specialised Equipment Suppliers and, more recently, Manufacturing Contractors in terms of strategic positioning, competence formation and change, involving learning and unlearning. Issues of strategic alignment and complementary competences were observed. Patterns of co-opetition also became evident, since the same pair of firms, say a Telecom Operator and a Specialised Equipment Supplier, might keep distinct forms of relationship, depending on the type of market/product that is being served. The relationship is either arm's length or cooperative or still partnering in the Mass, Service Shop or Corporate segments respectively.

The subsidiary-headquarters relationship presents another pattern. Overall, the competences that are localised are those more directly related to the service that has to be provided locally. Table 2 synthesises the roles played by subsidiaries and headquarters in the three layers of the supply network.

Table 2 – Distribution of competences among subsidiaries and headquarters.

	Headquarters	Subsidiary
<b>Telecom operators</b>	Global strategies regarding investments and partnerships Development of new types of services	Definition of local competitive positioning according to local characteristics (segmentation, products, competitors, regulatory constraints) Efficiency
<b>Specialised equipment suppliers</b>	Global strategies R&D targeting radical innovations and global platforms	Provision of integrated solutions for local clients including customisation of global platforms Pro-activism in the sense of interacting with end markets to identify new products and services Local supply chain management and partnering
<b>Manufacturing contractors</b>	Partnering with global firms Procurement in global scale R&D focusing production processes	Creation and management of capacity to supply routine type of products and services to local clients

The main point to be emphasised, concerns the notion of service as the key driver for the organisation of the Telecommunications industry in Brazil. The overall picture shows Telecom Operators servicing final customers, Specialised Equipment Suppliers providing integrated solutions for the Telecom Operators, but also looking for the final market, and Manufacturing Contractors servicing Specialised Equipment Suppliers. In the words of Lei (2003, p. 703) this reflects “the essential driver for firms as they seek to capture and dominate a larger share of the innovation net’s overall value proposition”. This involves a permanent concern with the identification, development, implementation and delivery of a service to a client.

**Discussion and Conclusions**

In search for generalisation, the first point to be highlighted concerns the limitations of the outcomes of the field research, namely that we are looking into the network through the lens of subsidiaries located in a country classified as an emerging economy. Second, that for being a fast clock speed industry, the configurations that were found might be distinct from the ones currently predominant in other types of industry. Therefore, any generalisation will have to take those factors into account.

Our initial inference is that, overall, the structure of the local supply network will tend to replicate the structure of the network at global level, the most salient feature being that the governance pattern at global level will also be the main determinant of the configuration of competences at local level. This means that the other participants of the local network will have to develop the competences that will be requested by the leader

which, in its position, will be the only one able to decide what competences it will locate at the respective subsidiary and to what degree.

We are not assuming that it is the headquarters of the leading enterprise that will decide the whole issue; on the contrary, depending on the competences consolidated at the subsidiary level, the latter should have a strong voice to discuss with the headquarters about the overall configuration of competences. But, in the end, the decisions that will affect the overall structure of the local supply network are in the realm of the leading enterprise.

So, even when there are other subsidiaries as members of the network, their decisions on which competences to develop locally will be subordinated to the configuration of competences of the leading enterprise; they will have to develop a certain degree of flexibility. In this case, it is expected that the subsidiary will have a more dependent relationship to its headquarters and sister subsidiaries in terms of competences and resources.

The local enterprises will have to play the game according to the same rules: the configuration of competences that they will have to develop will be those required by the other members of the network.

The contextual conditions: the local regulatory environment and intrinsic market characteristics, as well as the specific features of the industry that was object of the study created constraints for the generalisation of the outcomes.

Further research should be concerned with analysing industries characterised by distinct features operating in contexts where the regulatory apparatus and the characteristics of the local markets, both in terms of local enterprises as well as the consumers' behaviour.

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### **Biography**

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