1. Presentation

The objective of this paper is to present some findings about the historical evolution of the Telecommunications’ specialised equipment suppliers which provide subsidies for a discussion about the determinants of the internationalisation of Manufacturing and the building of International Manufacturing models.

Telecommunications is a particularly interesting field for investigation due to its “fast clockspeed”, meaning “the rate of evolution of an industry, related to product clockspeed, process clockspeed and organization clockspeed” (Fine, 1998, p.6). As we will later describe, the Telecommunications’ Specialised Equipment Suppliers (hereafter SES) went through a radical change regarding the strategic importance of Manufacturing, in a decade or so. For a better comprehension of the determinants of that change it is necessary to consider the position of the SES in the Telecommunications global industry.

Formerly, telecommunication services were a prerogative of the State and, as public services, evaluated according to social indicators, mainly. Prior to privatization, the State had the responsibility for the creation of scientific and technological competencies which was usually done under the logic of state-owned enterprises and research institutes.

Privatization introduced two radical changes. From the supply side, private enterprises became responsible for the identification and production of service, using the concept of “industrial production of service”: the production of a service that incorporates in its technologies, social organization and performance criteria, principles which are similar to the ones that are found in the large industry, modified according to the specific features of the service sector.

From the demand side, at least in theory, it empowered clients and customers to influence in the definition of the service to be supplied as well as in their development processes and to act in the evaluation of the performance of the supplier.
For the purpose of our study, the main features of the Telecommunications industry are:
- a trend to be “naturally” global;
- an interorganisational network that is visible;
- a composition of service provision and goods production;
- a specific relationship with governmental institutions.

In that environment, the competitive strategy and the core competencies of the SES evolved from Manufacturing to R&D and now to Service Provision. The structure of their international manufacturing network accompanied that process.

The field research involved in-depth case studies of three subsidiaries of Specialised Equipment Suppliers and three of their main clients (network operators). Two large users of Telecommunications services (a bank and a newspaper) and the Research Institute that was formerly responsible for decision-making at the Brazilian governmental level in the pre-privatisation period were also interviewed.

2. International Manufacturing Approaches

The determinants of the evolutionary process of internationalisation of Manufacturing systems is not yet fully understood. For Shi and Gregory (1988, p. 195) “Business globalisation is leading to widespread restructuring of international manufacturing systems in TNCs. ... Many critical issues, such as properties of international manufacturing network systems in terms of structural architecture, dynamic mechanisms, and related strategic capabilities and strategy processes, are poorly understood and are not covered by current manufacturing research agendas”.

The model developed by those authors at the Centre for International Manufacturing, at the University of Cambridge departs from the assumption that “the focus is just the international manufacturing network in which a TNC has direct investment, no matter how large or small percentage of the ownership, since this represents the activities over which the company has direct management control, contrasting with other types of collaboration”. (Shi and Gregory, 1998, p. 199)

Their contribution is synthesised in a Map of International Manufacturing Network Configurations that relates the geographic dispersion of the manufacturing operations to the learning and thriftiness abilities, creating a taxonomy for the classification of the strategies of TNCs regarding the internationalisation of their Manufacturing systems.

In a certain sense, that approach widens the existing approaches that focused on individual subsidiaries and their role vis-a-vis the global strategy of the enterprise (Ferdows, 1997; Fleury, 1999).

A more systemic approach is provided by the Strategic Management of Multinational Enterprises that, according to Tavares (2001, p. 141) is “a fast-growing body of literature on
subsidiary strategy providing important insights which contribute to a more realistic understanding of the nature of the modern MNE”.

The model proposed by Tavares (2001, p. 143), considers that subsidiary evolution is a result of the dynamic interaction among three main drivers: Internal Environment (the TNC system comprising the parent company and sister subsidiaries), the External Environment and Subsidiary Driver (the endogenous forces that underpin the subsidiary’s inner logic of proactive action and capabilities). In that approach Manufacturing is not at the focal point; it is just considered one of the activities to be performed by an enterprise for the achievement of its objectives.

We will build our approach focusing on the part played by Manufacturing in the strategies of the Telecommunications enterprises, the designated role of their subsidiaries and the way that manufacturing networks were shaped, by analysing their operations in a foreign country, Brazil.

3. The Internal Environment Driver: evolution of the Telecommunications industry

For Fransman (2002, p.4), “a key part of the “engine” driving change in the Telecoms 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 conceptualises the Old Telecoms Industry (to the mid 1980s) and the new Telecoms Industry.

In the Old Telecoms 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 Telecom’s CNET 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”. (ibid, 10).

In that context, SES had essentially a national character operating in conditions which, up to a certain point, resembles the current role of Manufacturing Contractors.

In the end of the 1980s, “for different political-economic reasons, Japan, the UK and the US decided to end the monopolies of their monopoly network 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 Telecoms 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, liberalisation created new markets for their accumulating knowledge and competencies”. (ibid, p. 14)
Therefore, the SES were facing new times where manufacturing accordingly to the specifications defined by the network operators was not the only critical success factor: the supply of technology and turnkey projects became another important source of revenues.

The evolutionary process had another inflection when “By the end of 1995 the now incumbent network 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)

That decision 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, SES are now considering their strategy as being “Integrated Solution Providers” (Davies et al., 2001). SES are trying to abandon the “old fashioned” approach to products and implementing a culture of service. This has two major implications. With the emergence of Manufacturing Contractors (Sturgeon, 1997), the more routinised Manufacturing and Operations activities and 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 deeply redefined in the sense that SES become an assembler of technologies rather than being a producer. Product or service innovation emerges 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.

It is important to stress that, in the relationship between network operators and specialist technology suppliers, fixed and mobile telecommunications present some differences. Fixed telecommunication, as a relatively mature technology, in which modularity concepts can be applied, allows to the operators to create one-to-many relationships with suppliers. On the other hand, for being a new and dynamic research area, which includes the Internet, mobile telecom demands a one-to-one relationship: one network operator relies upon one specialist technology supplier in a long term relationship.

The Figure in the next page sketches out the evolution of the Telecommunications industry formerly described.

In the left hand column, the different institutions that compose the Telecommunications industry are listed, the listing obeying to the relative position in the layers.

The drawing considers the four phases of that industry in the recent past. In each phase, the left side is reserved for the representation of the structure of the industry in the home countries, the industrially advanced nations. In the right side the structure of the industry in Brazil is presented.

At the bottom line, we introduce the regulatory institutions, such as the ITU – International Telecommunications Union, that is increasingly influential in the structuring of the networks.

For a deeper analysis of the behaviour of the enterprises of the Telecommunications industry, as depicted in that Figure, a framework relating competitive strategies and core competencies will be needed. That is what we will be presenting in next section.
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INFORMAL INFLUENCE
4. Competitive strategies and core competencies

Elsewhere we developed an analytical framework to relate competitive strategy and organisational competencies (Fleury and Fleury, forthcoming). Basically, we considered that the competitive strategy of any firm can be categorised in one of three ways: Operational Excellence, Product Innovation or Customer Driven. For simplification purposes, we also assumed that every firm has to develop competencies in three distinct areas: Operations, Product Development and Sales and Marketing. Our model considers that for each competitive strategy a different hierarchisation or prioritisation of those competencies is needed. The most important competence for a given strategy will be considered the core competence of the organisation, the other two becoming considered as supportive competencies.

4.1 Product Innovation

The companies that compete in terms of Product Innovation are continuously investing to create radically new concepts of products for defined customers and market segments. The critical function is Research & Development & Engineering (R&D&E).

The firms that are archetypal of this strategy are mostly mentioned in the Technology Management literature. Some time ago, Dupont used to be the role model and today Intel is the most mentioned. In general, industries that are Science and Technology intensive, such as the IT industries - Telecommunications, Computers and Internet, as well as Biotechnology or the Biomedical industry (Life Sciences), would be classified in this category. But there are innovators in the consumer’s markets such as Sony, Nike and 3M. In the Telecommunications industry, Qualcomm, Nokia and the majority of specialist technology suppliers would be considered innovators.

Companies whose strategy is Product Innovation guarantee their economic success through the systematic introduction of radically new products in the market, usually by making the existing ones obsolete. They survive and prosper due to the high profitability they achieve in the time span where they enjoy a monopolistic market position (Abernathy and Utterback, 1975).

The S&M function has essentially to prepare markets and educate potential customers for the launching of new products. Marketing efforts are mainly based on technical competencies.

The role of Operations is peculiar in this type of business. The most important requirement is rapid process development and the implementation of a new production system after a new product has been designed. What matters is the evolution from “idea” to industrial scale.

4.2 Operational Excellence

“Superior operations effectiveness not only serves but buttresses a company’s existing competitive position, but, when based on capabilities that are embedded in the company’s people and operating processes, is inherently difficult to imitate. For this reason, it can provide the basis for a sustainable competitive advantage, even when the company adopts the same competitive position as one or more of its competitors” (Hayes and Upton, 1998).
In this category, we have as role models the enterprises most mentioned in the Operations Management field: the automotive enterprises, in general, Ford in the past and Toyota in current times. In the electronics industry Compaq and Dell became the main examples. In the services sector McDonalds and Wal-Mart are the most mentioned cases.

The objective of a company that adopts the strategy of operational excellence is to offer to the market a product or service that optimises the price/quality ratio. Scale and standardisation are the most important determinants of competitiveness.

In this case, the core competence will be Operations, including the whole logistical cycle: purchasing, production and distribution. That is the competence in which the firm must excel to remain competitive.

As previously mentioned, the building of competencies in the other two areas: Product Innovation and Sales and Marketing should primarily target to the reinforcement of the performance of the first. From the point of view of product and/or service development, incremental suits better than radical innovation, and process is more relevant than product innovation. In the relationship with customers, the Sales and Marketing role is “getting customers to adapt to the operationally excellent company’s way of doing business” (Treacy and Wiersema, 1995).

4.3 Customer driven

These are companies concerned with servicing specific customers in specific areas: personalise and customise products and services to meet unique customer needs.

Even in the cases where they deliver a physical product, it is the service they provide the most important trade they make. Usually they specialise in the development of solutions to manifested demands and even anticipate their customers’ future needs. For this, such companies have to acquire a profound knowledge about clients and their business: Sales and Marketing becomes the critical function, pulling the efforts of R&D&E and Operations.

IBM used to be considered the role model for this strategy (Wheelwright and Clark, 1985), and Caterpillar is also mentioned as a case of “customer intimacy” (Treacy and Wiersema, 1995). The profitability of those companies are the result of a premium price that they are able to charge their customers.

In cases such as that, Operations must be essentially responsive and flexible to the clients needs.

That analytical framework was applied for a better understanding of the strategies that are being followed by the local Telecom enterprises and relate them to the portfolio of competencies that is being built.

5. The external environment:

In Brazil, the first stage of operations consisted of an heterogeneous group of isolated regional telephone operators, each one serving a specific locality using imported equipment. In the late 1960s, a national Telecoms company – Telebras - was created as the main responsible for the development and operations of Telecoms. That decision combined the imperatives of the
macroeconomic model of import substitution followed at that time, with the interests of the Military Government who saw in Telecommunications an area of strategic relevance in terms of national security and technological development.

Telebras had an operational arm – Embratel – assigned with the responsibility of long distance services and the organization and control of the 23 state network operators. The technological duties were assigned to CPqD – Center for Research and Development which, to a certain extent, played the role that the above mentioned labs used to play. The main concern of the CPqD was to create local capabilities in Telecommunications technologies, through its own research activities and integrate the activities undertaken by universities, enterprises and other research centers.

Until the late 1980s, large state investments, trade protectionism and subsidies created privileged conditions for the development of local suppliers. Subsidiaries of foreign specialist equipment suppliers already existed but their scope of activities was heavily influenced by the technological regime that was imposed by Telebras and the CPqD through the establishment of specific operational standards, designs and technologies. The subsidiaries that already had settled their roots in Brazil were originated from countries which had small internal markets: the Swedish Ericsson, the French Thomson, the Japanese NEC.

By the mid 1980s, the Brazilian Telecommunications industry started to undergo a critical situation due to the economic policies adopted by the State. After the fall of the military regime, Telecoms lost part of its strategic relevance and under the economic trade balance crisis the industry was used as a mechanism in the search for economic stability, through contention of tariffs and restrictions to investments. As a consequence, the expansion of telecommunications system was so limited that it could not even meet the basic demand; in the early 1990s, Brazilian indicators pictured a quite unhealthy sector. (Fleury and Fleury, 1995)

With the exhaustion of the import substitution model and the increasing insertion of the country in the globalised economy, a new model for the Telecommunications industry was needed.

Following the global trend, in the early 1990s, Brazil decided to develop a new model based on deregulation and privatization.

In 1997, the Brazilian Congress prepared the General Telecommunications Law to redefine the new institutional model. ANATEL, the National Telecommunications Agency – organism responsible for regulating and controlling telecommunication services, was created. ANATEL was thereon responsible for implementing the national telecommunication policy; regulating and controlling telecommunication services and networks; managing the concession agreements; determining and controlling service fees; establishing norms and standards, among others. The concession agreements aimed to guarantee the “universalisation” of telephone services within the required standards of speed, quality and price. “Universalisation” meant the access of any person to the service, independently of place or socio-economic condition which, in practice, should be gradually attained.

The main objective of restructuring process of the TELEBRÁS system was to establish a network really capable of servicing the local market, involving the implementation of enterprises of significant size, able to generate their own resources and to make investments in all regions of the country; to make a wider number of partnerships with global partners possible in the national market and to increase the regulatory action efficiency, allowing the for comparison among operators and lessening the information gaps.
The shareholder composition in each of the holdings (incumbents) was very diverse. The three fixed telephone operators became structured as follows: a) North and East: Brazilian private groups; b) Centre and South: Italian Telecom, Brazilian private groups and pension funds; c) Sao Paulo state: Spanish Telefonica; Bilbao Viscaya Bank and Iberdrola. As to Embratel, the former Telebras’ network operator, it became controlled by MCI –USA.

As to the mobile telecommunication operators, the principal players were chosen in bidding processes: Portugal Telecom, Telefonica Moviles of Spain, Telecom Italia, TIW (Canada), BID (Splice-USA), Telia (Sweden) and the Brazilians BCP and Algar.

In other words, the enterprises who took charge of the network operations were the recently privatised network operators of European countries or the so called new entrants (as the case of MCI).

The movement of the network operators was followed by 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 aimed at the characterisation of the competitive strategies and the identification of the concerns in terms of competence building in those subsidiaries, as an indication of the pattern that the TNCs have being choosing in building their international networks.

6. Research outcomes

6.1 Competitive strategies and core competencies in the new industry

As previously mentioned, three equipment-supplier enterprises were studied (one European, one Japanese and one American), three mobile communication network operators (two European and one Brazilian) and two large users (a bank and a newspaper producer, both Brazilian) and the CPqD in its new institutional position.

At these companies, we interviewed two or three persons from the directive board who were responsible for the enterprise strategy and planning as well as competencies management. The interview script focused on the following aspects: competitive strategy, critical functions, relationships upstream and downstream, service and product development, operations activities and management, human resources management. To gather complimentary information we also visited two great users (a bank and a newspaper), and a technological research center.

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.

In the analysis of products/services and markets we utilised the model developed by Silvestro (1999) which allows the positioning of each firm in the diagonal volume-variety. In that diagonal there are three basic types of services: Mass Services, Services Shop and Professional Services.
6.2 Network Operators

The network operators have undergone two phases since the privatisation process. The strategy was initially oriented to fulfilling and anticipating the targets established by the local regulatory agency. This meant very heavy investments for the implementation of infrastructure that would allow the expansion of basic services and the introduction of new products and services. Under these strategies, they anticipated the targets and, most of all, pre-empted the market for the new entrants – the mirror enterprises. With that they are now allowed to operate under a new regulatory system which is less restrictive and does not settle institutional targets. Therefore, they have much more freedom for establishing their own competitive strategies.

So, those firms are trying to understanding the services they can provide for their customers. Currently, the network operators are segmenting their market according to three client/service types, their characteristics being similar to the types proposed by Silvestro.

The first segment concerns the customers that demand voice transmission only: basic services. The second segment includes the clients who, besides voice transmission, demand supplementary services such as answering machines and are interested in having low volume data transmission services, such as broad-band, WAP and SMS-Short Message Service. At present, about 20% of the enterprises income is derived from these services. The third is the corporate market which is treated in a totally customised way. This market involves voice transmission and high volume data transmission.

In the case of basic services, the goal is an increase in scale and minimisation of costs to optimise the margin per client. The role of Marketing is fundamental in scale increase. Even if there are problems with quality levels and loss of clients (“churn rate”) the number of new subscribers is bigger than that of the ones who quit. Therefore, there is not too much concern with that.

In the differentiated services, the goal is to launch new services to raise clients loyalty and increment the use of the network, as well as to increase revenues. As the local market is not yet well understood in its demands for communication services, the risk for new launchings to fail is not negligible. One of the enterprises in our sample was considered innovative and the other two were followers. The role of Marketing is related to identifying clients profiles so that the choice for service and the investments associated to the launchings may be optimised.

Finally, in the case of corporate services, the aim is to create solutions and systems which, in the end, generate demand for the installed network, be it in terms of voice or data transmission. A relationship with the client is personalised by creating structures for this end. Specialist equipment suppliers participate in joint projects.

Therefore, network operators are primarily concerned with the development of a better understanding of their distinct markets and operating as efficiently as possible in each one. They need to introduce innovative services for a certain market segment (the Service Shop segment) and they have to act as a kind of specialised consulting firm in the corporate market (the Professional Services part).

Therefore, in the case of network operators, core competencies should be associated to Operations and Sales & Marketing, not necessarily with R&D in the strict sense of the term.
6.3 Specialist equipment suppliers

As to the equipment suppliers, two of them were already operating in the country in the pre-privatisation period. Due to the specificities of the local market, both in terms of demand and regulations, but aligned with the competencies that were being developed at their headquarters, those companies were operating according to a “Local Product Innovation” strategy, following the rules and specifications made by Telebras and the CPqD.

The third company settled in the country in the second half of the 1990s. The plant was designed and operated according to an Operational Excellence strategy, producing global products, designed elsewhere, exporting world-wide while competing with the other subsidiaries in terms of price and delivery. That was already a sign of the new telecommunication industry operating patterns ruled by global standards instead of local standards. R&D activities became centralised and to the subsidiaries an strictly operational role was assigned.

Nevertheless, those three firms are migrating towards a Customer Driven strategy. This is due to endogenous factors (the new clients’s profiles, the new rules of competition), but also to exogenous factors (the adoption of global standards, the establishment of new roles for the subsidiaries vis-a-vis the global strategies of their parent companies). Local activities prioritise servicing the clients. As an example, one of the firms is heavily investing in an internal programme entitled “Competence Shift”, aiming to create a new corporate culture. These firms are defining their strategies as Integrated Solution Providers.

If we look at the global strategies of those equipment suppliers we observe that product innovation is generally associated with strategic alliances with firms in complementary industries as is the case of the Ericsson-Sony agreement. The role of subsidiaries seems to be the development of systems and devices that would improve the operations of their local clients, often using a partnership with CPqD. Thus, heavy investments in the development of software (e.g. billing systems) or for the optimisation of network utilisation are in the project portfolio of those companies.

In the same way of thinking and acting, due to the recognisance that Manufacturing is not their core competence, those firms are using the services of Manufacturing Contractors, thus outsourcing the bulk of their manufacturing activities.

Summarising, local specialist equipment suppliers are now supplying their local clients under a Customer Driven Strategy. Understanding the client’s businesses and developing solutions (systems, components, ...) is the key competitive factor. The Product Development and the Operations functions have a supportive role.

7. Final comments

The main conclusions are

- the transitory character of Manufacturing as the core competence of SES;
- the current emergence of the concept of service as the main determinant for strategy formulation and competencies formation, at the different levels of the network;
- the supportive role of Manufacturing that is kept in-house as long as it has strategic relevance for product and service innovation;
• the increasing complexity of supply networks, requiring differentiated competencies for effective coordination.

In terms of International Manufacturing Model building the case points to the necessity of incorporating dimensions of temporality and the relative autonomy in terms of defining strategies for enterprises that are part of interorganisational networks.

REFERENCES


