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DOMESTIC MARKET AND INTERNATIONALISATION
IN THE TELECOMMUNICATIONS EQUIPMENT
INDUSTRY: TELETTRA ESPAÑOLA
AT THE END OF THE 20TH CENTURY*

This article explores the role played by European multinationals and their subsidiaries in shaping the global market for the telecommunications equipment industry. It focuses on the subsidiary of the Italian multinational Telettra SpA, successively called Telettra Española and Telettra España. This company was closely linked to the monopoly of the Spanish telephone service, that is to say, the Compañía Telefónica Nacional de España, due to its vertical integration with it. The study, of a descriptive and interdisciplinary nature, is based on both primary and secondary sources, such as the testimonies of the protagonists and the press.

Telettra SpA, Telettra Española, Telettra España, telecommunications equipment, diversification, internationalisation

L'articolo esplora il ruolo svolto dalle multinazionali europee e dalle loro filiali nel plasmare il mercato globale dell'industria delle apparecchiature di telecomunicazione. In particolare, si concentra sulla sussidiaria della multinazionale italiana Telettra SpA, inizialmente denominata Telettra Española, poi diventata Telettra España. Questa società era strettamente legata al monopolio del servizio telefonico spagnolo, cioè alla Compañía Telefónica Nacional de España, grazie alla sua integrazione verticale con essa. Lo studio, di carattere descrittivo e interdisciplinare, si basa su fonti sia primarie che secondarie, incluse le testimonianze dei protagonisti e la stampa periodica.

Telettra SpA, Telettra Española, Telettra España, apparecchiature per le telecomunicazioni, diversificazione, internazionalizzazione

* This study is assigned to the Centre d'Estudis 'Antoni de Capmany' d'Economia i Història Econòmica, Department of Economic History, Institutions and Policy and World Economy, Faculty of Economics and Business (Universitat de Barcelona, Spain). I would like to thank those responsible for supporting my research as well as the editors of this Journal and the anonymous reviewers. I am very grateful to Andrea Giuntini for his elegant and effective role as intermediary. My gratefulness also extends to Mariluz Congosto, Carmen Pagés Arévalo, José Ignacio Alonso Montes, Daniel E. Anselmo, Jesús Banegas, Héctor Mario Carril, Jorge Chorni, Roberto De Filippi, Damián Martínez Muñoz, Ignacio Menéndez de Luarda and Eduardo Serra Reixach.

Introduction

This article addresses the role of European multinationals and their subsidiaries in shaping the global market in the telecommunications equipment industry. It focuses on the subsidiary of the Italian multinational Telettra SpA, initially called Telettra Española and, since 1988, Telettra España. This company was closely linked in its creation and trajectory to the monopoly of the Spanish telephone service, that is to say, the Compañía Telefónica Nacional de España (CTNE), because of its vertical integration with it. While the parent company has been the subject of monographic studies of varying scope, the Spanish company has not received the attention of economic and business historians¹.

The interest of the study on Telettra Española/Telettra España (TESA) lies in several aspects related to the location and structure of the market. Firstly, its nature as a subsidiary of a southern European multinational, considered a small jewel, well equipped with capable managers and a strong presence in international markets, but a rich yet isolated province of the «empire»². As a second point of interest, the country of origin of Telettra SpA, a non-central power, presented a profile of a marginal global producer of telecommunications equipment and services³. A third area of interest concerns the medium-small size of this multinational, which is clearly different from the giants of the sector such as AT&T, IT&T or Alcatel itself. Telettra SpA also presents a case of horizontal integration of the Italian industry, since it has belonged to Fiat from 1968, when the carmaker acquired 35% of that company as a result of a strategy of sectoral diversification. Fiat's primary object – the car industry – did not necessarily incline it to turn to a company from another field if difficult times came in its core business⁴. The fifth issue places us in a changing regula-

¹ E. PONTAROLLO, *La fabbrica degli imprenditori: Telettra e i suoi spin off*, Milano 2002; L. SOLIMENE, *Gli appuntamenti mancati dall'industria italiana: il caso Telettra*, «Annali di storia dell'impresa», 13 (2002), pp. 287-320.

² *Metà del mercato delle centrali è ora in mano alla neonata Telit*, «La Repubblica», 18 September 1987.

³ CIA, *The Italian telecommunication industry*, Washington 1986, p. 3.

⁴ See G. SCOTTI, *Fiat, auto e non solo*, Roma 2003, p. 50; G. VOLPATO, *Corporate Governance at Fiat SpA*, Report prepared for the Research Project «Corporate Governance, Innovation, and Economic Performance in the EU», 16 November 2001, p. 63. As a result of the reorganisation in the second half of the 1970s, Fiat was set up as a holding company comprising twelve business sectors (R. CERCOLA, *L'intervento esterno nello sviluppo industriale del Mezzogiorno: analisi della situazione attuale e delle tendenze recenti*, Napoli 1984, p. 113). In addition to Telettra SpA, several companies in

tory environment – the shift from the predominance of the public telephone monopoly to liberalisation – and in the face of a process of reconstitution of the telecommunications industry. Finally, according to the scholars, the internationalisation of Telettra SpA by direct investment was the result of replicating the formula used with Telettra Española/Telettra España in the various countries, both in large powers and in the recently industrialized ones. Giving the managers (monopolists) the majority of shares was a necessary toll to enter the country, since what was really important was the control of the technology⁵. It should be noted that the subsidiary under study here was controlled, at least initially, not by the parent company but by the monopoly operator of the telephone service, the CTNE.

The parent company Telettra SpA was located in the Brianza triangle, around Vimercate, a region that owed the name of Lombardy's Silicon Valley to the concentration of high-tech industries. The company was different from SIT-Siemens, a vertical integrated manufacturer predecessor of Italtel, which supplied more than half of the Italian market. Indeed, it had managed to build up expertise in electronics through its specialisation in transmission technology, one of the three major areas which, together with customer and switching, make up

the electronics industry confirmed Fiat's diversification: SGS (active components), Magneti Marelli (radio and television receivers) and ATES (components) (US OFFICE OF INTERNATIONAL MARKETING, *Export Opportunities for Electronics Industry Production and Test Equipment*, vol. 57, U.S. Department of Commerce, Washington 1974, p. 113). The weight of telecommunications within the Fiat group increased during the 1980s as Telettra represented 12.8% of Fiat's total workforce in 1988, three percentage points more than five years earlier, while turnover had risen from 6.10% to 8.62% in 1988. In 1989, a key year for Telettra SpA, telecommunications contributed 3.13% of net revenue, 21.33% of operating profit, 2.74% of investment and 3.04% of employment to the Fiat group [«Sistema Informativo», 6 (June 1990), p. 1]. On SGS, a pioneering European initiative (1957) in the semiconductor industry, promoted by Telettra in partnership with Olivetti and Fairchild, see F. ONIDA, G. BERTA, M. PERUGINI, *Old and New Italian Manufacturing Multinational Firms*, in *The Oxford Handbook of the Italian Economy Since Unification*, ed. by G. Toniolo, Oxford 2013, pp. 417-454.

⁵ See L. DE BIASE, G. CARAVITA, *Elettronica italiana: una storia con un futuro*, Roma 2013; PONTAROLLO, *La fabbrica degli imprenditori*, p. 76. The manufacture of telecommunication equipment in newly industrializing countries spanned from the reasonably modern range based on independent designs – digital switching and integrated circuits – to manufacturing in obsolete plants under foreign license [F. IVANEK, T. NULTY, N. HOLCER, *Manufacturing Telecommunications Equipment in Newly Industrializing Countries. The Effect of Technological Progress*, «The World Bank Technical Paper», 145 (1991), p. iv]. Telettra was among the five companies – Pecom Nec, Siemens, Pirelli and Saida – that were the beneficiaries of alleged overpayments investigated by the Argentine Justice («Clarín», 4 July 2000).

the global telephone network⁶. Telettra SpA was an innovative company in the design and production of radio and electronic components linked to the demand of the telephone operator SIP (Società Italiana per l'Esercizio Telefonico p.A.), mainly oriented to the national market⁷. It led to the development, in the early 1970s, of a second generation of time division digital switches, known as SINTEL⁸. At that time, Telettra SpA had put into production a wide range of equipment – circuits, for both FDM and PCM multiplexers, line systems, radio relays, electronic switchboards, remote monitoring and control equipment⁹. In the middle of the same decade, Telettra launched the first digital telephony applications on radio links and coaxial cables. Its status as a substantial supplier of radio equipment placed it in a segment of the telecommunication equipment market – transmission – characterized by a continuously changing technology and a type of business based on a varied range of products – high density circuits, radio frequency resonators, mechanical and quartz filters, optical components and gallium arsenide field effect transistors.

Europe's own situation was one of fragmentation of the telecommunications market into national portions, caused by the fact that national telecommunications authorities generally tended to place their orders with national suppliers¹⁰. However, this structure was to undergo profound changes from the 1980s onwards.

⁶ *Public technology procurement and innovation*, ed. by Ch. Edquist, L. Hømen and L. Tsipouri, New York 2000; P. LLERENA, M. MATT, S. TRENTI, *Public technology procurement: The case of digital switching systems in Italy*, in *Public technology procurement and innovation*, pp. 223 and 226; D. ROGGA, *Hybrids in Telecommunications*, «Electrocomponent Science and Technology», 5 (1978), pp. 3-7; *I 5 fattori dello sviluppo locale. Cultura, produzione, lavoro, leadership e megatrends nel futuro della Brianza*, Milano 2011. Transmission accounted for 65% of Italian exports of telecommunications equipment (CIA, *The Italian telecommunication industry*, p. 3).

⁷ L. CASTELLUCCI, R. GIANNETTI, 'Leaping Frogs' in the Demography of Manufacturing Firms (1911-71), in *Forms of Enterprise in 20th Century Italy: Boundaries, Structures and Strategies*, ed. by A. Colli and M. Vasta, Cheltenham 2010, p. 235.

⁸ R.J. CHAPUIS, A.E. JOEL, *100 Years of Telephone Switching*, Amsterdam 2003, p. 433.

⁹ ROGGA, *Hybrids in Telecommunications*, pp. 3-7. FDM: Frequency Division Multiplexing; PCM: Pulse Code Modulation.

¹⁰ J. PELLISÉ, *La explotación abusiva de una posición dominante (arts. 82 TCE and 6 LEDC)*, 1996, p. 194, <https://www.tesisenred.net/bitstream/handle/10803/1405/TOL101.pdf?sequence=1>. Telettra SpA was active in the public network market for around three quarters of its sales, consisting of products for transmission over physical lines – multiples and digital systems on optical fibre – and over radio transmitters-microwave links and the public mobile radio product ranges. Sales to private

1. *Telettra SpA: diversification and internationalisation*

The origins of Telettra SpA go back to the creation at the beginning of the second post-war period (1946) of a company whose name perfectly revealed its ambitions to undertake an industrial activity merging telephone, electronics and radio. The latter and the multiplex became the platform for expansion into Italy and various peripheral markets in southern and northern Europe, i.e. Greece, Turkey, Yugoslavia and Ireland, as we will point out later. In the sixties, two decades after its creation, Telettra SpA renewed with the enterprising spirit of Raffaele Palieri, director of an industrial group decided to strengthen its position in foreign markets and to internationalize its production, a way of convergence with Spanish interests, a central issue in this study. Telettra SpA had almost 9,000 employees and twenty sales offices around the world, with a turnover of about \$ 1.23 billion. The telecommunications section of the Fiat group in 1990 was mainly concentrated in Europe, the largest market for the group as a whole¹¹. It was composed of the parent company Telettra SpA and three other main units in Italy (Sistema – Società di Informatica e Telecomunicazioni, Telettra Tecnet, TTN-Sistemi di comunicazione) and in Spain (Telettra Española, S.A.), in Norway (Telettra Norge) and in Luxembourg (Telettra International S.A.H.). The second largest concentration was in Latin America, with three companies (Telettra Industrial S.A. in Mexico, ABC-Telettra Telecomunicações S.A. in Brazil and Telettra Argentina Sociedad Anónima, Industrial y Comercial (SAIC), with a capital of 118,000 pesos¹². The list of the most

networks, which represented around one fifth of total turnover, were made primarily through carrier systems for high and medium voltage lines, train-to-ground communication systems and a wide range of other transmission products; systems for the monitoring of various forms of networks, private branch exchanges and key telephone systems absorbed the remainder of Telettra's activity in this area: M. JOHN, *Telettra sets consciousness raising programme as prelude to quest for partners*, «Computer Business Review», 21 November 1989.

¹¹ FIAT, *Annual report pursuant to section 13 or 15(d) of the securities exchange act of 1934. For the fiscal year ended: December 31, 1989*, Commission file number 1-10108, F-20.

¹² Telettra Argentina SAIC was intended to engage in industrial and commercial operations. The former comprised the manufacture, installation, maintenance, R&D of machines, systems, equipment, appliances and accessories, especially in the electronic, electromechanical and telecommunications sectors, mainly for the transmission and processing of information, process automation and related technology. The commercial activities included the import, export, purchase, sale of goods, machin-

significant companies was completed by five others, spread over four continents (Telettra Saudi Arabia Ltd., Telettra USA, Telettra Electronics Pty Ltd. and Telettra Swaziland Pty Ltd.)¹³.

On the other hand, internationalisation consisted of trade expansion abroad, often a way out of the fragmentation of the internal market. Thus, in 1981, Telettra SpA reacted to the apathy of the domestic market – an effect of the different general situation of the country and of the pending reorganization of the network management – in a context of important growth of the international telecommunications market with an increase of exports by 50% with respect to the previous year. The acquisitions in Saudi Arabia, Iraq, Norway, Australia and Brazil, which coincide with the company's presence as a manufacturer, were noteworthy¹⁴. By the late 1980s, unlike Italtel, which had a very low export intensity or ratio of export value to

ery, systems, equipment, apparatus, accessories, processed or to be processed raw materials, representations, distributions and consignments. Almost all the creators were liberal professionals of Italian nationality: four engineers (Pasquale Tártara, Pedro Aria, Virgilio Minzi and Salvatore Randi), a lawyer (Rafael Palieri), two economists (Ferruccio Verri and Amelio Peduzzi), an electronic technician (Mario Zanfi). The local part was represented by the Argentine economist Juan Born («Boletín Oficial de la República Argentina», 20 July 1971, pp. 1-5).

¹³ FIAT SpA, 85° Esercizio. *Relazioni e bilancio al 31 dicembre 1990. Assemblea degli azionisti*, Torino 27-28 Giugno 1991, p. 12; P. SARCEVIC, *Major Energy Companies of Europe 1989/90: a Collection of Essays*, London 2012, p. 122. Italy was the second country behind the USA in the volume of foreign investments authorized in Argentina between 1977 and 1983 (Economic Commission for Latin America and the Caribbean, *Las empresas transnacionales en la Argentina*, Working paper, 16, Buenos Aires 1985, p. 65; ID., *Nuevas formas de inversión de las empresas extranjeras en la Industria Argentina*, Working paper, 33, Buenos Aires 1989, pp. 40 and 54). One example of supply to Australia was equipment for research laboratories («Commonwealth of Australia Gazette», G6, 10 February 1981, p. 66).

¹⁴ FIAT, *Bilancio consolidato del gruppo Fiat*, Torino 1981. In June 1982, Telettra SpA and Thomson-CSF (France) were awarded a \$18 million contract under the MEDARABTEL telecommunications plan, formulated by ITU and funded by the United Nations Development Programme together with participating countries, to establish a microwave link between Saudi Arabia, Yemen, Djibouti and Somalia. Telettra SpA installed a local digital microwave system in Riyadh to connect government buildings with certain official government residences (US CONGRESS, *Technology Transfer to the Middle East*, Washington 1984, pp. 192-210). Brazil, as well as India and Yugoslavia, belonging to the group of developing countries, had the necessary highly qualified human resources (IVANEK, NULTY, HOLCER, *Manufacturing Telecommunications Equipment in Newly Industrializing Countries*, p. iii). British Telecom awarded Alcatel Telettra Norway (Halden), a subsidiary of Alcatel Telecom Norway, a NOK 500 million contract for the supply of fibre optic systems to the high speed ISDN network in the United Kingdom («Telecompaper», 6 April 1995).

production value (around 6%), Telettra was highly exposed to international competition (export intensity was over 50%)¹⁵. Access to foreign markets was largely based on the transfer of knowledge and human capital to the buyer countries. A complementary way of expanding trade abroad was through the conversion of several companies around the world into licensed manufacturers of the company's products, including Nikola Tesla in Yugoslavia, A.W.A. Ltd. in Australia and Raytheon in the United States¹⁶.

Let's take a moment to look at the mechanisms of penetration in international markets. To begin with, the subsidiaries, sometimes acting in a coordinated and complementary manner, offered an instrument for entry into the respective countries, as happened, for example, in Mexico. The local subsidiary of Telettra, please note, in alliance with the Spanish one, was awarded a contract of 21 million dollars to install a multi-access rural telephony network of Teléfonos Mexicanos (Telmex). Telettra Española provided the transmission equipment for an amount equivalent to more than half of that sum, while the Mexican subsidiary guaranteed all local infrastructure and the implementation of the network¹⁷.

The case of Argentina makes it possible to define different levels

¹⁵ COMMISSION OF THE EUROPEAN COMMUNITIES, *The "cost of non-Europe" basic findings*, «Studies on the economics of integration», 2 (1988), p. 261. Palieri, Managing Director of Telettra SpA, foresaw that although competition is the "natural environment" of the industry, large-scale and complex programs would require cooperation between companies [«Strategic Digest», 16 (1986), p. 135].

¹⁶ PONTAROLLO, *La fabbrica degli imprenditori*, p. 76. As an example, Nikola Tesla manufactured digital multiplexing equipment of Telettra design [«Telecommunications», 15 (1981), p. 88].

¹⁷ P. ALONSO, *Las relaciones México-CE*, «Afers Internacionals», 23-24 (1992), pp. 205-224; «ABC», 6 October 1989. The example would allow one to presume that TESA played an important role in the parent company's commercial expansion throughout Latin America. In fact, a former manager of Telettra Española acknowledges the market delineation between the parent company and the Spanish subsidiary, which is clearly oriented towards the domestic market and that region (Author's interview with Eduardo Serra Reixach, 16 October 2019). Similarly, Spain served as a bridge to invest in Italy in telecommunications, as was the case with Alcatel's investment in Telettra Telefonía e Radio, equivalent to 35 percent of Spanish flows in the country [see A. ARAHUETES, A. GARCÍA DOMONTE, *Las Inversiones Directas de las empresas españolas en la Unión Europea, 1986-2002*, Real Instituto Elcano, Working Paper 13, 2003, p. 11]. Telettra SpA's activities in Mexico go back a long way, since in the early 1970s, together with the public Instituto Mobiliario Italiano, it financed that country's telecommunications program, which included the installation of transmission equipment («El Informador», 17 January 1970, and 9 February 1970).

of intervention by companies, without forgetting the role of the State. Telettra Argentina SAIC, registered in 1971, was acquired from Fiat SA by Techint, which thus managed to enter the switching equipment industry after a first attempt through the PAT SA consortium – an association with the Astra economic group and the Philips subsidiary in Argentina. The grouping with the main multinational suppliers in the Unión Transitoria de Empresas (Siemens SA, Alcatel SA and Pecom-Nec SA, a joint venture between the local economic group Perez Companc and Nec of Japan) allowed it to be awarded the installation of digital exchanges in Buenos Aires. The project was worth USD 800 million and was partly financed with the funds provided for in an agreement between Argentina and Italy¹⁸. As it occurred with the former IT&T companies in Europe, Telettra Argentina was integrated into the French multinational group Alcatel, giving rise to Alcatel-Techint¹⁹.

2. *Telettra Española*

The multinational Telettra SpA began to have a significant presence in Spain between 1956 and 1966 through a commercial delegation, a low of commitment according to the scale set out the gradual scheme of internationalisation of companies advocated by the Nordic school of Uppsala²⁰. The allocation of the tender for a large

¹⁸ In 1987, the governments of Argentina and Italy signed a special partnership agreement that included a Program of Support for Argentine Economic Development, aimed at increasing productive investments by approximately \$5 billion, one third of which was aid credit resources. Within this treaty, considered by President Alfonsín as a model for North-South relations, the Argentine government awarded the project for the digitalization of links between urban and interurban offices and data networks (DIGI II) (see: Economic Commission for Latin America and the Caribbean, *Nuevas formas de inversión*, pp. 40 and 54; and Economic Commission for Latin America and the Caribbean, *Las empresas transnacionales*, p. 65; «Latin American markets», 149-173, 1987, p. 49). The link between the supply of subsidized equipment and concessions for the operation of the service is clear (W. MOLANO, *The Logic of Privatization: The Case of Telecommunications in the Southern Cone of Latin America*, Greenwood Press (1997), Westport, CT, p. 83). Telettra was, together with Siemens, Pecom Nec – of the Perez Companc group – and Telettra and Italtel – of the Techint group – part of all the main contractors of the operator EN-TEL.

¹⁹ «Expansión», 926-928, 1995, p. 41.

²⁰ We limit an extensive literature to a single reference: J. JOHANSON, J.E. VAHLNE, *The Uppsala Internationalization Process Model Revisited: From Liability of For-*

telegraph network (GENTEX), for which Siemens and IT&T competed, made the Italian multinational a stable partner²¹.

In 1956, market presence was raised through the creation of a very first organizational structure. From this, the Sociedad Comercial Telettra Española S.A. was born with 5 million pesetas of capital and a participation of 15% by Francisco de la Vega, representative in Spain of Telettra Società per Azioni (Telettra SpA). The CTNE was soon to play a decisive role in the company's development. Indeed, Rebollo, the managing director of the monopoly operator, was looking for a dual supplier to compete with IT&T's Electric Standard. Finally, the choice of Telettra SpA as a provider and the signing of the subsequent contract certified the birth of a new industrial company²².

As a matter of fact, Telettra Española was born out of the new strategy by which, in the 1960s and early 1970s, the CTNE sought to break with the tradition of a single supplier and admit additional providers to ensure procurement. This was a strategy of diversification that was based on the three main products for the telephone service, namely transmission equipment, cables and switching. Thus, together with Standard Eléctrica, Telettra Española, Intelsa, Cables de Comunicaciones and Citesa emerged. As a result of this strategy, the CTNE set up an industrial holding company that was dismantled under the guidelines of the Uruguay Round and the EEC, the latter institution into which Spain was fully integrated in 1986, in favour of a single European market²³.

Ten years after the constitution of the first commercial structure, the Italian multinational Telettra Società per Azioni and the CTNE joined forces at 51/49% to create Telettra Española (1966). Throughout its history, Telettra Española divided its activity between various

eignness to Liability of Outsidership, «Journal of International Business Studies», 9 (2009), pp. 1411-1431.

²¹ «Boletín Oficial del Estado» (Official State Gazette, hereinafter *BOE*), 183-194, 1982, p. 21530.

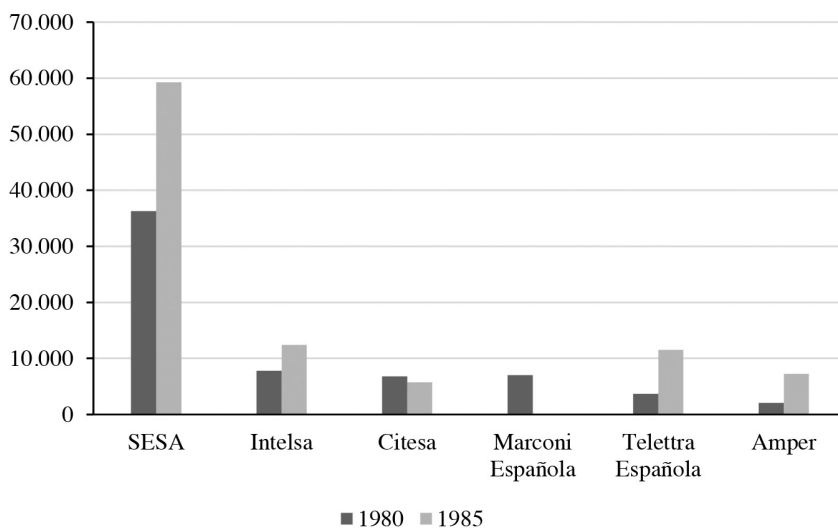
²² The key executives of Sociedad Comercial Telettra Española S. A. were held by Italian managers –Ferruccio Verri as president and Evaristo Gatti as general manager (G. MARZOCCHI, *Prima parte delle testimonianze sulla nascita 40 anni fa e sullo sviluppo della Telettra Española nella presentazione di Guido Vannucchi durante il pranzo Amici Telettra*, 13 Ottobre 2012, <https://www.youtube.com/watch?v=j2PEMSFnZOQ>).

²³ CONGRESS OF DEPUTIES, Audio transcription of the Commission session, 2 February 1982, n.p., *Response from Sánchez Terán to Luis Solana and Enrique Barón on the alleged conversion of Telefónica into a telecommunications production holding company and whether it is the start of a new telecommunications policy*.

locations in Spain – Torrejón, San Roque and, since 1982, Arteixo, near Madrid, Cádiz and La Coruña, respectively. This dispersed location was due to a scheme of specialization of the factories by products: complex equipment of short series radio (Torrejón); multiple equipment (San Roque) and systems of tariffing, supervision and telematic terminals (La Coruña)²⁴. Torrejón was the main establishment comprising a production plant and a research centre integrated with that of Telettra SpA, with the rare privilege of belonging to the restrictive group of companies with their own R+D centre. The Spanish market, which represented around 35% of Telettra's consolidated turnover, was of strategic importance to the Italian multinational. Together with Italy, the parent company's country of origin, Spain represented a «national» country for the activities of Telettra SpA.

At the outset of the 1980s, Telettra Española (TESA) was one of

Graph 1 – *Telettra in the telecommunication equipment manufacturing sector: turnover in millions of ptas*



Source: Elaborated from Telecommunications Commission, *Situación de las Telecomunicaciones en España*, «BIT», May-June (1987), p. 56.

²⁴ At the time of its acquisition, the Arteixo (La Coruña) factory had 232 employees (TELETTRA ESPAÑA, *Telettra España, 1966-1991*, Departamento de Comunicación e Imagen, Madrid 1992, pp. 113 and 115).

the smallest units in the group of six major companies in the telecommunications equipment industry in Spain and was part of the electronics and microelectronics industry, which was heavily concentrated in the Madrid region, home to 90% of the Spanish IT and defence industry. Its turnover was between the positions of Citesa at the top and Amper at the bottom (see Graph 1). If we refer to any of the specific technology and equipment markets in Spain, TESA was part of the group of four most important high-tech companies that supplied Telefónica with 87 percent of the national production, slightly below those of Standard Eléctrica, the recently mentioned Citesa and Intelsa (94, 95 and 88 percent, respectively)²⁵.

It had a share capital of four hundred million pesetas and a staff of 1,500 employees – between Marconi's position at the top and Amper's at the bottom – 10.6% of whom were in research laboratories. Under the presidency of Mariano Jacquotot, Telettra Española incurred no major losses, although the results were not always entirely satisfactory, as happened, for example, in 1984. The company even conceived expansion plans, among which the purchase of Intelsa's plant in La Coruña stood out, conditioned by the technological evolution – passage from electromechanical plants to electronic plants – and its repercussions – excess of personnel²⁶. But difficulties were ap-

²⁵ CORTES, *Diario de Sesiones del Congreso de los Diputados*, 15 November 1979, p. 2187. For Madrid's electronics cluster, see L. SUÁREZ-VILLA, R. RAMA, *Outsourcing, R&D and the pattern of intra-metropolitan location: the electronics industries of Madrid*, «Urban Studies», 33 (1996), pp. 1155-1197. In 1990, Telettra España achieved a turnover of PTA 53,8 billion and a net profit of PTA 9,5 billion (ITL 112,2 billion compared with ITL 110 billion in 1989); on this see FIAT SpA, *85° Esercizio*, p. 35.

²⁶ The two Intelsa partners – Ericsson and Telefonica – in two working sessions in Madrid and Stockholm studied the scheme to refloat the company. In the environment of the CTNE it was seen that the factory of Arteixo (La Coruña) was more and more on the fringe of Intelsa's central factory in Madrid. In the program of objectives a greater financing of the company was marked with capital increase and an increase of the number of lines to manufacture – 40,000 –, distributed equally between the operator and Ericsson. The integration into Telettra was considered an “excellent, brilliant solution” because it boosted a growing company and moved a well-conceived but no longer functioning factory into the field of transmission. The plant, which was threatened with closure, achieved an adequate technological level and the employment problem was solved. Sánchez Terán even presumed to have been questioned by the workers of La Coruña and they found that it was a good solution (CONGRESS OF DEPUTIES, Audio transcription of the Commission session, 2 February 1982, n.p., *Answer from Sánchez Terán to Luis Solana and Enrique Barón*

pearing on the demand side which could be considered more secure, the public demand, an unmistakable sign of the accentuation of competition in the sector. As an example of an unfavourable situation, the Basque Government relegated Telettra's equipment to the installation of its own radio-television network, even though it was cheaper and of national technology. The Basque executive awarded several contracts to the company Page Ibérica, which used technology from the North American company Farinon²⁷.

The own R&D activity, a differential element of it as it has been pointed out, was linked to the beginning of the national production in 1972. Then one hundred and a half engineers constituted the first embryo of the future research and development centre. Two years later restructuring in which Telettra SpA organised its activity by division, the R&D activity dealt specifically with digital terminal equipment and all analogue and digital developments of high-capacity transmission lines. Before carrying out such a reorganization, the company sent a representative to Hewlett-Packard to advise on the advantages and disadvantages of the divisional organization²⁸.

In contrast to IT&T, Telettra SpA sought to strengthen the R&D

about the alleged conversion of Telefónica into a telecommunications production holding company and whether it is the beginning of a new telecommunications policy).

²⁷ The president of Telettra Española found political reasons in the Basque government's decision and the government saw legal, technical – inadequate delivery times and delayed Telettra-technology – and economic reasons. The Basque authorities claimed that Telettra's offer included an import element – a progressive wave tube – and that a foreign company – Farinon – was supplying equipment to the central administration for Army, Navy and Civil Aviation installations [CONGRESS OF DEPUTIES, Audio transcription of the Commission session, 2 February 1982, n.p., *Hearing of Mariano Jacquotot Uzuriaga, President of Telettra, Sociedad Anónima (SA), to report on medium-term investment plans in the communications sector*; «El País», 3 February 1982]. ANIEL, employers' association in the electronic sector, advocated the defence of national industry («El País», 14 January 1982 and 15 January 1982). Page Ibérica, founded in 1965, was dedicated to radio and defence installations, air navigation aids and integral security, preferably in the design, supply, installation and maintenance phases («BIT», 23, July 1982, p. 51).

²⁸ *Guido Vannucchi: An Interview Conducted by David L. Morton, Jr.*, IEEE History Center, 29 July 1996, https://ethw.org/Oral-History:Guido_Vannucchi. In the assembly of central units, Telettra SpA tended to coincide restructuring with replacement of human resources, with the twofold objective of increasing productivity and improving response times to the market: G. CAINARCA, M.G. COLOMBO, S. MARIOTTI, *Nuove tecnologie ed occupazione. L'impatto dell'automazione flessibile sull'occupazione nell'industria. Un'indagine microeconomica*, Roma 1991, p. 97.

laboratories with native expertise in each foreign country where it was present, an idea well seen in the countries involved.

Inaugurated at the opening of April 1990, the Research and Development Centre combined highly qualified staff and technical resources and was organized according to modern criteria. In substance, it was based on the separation between theoretical and applied research through the subdivision of each sector of the centre into two parts. In the first part, the researchers completed the theoretical phase of the project with the help of computers, while in the second part, the laboratory, these studies were applied to the equipment and systems. One third of the turnover and R&D was produced in Spain and of that percentage, approximately 7 percent was aimed at the Spanish market²⁹.

The Spanish unit claimed the complete independence of the R&D Centre from the Research Centre in Italy, although it admitted this integration with a division of functions by converting the technology transfer contract into a technology cooperation contract³⁰. The activity of the facility was aimed at the development of products that were later produced in the company's own industrial plants and gave rise to different products, among them the MORE or the Datáfono (Dataphone)³¹. There was also no lack of solutions and methods. Over

²⁹ «ABC», 4 April 1990. In 1989, the R&D department of Telettra España, located in Barajas, had as a director J.J. García; the transmission area was headed by Emilio Gil Delicado (Author Interview with Damián Martínez Muñoz, 25 October 2019).

³⁰ Thus, in the Telettra Española radio system, the VHS was investigated while the matrix developed the high-capacity microwave in Italy; the terminals were run by Telettra Española and the charging systems were done, with variants, in Italy. However, the charging systems sold to Venezuela corresponded to entirely Spanish electronic technology, while the basic technology of Uruguay's microwave network came from Italy (CONGRESS OF DEPUTIES, Audio transcription of the Commission session, 2 February 1982, n.p., *Hearing by Mariano Jacquotot*; «El País», 18 December 1981). The design for the data network was Spanish but the development was done in coordination with Italy (Author Interview with Damián Martínez Muñoz, 25 October 2019).

³¹ The Datáfono generated initial orders of about 25,000 devices manufactured in Arteixo, and later exceeded 100,000 (*Interview with José Luis Adanero*, «Bit», 157, June-July 2006, pp. 14-18; «Computerworld», 23 March 2001). In R&D, engineer Adanero worked as a manager before joining Amper in 1986 («Bit», 204, May 2017, p. 29). After being awarded the MORE works for two years to AMPER and Alcatel, in 1997 the Arteixo plant became the supplier (M. CONGOSTO, *MORE: un avance hacia la digitalización*, in FHT, *Jornada Telefonía Rural*, Madrid 18 October 2018, <https://www.coit.es/noticias/fht-jornada-telefonía-rural>). The accumulation of experi-

time, TESA transferred this technology to other companies, including Telesincro, through its human capital. The company benefited from the experience and knowledge of the parent company at the management, industrial and technological levels. In this sense, no less than nineteen Italian experts were transferred to Spain to accelerate the start of industrial activity³².

The coexistence of various business cultures in Telettra Española fed taifa kingdoms between the different divisions that fought for power among themselves, a situation that the company had to overcome³³. Telettra Española/Telettra España managed to have its own human capital at the different levels of top management, commercial management, finance and control, industrial plants, production and quality and R&D³⁴.

ence and knowledge generated by the design and implementation of the MORE system was not taken advantage of and the components of the team were deprived of new opportunities (Personal communication by M. Congosto to the author, 2 December 2018). As an example, let us point out that Telettra Española manufactured and approved printed circuits type Groups 1 and 2 in San Roque (Cádiz), as well as a keyboard brand Telettra España model T/TNIS, manufactured by Telettra Española in Torrejón de Ardoz (Madrid) (*BOE*, 7 February 1989, pp. 3724-3725; *BOE*, 128, 29 May 1991, pp. 17535-17536). Anonymous sources attribute to Telettra Española the PSTK, PST2, PST3, the TAT, the 24-channel MIC and the DT-30, which are responsible for the automation of the manual exchanges and the transmission of their circuits to the national network.

³² Background on Telettra in A. CALVO, *Standard Eléctrica y la industria de las telecomunicaciones en España, 1877-1975*, Barcelona 2014, pp. 253-257. Among the experts: Manuel Romano as president (1972-1976), Arnaldo Odello as general manager, Alberto Pichio as R&D manager and Michele Giaconia as production manager (1972-1977); engineers A. Odello, Michele Giaconia and Claudio Morino (1988-92) as managing directors; commander Elia as facilities manager (1972-1983) (MARZOCCHI, *Prima parte delle testimonianze*); Giaconia was an electrical engineer at the Politecnico di Milano («ABC», 174, 5 June 1988, p. 23).

³³ In her MAT (Metamodel of Transformational Analysis) diagnosis, Preciada Azancot drew up an action plan to organize leadership and management in which she set the objectives of overcoming fragmentation and creating a culture capable of creating a united work team and establishing strategic planning.

³⁴ Senior management, Barrera de Irimo, President of the CTNE; Rebollo, General Director of the CTNE; Francisco de la Vega; Manuel Roma; Mariano Jacquotot and Eduardo Serra. Commercial management: Banegas, González Carro; Luis Pérez and Vaquero. Finance and control: Chao, Magraner. Plants: González Valencia; Ramos and Vargas. Production and quality: Caro, Castaños, Llorente, Rebollo, Martínez and Ruti. R&D: Adanero, Blasco, Centenera, García Echegoyen, García Pérez, Gil, Menéndez Sánchez and Javier Nadal, some of them trained in Italy (MARZOCCHI, *Prima parte delle testimonianze*). Luis García Echegoyen, who joined Telettra Spain in 1971, the year in which he graduated as a senior telecommunications en-

The company studied stood out especially in rural telephony, as we will point out repeatedly, a field in which it achieved its own developments and notable export successes in the world market. The rural telephony cemented a recognized leadership and nourished of managerial talent to the whole sector of the telecommunications in Spain³⁵.

At the beginning of the 1980s, the company we are dealing with here developed analogue rural radio systems in cooperation with Telefónica I+D, a subsidiary of the Spanish monopoly operator. This was the Multiacceso Rural (MAR 801 and 1604), a point-to-multipoint radio technique capable of serving up to almost a hundred scattered users. Between 1981 and 1983, Telettra Española supplied Telefónica with some 600 systems that enabled it to provide service to more than 50,000 customers in rural areas. Both systems were exported by Telettra Española to more than twenty countries. Its successor, a Symmetric Traffic Concentrator (CDS 96/16), provided service to 40,000 Telefónica subscribers through half a thousand systems. Next, Telettra Española developed the Digital Radio Access System (SMD 30/1.5), which is designed to handle traffic for up to 256 users. Together, these proprietary developments made Telettra Española a world leader in

gineer, returned to Spain after a three-year stay at the Telettra SpA laboratories in Milan to take over the role of service manager in the company's Transmission Laboratory. Between 1985 and 1989, he took over the management of R&D of new products and assumed the mission of developing the new components and technologies division, which included the fields of design, industrialization and manufacturing. In the following two years, he was entrusted with the management of the public networks division, which included R&D, marketing and product planning and sales («BIT», 78, 1992, p. 40).

³⁵ «Computerworld», 23 March 2001. An exceptional example is provided by Jesús Banegas, who spent twelve years at Telettra Española (1972-1985) and exercised his professional career in the pioneering field of new product development and the opening of international markets as a commercial director. From there he became General Manager of Telefónica Sistemas (1985-1986) and he joined Amper (1986-1999) where he remained for nearly twelve years as General Manager. At the end of 1999 he founded I.P. Sistemas S.A. and Fonytel S.A., engaged respectively in engineering and integration of Internet platforms and CTI and voice recognition technologies and advanced multimedia solutions (J. BANEGAS, *La nueva economía española. Impactos de las tecnologías de la información y la comunicación en la economía y la sociedad*, Madrid 2001, p. 12; «BIT», 133, 2002, p. 4). He started at Standard Eléctrica (1970-1972): J. Banegas, *Memorias profesionales*, manuscript (courtesy of J. Banegas with the author). Ignacio Menéndez de Lurca and Navia Osorio moved from Telettra, from the IT&T group, to Amper. On the deployment of rural telephony, see A. GOLDEROS, *El problema del desarrollo de la Telefonía Rural en la España del último cuarto del siglo XX*, in FHT, *Jornada Telefonía Rural*.

this type of technology and generated revenues of more than 35 billion pesetas between 1982 and 1989. Engineers from the now defunct Telettra Española designed radio access terminals (LICEA I) at AMPER, S.A., which were exported to sixteen countries³⁶.

In terms of R&D as a percentage of sales expenditure, it was much more modest than the leader of the top six (Emper) and also the largest (SESA). Telettra Spain dedicated 4.5% of its turnover to research and development, within a growth trend. In the late 1980s, this activity had a twofold objective. On the one hand, it sought to satisfy the needs for new products demanded by the domestic market and, in particular, by the customer par excellence, the CTNE. On the other hand, it aimed to enrich as much as possible the group's product offer to meet the diversity of international markets.

3. *Domestic market and foreign expansion*

The foreign market was an option that Telettra Española considered from early on. In the years between the 1970s and 1980s, Telettra Española installed the aforementioned microwave network in Uruguay, two radio link programs in Argentina and Chile, worth more than four hundred million pesetas and two hundred million pesetas, respectively, and sold electronic equipment to Venezuela for nearly two billion. We cannot overlook several details in the Uruguay operation, along with Costa Rica, the only country with a public monopoly in telecommunications. The first concerns the triumphant competition against the large houses in the sector, namely the American GTE International and Collins Systems, the French Thomson, the German Siemens AG, the Belgian Bell Telephone and the Japanese Mitsubishi and Nippon Electric. Secondly, the contract broke the alleged dependence incurred by the award to General Telephone and Electronics of the extension of the previous microwave systems and the new ones between Maldonado-San Carlos³⁷. The third, not

³⁶ J.L. ADANERO, *El servicio telefónico en las zonas rurales. El problema de acceso y sus soluciones en el último cuarto de siglo*, in FHT, *Jornada Telefonía Rural*, pp. 6-7.

³⁷ US DEPARTMENT OF COMMERCE, *A Guide to Telecommunications Markets in Latin America*, International Trade Administration, vol. 61, Washington 1989, p. 77; ADMINISTRACIÓN NACIONAL DE TELECOMUNICACIONES (Uruguay), *Memoria*, 1976, p. 7; ID., *Memoria*, 1979, p. 3; «ABC», 22 December 1978. The contract with Venezuela envisaged the supply and installation of programmable electronic equipment for tar-

less important, refers to the totally local component of the technology used, since it was developed and produced in Spain³⁸. Entel Argentina also purchased 246 similar devices to those sold in Uruguay and 985 transceivers for four Latin American countries – Uruguay, Chile, Mexico and Colombia –, two European countries – Yugoslavia and Ireland – and two African countries – Ivory Coast and South Africa –, among a long list³⁹. Around the middle of the decade, Telettra Española supplied the Instituto Ecuatoriano de Telecomunicaciones (Ecuadorian Institute of Telecommunications) with rural telephone systems using Spanish technology for a sum of 425 million pesetas, with financing from the Inter-American Development Bank. Also, this time Telettra competed with other foreign companies of the sector, no doubt a condition imposed by the financing organism⁴⁰.

The nature of the exported products, sometimes consisting of entire networks, required the establishment of project offices in the countries concerned, distinct from the trade delegations. These units had the function of tailoring the product to the specific needs of the country concerned and were perishable in nature but involved significant knowledge transfer experiences, somewhat closer to the revision of the initial Nordic theory of internationalization. To take one example, Telettra Española had a project office in Venezuela in which the responsibilities of the members were well defined⁴¹.

iffing the telephone service in more than five hundred exchanges; the contract, worth 20 million dollars (about 1.9 billion pesetas), was financed by the Banco Exterior de España («El País», 18 December 1981). The 1,600-kilometre-long Uruguayan network covered the entire territory, starting with three lines that converged in Montevideo (*Telettra Española construirá la red de microondas de Uruguay*, «El País», 24 November 1978; «El País», 18 December 1981). Entel's plans to expand the microwave network («Intel-trade», 15 December 1978, p. 3).

³⁸ MARZOCCHI, *Prima parte delle testimonianze*.

³⁹ Since 1987 there has been a constant increase in Spanish exports to Mexico, which in 1991 was Spain's first customer in Latin America, well ahead of Cuba. For its part, Spanish investment in Mexico in the 1990s increased considerably, always within modest levels; in 1992, Spain was the seventh largest investor in Mexico (ALONSO, *Las relaciones México-CE*, pp. 219-220). In several contracts obtained in Colombia – with ENTEL and with the Municipal Companies of Cali – the representative of Telettra SpA was a Spanish citizen, resident in Bogotá («Diario Oficial de la República de Colombia», 10 February 1987, p. 9, and 10 March 1987, p. 14).

⁴⁰ «El País», 17 October 1984.

⁴¹ Author's interview with Ignacio Menéndez de Lurca, 28 October 2019. It should be remembered that the Uppsala school initially viewed internationalisation as a gradual process of entering the foreign market, which began with commercial

One facet of internationalization was participation in leading global research programs. Telettra Spain took part in European projects financed by the EEC – Race and Esprit. The activities were aimed at the implementation and development of the European integrated broadband network, advanced radio communications and ultra-wideband fibre optic local area systems. In addition, it was present in the Eureka, Hermes, European radio search system programmes. Of particular interest was the bit rate reduction programme for high definition television, carried out in collaboration with RTVE and RAI, the Polytechnic University of Madrid and Telettra España and Telettra Italy, approved in Eureka⁴².

As on so many other occasions, the celebration of major world events – on this occasion the world football championships – offered the company an unparalleled opportunity. In the public tender for RTVE, Telettra Española was awarded contracts worth 1,700 million pesetas. The contract included the construction of infrastructure and the supply of equipment for the radio links and the supervision systems based on in-house technology developed entirely in the research, systems and software departments of Torrejón, the plant that was entrusted with their manufacture⁴³.

The difficulties of the market so often mentioned led Telettra Es-

offices and led to direct investment in manufacturing (JOHANSON, VAHLNE, *The Upsala Internationalization Process Model Revisited*).

⁴² «ABC», 8 March 1989. The high definition project (HDTV), comparable to the episode of the camel passing through the eye of the needle, had no continuity and was replaced by another developed in Switzerland (MARZOCCHI, *Testimonianze raccolte nella presentazione di Guido Vannucchi dedicata ai 40 anni dalla nascita di Telettra Spagna durante il pranzo Amici Telettra del 13.10.2012*, 2012, <https://www.youtube.com/watch?v=j2PEMSFnZ0>; *Special issue for high definition tv*, «Rivista Telettra Review», 45 (1990), 1, pp. 1-117). Other companies in the sector were: Cables de Comunicaciones, COSESA, ELASA, ENTEL, HRM, IND-ELEC, SINTEL, TEMASA, TEPEsa, THM and TYD. The Department of Electronic Engineering of the School of Telecommunication Engineering (Escuela Técnica Superior de Ingenieros de Telecomunicación, Polytechnic University of Madrid) consisted of three Research Laboratories: High Speed Electronics Laboratory; Systems Integration Laboratory and Speech Technology Group. The mother company collaborated with various universities, in particular those of Bologna, Padua and Pisa.

⁴³ M. FERNÁNDEZ SÁNCHEZ, *Mundial-82: ¿Qué aporta su empresa al M-82?*, «BIT», March 1982, pp. 63-64. Telettra developed the MD5, a digital multiplex with five audio channels and FM quality (Author Interview with Damián Martínez Muñoz, 25 October 2019).

pañola, which was primarily a supplier of radio equipment, to deteriorate due to serious limitations in access to technologies and foreign markets that are not very motivated by an inadequate range of products.

TESA faced the widespread crisis in the sector with a policy of product diversification and trade expansion. To achieve this, it promoted research and development laboratories while increasing commercial activity in Spain and abroad. In this regard, it created a military systems division in the belief that it was convenient to supply the internal defence demand with domestic products⁴⁴.

The drop in exports was extremely serious, as in 1984 it stood at 1.77 billion, or 71.65% of the level of two years earlier. This difficult situation was exacerbated by R&D, which was far from the cutting edge of digital transmission and radio, and by the obstacles to access to the most attractive world markets imposed by the Italian parent company⁴⁵.

Telettra Española benefited from the protection granted by the Government to many Spanish companies in the form of, among others, tax exemptions⁴⁶. Bringing the company out of the doldrums and clearing its future required significant investment to recover cutting-edge technological options, as was attempted with external funding. The European Investment Bank (EIB) stood out in this role, favouring telecommunications over steel and whose loans helped open up a market for six major telecoms companies. The EIB granted a loan of 1,375 million pesetas to Telettra Española. This was one of the first credits from the aforementioned European Community financial institution to the private sector in an operation guaranteed by a foreign

⁴⁴ M. JACQUOTOT, *Telettra*, Jornadas profesionales de Electrónica (Professional conferences of Electronics), Madrid, 20-22 October 1982, https://www.coit.es/sites/default/files/archivobit/pdf/bit024_17.pdf.

⁴⁵ The labor conflict brought up the management style. Telettra Española SA carried out a lockout of its facilities, in the opinion of the workers in response to the legal strike of the staff, due to the lack of collaboration of the company in providing documentation on the wage bill to prepare the collective bargaining agreement and clarity on the issue of social security contributions, as well as abuses of authority by advisors of the mother company (*Cierre patronal en Telettra Española*, «El País», 28 April 1978). In 1983, the workers of Telettra Española (1,700) carried out actions to protest the blocking of the negotiations of the agreement («El País», 19 March 1983).

⁴⁶ *Order of 18 December 1981 extending the tax benefits provided for in Law 152/1963 of 2 December 1963 to the following companies*, BOE, 19 January 1982, pp. 1603-1604.

bank, Midland Bank. Two years later, the EIB extended the financing by 4,500 million pesetas for the same reasons⁴⁷.

But the necessary drastic solutions did not depend exclusively on the Spanish side, since they also obeyed the plans of the group's head company. The global dimension of the problems was once again becoming apparent.

Large companies in the telecommunications sector were looking for ways to respond to the increase in demand and, in fact, since 1983 agreements have been reached in North America and Europe between already large companies. Such arrangements (GTE, Siemens, CGE, IT&T, etc.), which, by raising the financial, commercial and production threshold of competitiveness, substantially modified the world market in the sector, had a significant direct impact on the production structure and employment of the Italian subsidiaries of multinational companies with significant shares of the domestic market. To be closer to the European market, in 1986 three leaders of the European telecommunications industry (ANT Nachrichtentechnik GmbH in the Federal Republic of Germany, GEC Telecommunications Ltd. in the United Kingdom and Société Anonyme de Télécommunications in France) joined forces in joint strategic R&D and investment programmes. It is significant that Italtel, the main national company in Italy, remained completely absent from these agreements, blocked by a long phase of study of a hypothetical agreement with Telettra, with negligible repercussions on the possibilities of having an impact on world markets⁴⁸. In contrast, Italtel did forge alliances with Ital-

⁴⁷ TELETTRA ESPAÑA, *Telettra España 1966-1991*, p. 115. Companies benefiting from EIB loans: SIT Siemens, Telettra (a Fiat subsidiary), Fatme (an Ericsson subsidiary), Olivetti and two subsidiaries of US companies – FACE and GTE (SH. LEWENHAK, *The Role of the European Investment Bank*, London-New York 2012, p. 175). The first drawback faced by telecommunications as an investment field was the severe competition from Japan and the newly industrialized countries. For Telettra it was specifically noted: «Extension of plants manufacturing telecommunications equipment and expansion of research and development capacity at Algeciras (Andalusia), La Coruña (Galicia) and on the outskirts of Madrid Telettra Española S.A. ptas 1.375 million» (EUROPEAN INVESTMENT BANK, *Annual Report*, Luxembourg 1986, p. 340-0; Id., *Annual Report*, Luxembourg 1988). The funds were granted for a period of eight years at a fixed annual interest rate of 10.25% («El País», 27 December 1986). For an assessment of the EIB's performance in Spain, see «El País», 30 July 1988.

⁴⁸ CAMERA DEI DEPUTATI, *IX Legislatura, Atti Parlamentari, Discussioni*, Seduta dell'8 agosto 1986; «Telecommunication Journal», 53 (1986), p. 549; «Fiber Optics Weekly Update», July 1986, p. 7.

ian companies, as it did around 1981 with Telettra SpA in the form of collaboration and specialisation agreements in search of economies of scale. Telettra intended to optimise its R&D and investment activities and to jointly undertake strategic European programmes in the transmission branch of the public telecommunications field⁴⁹.

It is clear that the Italian telecommunications market, fifth in the world in terms of potential in 1990, was attracting the interest of foreign companies. For its part, the government was committed to increasing domestic demand, a stance that was evident in the adoption in 1985 of the ten-year telecommunications plan and the approval in May 1987 of the European alignment plan, an additional five-year investment programme worth 10 billion euros. Such prospects and the awareness of the marginalisation of companies unable to produce at a reasonable cost gave birth to the Telit project, whereby Fiat and STET agreed to promote a national public communications pole, i.e. a company that would provide the means for the state-owned company managing the telephone service. The project, finally aborted and with no place here, shows the implications of the nation states in the configuration of the world map of telecommunications⁵⁰.

There is one aspect of the recently mentioned failed joint venture

⁴⁹ FIAT, 76° Esercizio 1981. *Relazioni del Consiglio d'Amministrazione e dei Sindaci agli Azionisti*, Assemblea Ordinaria degli Azionisti 30 giugno 1982, Torino n.d., p. 8; SCOTTI, *Fiat, auto e non solo*, p. 69; «Telecommunication Journal», 53 (1986), p. 549; «Fiber Optics Weekly Update», July 1986, p. 7. For example, the European Commission granted national aid for Italy's participation in three Eureka projects, one of which, amounting to LIT 599 million, was for Telettra-Telefonia Electronica and Radio SpA (EUROPEAN COMMISSION, *Press Release*, 5 April 1989). RAI and Telettra participated in EUREKA 256 on the Italian side and Retevision, Telettra Spain, University of Madrid for the Spanish side. The development of the hardware was carried out by Telettra. Some of the meetings of the Eureka 256 group, the sixth for example, took place in Madrid (V. CANTONI, G. FALCIASECCA, G. PELOSI, *Storia delle telecomunicazioni*, Firenze 2011, p. 190; *Sesta riunione del gruppo del progetto europeo EUREKA 256 Barajas, 9-10 Novembre 1989*, «Elettronica e Telecomunicazioni», 1 (1990), pp. 45-46; M. ARDITO, G. BARBIERI, M. COMINETTI, *Italia '90: prima mondiale di collegamento numerico in HDTV via satellite*, «Elettronica e Telecomunicazioni», 3 (1990), p. 100.

⁵⁰ Parliament's resolution of March 1987 indicated as an optimistic solution a joint venture, which excluded the possibility of surreptitious privatisation [CAMERA DEI DEPUTATI, Commissione permanente (Trasporti, poste e telecomunicazioni), «Bollettino Commissioni», 89, 16 December 1987, pp. 95-101]. In the early 1970s, STET decided to start a national project for electronic switching and transmission – the Proteus power station (COMMISSION OF THE EUROPEAN COMMUNITIES, *Social Europe. Supplement to new technologies and social change. Telecommunication*, Luxembourg 1985, pp. 52-53).

that is not generally highlighted and is of great importance to this study. Now is the occasion to enhance the international dimension, since Telettra had maintained a presence abroad as a producer and marketer since the 1960s-1970s through its subsidiaries in Switzerland (1968), Argentina (1972), Brazil (1976), Norway (1976) and Mexico (1978). All of them were regrouped in Telettra International S.A., with headquarters in Luxembourg. In turn, many industrial companies around the world became licensees of Telettra products, as noted above⁵¹.

The strengthening of Telettra SpA's international presence, within a framework of growth, was evidenced in the case of Spain by an increase in its participation in the subsidiary of that country. In 1988 it exchanged 10% of its shares for a substantial part of Telefónica's shares (41%) in Telettra Española. This shareholding was used by Alcatel to certify its entry into Telettra SpA for an amount close to ECU 165 million (PTA 21 billion)⁵². One year later the multinational closed a decade of progress, marked by good results and the consolidation of its subsidiaries outside Italy. Well into 1990, a strategic alliance with Fiat allowed the French group Alcatel NV to Telettra SpA, a concentration that brought about major changes in the hitherto Italian multinational and had profound repercussions in Spain. In 1991, Telefónica sold to Alcatel the remaining 10% it owned in Telettra SpA for an amount identical to that paid by the French multinational to enter Telettra SpA⁵³.

⁵¹ *Public technology procurement*, p. 227; PONTAROLLO, *La fabbrica degli imprenditori*, p. 76. The Swiss company was named Telettra-Telecommunications SA («Opera Mundi Europe», 408, 15-21 April 1968, p. 17). There must have been some organizational structure in Venezuela, since it is recorded that a technician stayed in Venezuela on a non-occasional basis from 1992 to 1995 as the person responsible for engineering. In Brazil, Telettra had been operating since the early 1970s with specialists and workers assigned to technical work.

⁵² *Commission Decision of 12 April 1991 declaring the compatibility of a concentration (Case No. IV/M042-Alcatel/Telettra), Council Regulation (EEC) No. 4064/89*, accessed at http://ec.europa.eu/competition/mergers/cases/decisions/m42_en.pdf; TELEFÓNICA, *Balance social 1986-88*, Madrid 1988, p. 140; Comisión Nacional del Mercado de Valores (National Securities Market Commission), *Relevant Fact*, 220, 26/4/1991. The profits contributed by Telettra SpA to the Fiat group rose from 7.215 billion lire in 1986 to 13.175 billion lire the following year (FIAT, 82° *Esercizio. Relazioni e bilancio al 31 dicembre 1987*, Torino n.d.).

⁵³ CANTONI, FALCIASECCA, PELOSI, *Storia delle telecomunicazioni*, p. 190. In the previous year of the takeover, minority shareholders held 10% of the shares (*Annual report pursuant to section 13 or 15(D) of the securities exchange act of 1934 for the fiscal year ended: December 31, 1989*, F-18).

Indeed, at first Telettra Española followed a path of progress. Its results rose from 30 million pesetas in 1985 to 102 million pesetas in 1986. An important jump took place in 1987, when they reached 561 million pesetas, before tripling the following year⁵⁴. However, the Spanish subsidiary was soon caught up in the whirlwind of the re-composition of the global telecommunications industry, an aspect that calls for specific attention elsewhere⁵⁵.

Conclusion

Despite the potential of the case, no scientific study has investigated and analyzed in depth the history of Telettra Española. This article has examined the vicissitudes of this subsidiary of the Italian multinational Telettra SpA specialized in transmission equipment, throughout the 1980s. In its methodology, the work has sought to combine written and oral sources, documents from public and private archives, newspaper articles and a rich secondary literature.

As a first contribution to the historiography of the history of the company in general, a careful analysis of the case authorizes us to state that internationalization turns out to be a much more complex process, extended in time and rich in content than that advocated by some schools of thought in vogue. It involves decisions to go abroad, the first commercial structures, alliances and products, as well as knowledge and human capital.

The history of Telettra unfolds in a dense network of relationships between the diverse interests of the various players: Italian and Spanish political interests, those of Spanish and Italian private capital, and those of the large international telecommunications oligopolies.

We could summarize the role of Telettra Española as a success story in Spain, until it was acquired by Alcatel. Telettra Española could inspire new episodes of internationalisation of the parent company, a role that some experts attribute to it, since its creation was ahead of others. However, there is no evidence that the creation of subsidiaries around the world, i.e. the conversion of Telettra SpA into a multinational, followed the pattern of the Spanish subsidiary in each

⁵⁴ TELEFÓNICA, *Balance social 1986-88*, p. 137.

⁵⁵ Years before there had been an organizational restructuring: Telettra Española, S.A. absorbed Electroautomática del Sur. S. A. by acquiring all its share capital (*BOE*, 266, 5 November 1980, p. 24703).

case. To the elements of interest already mentioned, a new one is added: Telettra Española is also interesting because it has been another victim of the oligopolistic recomposition of the telecommunications industry.

Telettra Española developed its own technology and managed to export it worldwide. It excelled above all in rural telephony, a chapter in which it managed to achieve a recognized leadership. It played a leading role in typical episodes of a globalized economy, such as the partial relocation of production. From one of its plants, a regional experience emerged with strong market projection. Finally, it served as a school for some managers in the telecommunications sector in Spain.

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L'EVOLUZIONE DEL MESSAGGIO.



Saltando nell'acqua il delfino "parla" con il branco, emettendo una gamma di suoni e di ultrasuoni. Usa così un codice sonoro, avvalendosi del canale acustico. L'uomo esige strumenti di comunicazione ancora più evoluti, per poter trasmettere non solo parole, ma anche immagini e dati. Questa è la realtà di Telettra, azienda leader nei sistemi avanzati di telecomunicazioni. Telettra opera con un know-how totalmente proprio, realizzando sistemi per reti pubbliche e private, in Europa come in Australia, negli Stati Uniti e in Sud America come in Africa. Telettra è un gruppo internazionale che nell'89 ha fatturato 1600 miliardi. Oltre 230 miliardi di investimenti e 1800 tecnici sono impegnati per progettare e realizzare sistemi sofisticati, fino ai traguardi delle nuove reti integrate. Innovazione e qualità globale per superare ogni barriera, per favorire il vivere sociale. Telettra - Communication in progress.



TELETTRA - SISTEMI DI TELECOMUNICAZIONI PER FONIA, DATI, IMMAGINI.
SEDE IN MILANO • 18 POLI INDUSTRIALI IN ITALIA, SPAGNA, NORVEGIA, USA, MESSICO, ARGENTINA

Source: TELETTRA, *L'evoluzione del messaggio*, «Elettronica e Telecomunicazioni», 2 (1990), p. 72.