FINANCING TELEGRAPH INFRASTRUCTURES
(1850-1900)

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Financing telegraph infrastructures (1850-1900)$^1$

In the late 1830s the first electric telegraph models were patented both in Europe and the United States, but it was only in the following decade that the first distance telegraph transmissions were started up, mainly with the aim of supporting the railway lines. In fact, existed two kind of telegraphy: 1) land telegraphy, 2) submarine telegraphy. In the first case, the telegraph infrastructures were easy to built and cheap. For this reason, land telegraphy was managed by the state in all European countries (except United Kingdom, until 1869, when the telegraph companies were nationalized). On the other hand, submarine cables were difficult to built and very expensive. Besides, in order to work, submarine telegraphy had to solve some important issues: 1) building a well insulated cable; 2) transporting the cable with a ship; 3) laying the cable on the bottom of the sea; 4) communicating at great distance. Only Great Britain had the technology to build and lay a submarine cable but this was a very expensive enterprise. In other words, in the second half of XIX century two kind of telegraph financing existed: 1) the state directly financed the development of land telegraph; 2) the business-men, as a stock-holder, invested in the submarine telegraph companies, which represented a high market risk but it also represented a big return. In the paper one will concentrate on the Great Britain case where many connections existed among these two kind of telegraph financing. For example, the most influencing business lobbies invested directly in the most important submarine telegraph companies while, the same lobbies tried to influence on the government decisions about the national telegraph network development (which was public). Starting from the British case of study (Great Britain was the only country where telegraph service was managed either by private companies or by public administration) one will describe who, why and how invested in telegraph infrastructures in the second half of XIX century.

**Keywords: Telegraphy, Infrastructure, Telecommunications**

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Masterminded in the 1830s and subjected to much experimentation in the following decade, the telegraph had already entered everyday life in the 1850s. Then in the second half of the century international telegraph systems, brought together by the integration of numerous interconnected national telegraph networks linked by long undersea cables, went through an extraordinary period of expansion. The aim of this paper is to identify and describe the principle methods of financing the infrastructures which made such an intense development possible. Though this papers refers to the global/international system in general, it will be examining only the ways in which infrastructures were financed in Europe, and will be leaving aside for the moment the particular case of the United States.

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In order to indeth the reciprocal influence of technical and economic variances, reference will be made to the literature of the Large Technical Systems (LTS), and the European variant (Macrosystème technique, MST), integrated where opportune with the considerable literature on nineteenth century telegraphy and appropriate primary historical sources. In the first section it will be explained why the global system of telecommunications can be considered an LTS/MST, and for what purposes. The concept is used in this paper as an object of study, leaving in the background the methodological approach developed from it. The following sections will analyse the infrastructural technologies of telecommunications, ways of running them and their influence on typologies of financing. The last paragraph will be dedicated to the development of a case study which represents an exceptional meeting point between the two main methods of financing adopted in the telegraph sector.

The global system of telecommunications (1850-1900)

The worldwide system of telecommunications, which goes back to the creation of individual national systems around the 1850s, was re-enforced in the same decade by international treatises and technological innovations giving rise to international connections. Nevertheless, the international telegraph system was only really able to define itself as such with the laying and operating of the first intercontinental cables in the 1860s. To seal the systemic and international nature of telegraphic communications, the International Telegraphic Union, forefather of the present ITU (International Telecommunications Union) was then founded in Berne in 1865.

In this paper the term “system” is specifically adopted in place of the more frequently used “network”, normally considered a synonym. In scientific language, however, a network is only one of the components of a macro-technical system, and in the history of technology there are two major definitions of a technical system: the “Macrosystème technique” (MST) of Europe influence and the “Large Technical System” (LTS), created by Thomas Hughes and then used mainly by American scholars. The two definitions obviously differ in greater or smaller methodological nuances, though in both cases the system features three main aspects: 1) an industrial object, the telegraph, at the centre of the system; 2) a complex of infrastructures forming the network, e.g. the international telegraph network; 3) a public or private company carrying out a commercial activity via the network, generating a service, just like the telegraphs.

LTS are normally subdivided into subsystems in order to simplify analysing them. In the case of the international telegraph system, it is particularly necessary to identify at least two levels of sub-systems, in order to allow a thorough investigation of the financing of infrastructures.

First of all, on an operative level the international telegraph system was divided into national systems. Each state had originally organized its own service, which it either ran directly or gave in concession to privates. In any case, each country had the right to autonomous regulations just as it was free to decide tariffs and adopt the technologies it judged most opportune. The institution of the Telegraph Union led to a more rigorous standardization of technology, norms and tariffs, but mostly for international lines.

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8 In this paper LTS are used mainly as an object of study and not as a methodological approach. LTS are in fact usually used to explain the transmission of technological innovation within and outside the system, a subject that remains here on the side lines. For a recent review of the methodological approach of LTS Erik Van der Vleuten, Infrastructure and Societal Change. A View from the Large Technical System Field, «Technology Analysis & Strategic Management», 16, 3, 2004, pp. 395-414.
In fact, the sovereignty of the single states also covered telegraph infrastructures and services, which was why the international telegraphic system could be said to be mainly made up of numerous national sub-systems.

In the second place, in the field of the global telegraphic system there existed at least two completely different technological paradigms, for land and submarine telegraphy respectively. As the term indicates, land telegraphy, which included most of the world’s lines, covered the inexpensive and technologically very simple infrastructures constructed on land. Under the definition of submarine lines were those infrastructures connecting two separate points under water (rivers, lakes, seas and oceans). Submarine cables were technologically complex and costly, as were the techniques for transporting and laying them. The great difference between the two types of lines was inevitably reflected in the different ways of running them. Land services were generally in the hands of public administrations dependent on the state, while submarine ones were dealt with by big joint stock companies and private capital. Obviously, the different way of organizing them gave rise to two different modes of financing, but before going into the subject, it is better to illustrate the essential features of two kinds of infrastructures.

**Land telegraph lines**

Land telegraph structures were composed basically of offices and the lines connecting them. The telegraph lines, the only infrastructures to be considered in this paper, were in turn composed of three basic elements: 1) wires; 2) poles. 3) insulators.

The wires could be made of different metals. Copper or iron, two metals with very different characteristics, were normally used. Copper makes a better electric wire than iron, but it is far less resistant than iron to being twisted and subjected to strain. And outdoors, the metal wire was often subject to the effect of atmospheric agents like wind and snow, which could twist or strain it. Furthermore, to be fastened to the poles the wire needed to be pulled from one supporting pole to the next without suffering damage. It is easy to understand therefore why by the 1850s, many states had already opted for iron wire. The poles holding up the wire lines were obviously essential for the correct long-time working of the telegraph service. They were always made of wood, given that it is a very poor conductor, and thus guarantees a negligible dispersion of electricity. Another

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advantage of wood is that it was then the least expensive material. The type of wood used, however, could have heavy repercussions on maintenance costs. Different countries generally used the most readily available wood guaranteeing the longest life-span\textsuperscript{12}.

Insulators were another technological component essential to the development of telegraph lines. The purpose of insulators was to avoid power dispersion during communication by keeping the wire insulated from the iron support it rested on. Insulators, made of glass, ceramic or porcelain, were of all sorts of shapes: bells, inverted mushrooms, etc. As for the materials, the least efficient was definitely glass, which was more likely to trap moisture and therefore disperse more electricity. The best was definitely porcelain, which repelled moisture and was therefore more reliable in very damp locations\textsuperscript{13}.

To sum up, land telegraph structures were made of structurally simple elements and constructed with easily obtainable and inexpensive materials.

\textit{The running and financing of the landlines.}

All over the world, except in the States and the UK, national telegraph services were directly in the hands of the State\textsuperscript{14}.

Generally speaking, European countries chose right from the beginning to use a public monopoly for reasons of national security, as is shown by a variety of countries like Russia, France, Rumania, Serbia and the Kingdom of Piedmont and Sardinia, who in the initial stages of development kept the administration directly under the Ministry of the Interior. Then around the 1860s others, like the Italian and Belgian governments transferred the competences of the telegraph services into the hands of the Ministry of Public Works, together with the railways and other infrastructural works\textsuperscript{15}. It is in this context that a political awareness of the role of communications grew, not only for keeping internal order or increasing national defence but also for encouraging the

\textsuperscript{12} Tal P. S\textsc{haффner}, \textit{The Telegraph Manual: a complete history and description of the semaphoric, electric and magnetic telegraphs of Europe, Asia, Africa and America, ancient and modern}, New York, Pudney & Russel, 1859.

\textsuperscript{13} Robert S. C\textsc{ulley}, \textit{A Handbook of Practical Telegraphy}, London, Longmans, Green and Co, 1885.

\textsuperscript{14} The British service was unusual and for this reason will be treated in the next paragraph, because it was originally run by private companies and only after nationalization in 1869 fitted in with the typology of organization adopted in the rest of Europe. See also Charles R. P\textsc{erry}, \textit{The Victorian Post Office. The growth of a bureaucracy}, Wooldridge, The Royal Historical Society-The Boydell Press 1992.

circulation of personal, commercial and financial information. It was thanks to this perception that during the 1870s telegraphic administrations in many countries were able to enjoy a greater autonomy and more independence than public administration structures. The director was not chosen by the ministry on political grounds, the minister often left him ample autonomy over decision-taking, telegraphers were given different working conditions and salaries to other public employees. In other words, in states like Italy the telegraph administrations behaved like authentic state companies, generating, income which despite all the bureaucratic fetters was mostly re-invested in the construction of new lines and upkeep of the old ones.

From the 1880s onwards, most European countries began to merge the postal and telegraphic services into one administrative unit. In this way, the telegraphic service fell under the Ministry of Post and inevitably telegraph administration lost their distinctive managerial features. For example, in France and Italy the merger damaged the telegraph service, which was literally swallowed up by the Post Office and generally considered a multi-service (letters, parcels, magazine subscriptions, post office savings banks). In other cases, as in Great Britain and Germany, the rigorous postal administration contributed to maintaining a high level of investment and technology, but in some cases (Great Britain) with much heavier payroll.

In the case of landline telegraphs the question of infrastructural financing appears to have been less important for at least two reasons: 1) the public running of the service; 2) the low cost of telegraphic infrastructures automatically limited the number of financial instruments available for raising the capital needed for constructing telegraph lines. In theory, telegraph administrations could have medium term bank loans, alternatively, they could resort to issuing bonds. In reality, at least up to the early nineties, these instruments were rarely used for landline telegraphy, which relied mainly on self-financing because of the low cost of the infrastructures and the healthy profits obtained.

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16 Bureau International des Administrations Télégraphiques, La législation télégraphique, Berne, Imprimerie Rieder & Simmen, 1876.
20 For example, at the turn of the century when a period of intense economic expansion in Italy called for the telecommunications network to be modernised, parliament put aside as much as 25 million lire of the
Submarine telegraph lines

Submarine telegraph infrastructures differed greatly from landlines because of the decidedly higher level of technological complexity needed for construction and maintenance. Laying the cables under seas encountered at least four grades of difficulty: 1) constructing impermeable cables capable of transmitting electric current; 2) sounding the seabed to ensure the safe laying of the cable; 3) the transport and immersion of the cable; 4) the reception of electronic impulses over long distances.

The first problem of the cable’s impermeability was mostly resolved with the application of gutta-percha, a natural rubber imported mainly from Asia. The first submarine cables were constructed about 1855; as years passed, they were gradually perfected, but their structure remained more or less the same. There were one or two conducting wires in the centre, which served for transmitting the electric current. The wires were then wrapped in a layer of gutta-percha, to ensure they were impermeable. The isolated wires were held together with a mixture of tar and hemp, again to increase impermeability. To ensure resistance to possible external mechanical agents, the cable was armoured, i.e. strengthened on the outside by a spiral of thick steel or iron wires.

The period (the largest investment in telecommunications up to then) using a surplus from the previous year (Legge 24 marzo 1907, n°111, art.2.). This merges also from the words and writings of the telegraph managers of the time, who insisted that parliament would have to allow investments in lines and technology provided by the continual income generated by the service itself. See for example Ernesto D’AMICO, Cenni sull’amministrazione dei telegrafi in Italia dalle origini all’anno 1885, Roma, Tipografia Cecchini, 1886.


William Hooper, Indian Rubber considered in reference to its Applicability as an insulator for telegraphic conductors, read at the Birmingham Meeting of the British Association in Section A, September 7th, 1865, and again following day, in section G, by request of the Committee. (stored in K I, British Telecom archives, London)


Charles Bright, Submarine telegraphs. Their history construction and working, London, Crosby Lockwood and Son, 1898.

Right from the beginning it was deemed opportune to insert more than one conducting wire inside the cable, in case one got damaged. Fin dall’inizio si preferì inserire all’interno del cavo più di un filo conduttore.

T. Seeligmann, Indian rubber and gutta percha: a complete practical treatise on Indian rubber and gutta percha in their historical, botanical, arboricultural, mechanical, chemical and electrical aspects, London, Scott Greenwood, 1903.

The outside amour could favour the dispersal of electric energy via “inductive currents”. The problem was resolved with different expedients by many scientists including Wheatstone and Siemens. See Werner Siemens, Apparati per l’esercizio di lunghe linee telegrafiche sottomarine di Werner Siemens e Halske, Firenze, Tipografia Bencini, 1867.
The morphology of the seabed had to be examined before the cable could be laid. They had to avoid at all cost, for example, suspending the cable over two peaks, so that the middle part floated at the mercy of the currents. The only known method in the period for checking on the seabed was to measure depth via continued soundings. Given the steel armour, the cables were very heavy. The kind of ships needed had to be able to transport great weights and be equipped with mechanisms for laying cables. At first, very large craft adapted for transporting and laying cables were used. Then new ships were custom built. Cable ships were equipped with enormous rollers the cables were wrapped round, while enormous chain-pulleys connected to the rollers slowly lowered the cable into the water. During the operation the personnel had to be careful that the cable was not damaged, which would have ruined all the work done. To avoid any ugly surprises the cable was tested as it went down. Sometimes the chain pulleys could not hold the weight and dropped the cable in water, totally out of control 29. In order to receive the weak electric current that had crossed thousands of miles in an intercontinental cable, telegraphs more sensitive the Morse, like the siphon, were invented 30.

To sum up, the technology required for building, laying and running cables were complex, refined and called for heavy investment, both in the infrastructures and in research and development.

The running and financing of submarine lines

In comparison to landlines, the running of submarine telegraphy was different in two main ways: 1) high costs; 2) high risk of failure. This cost/risk element was what induced public administrations to entrust the construction, laying and day-to-day running of the cables to private companies, with exclusive medium to long term concessions. The company organization best suited to raising big capital and facing the risk of failure was a joint-stock company, thanks to its capital spread and partners’ limited responsibility 31. Most of the submarine companies operating in the first half of the twentieth century were British, though also laying and running cables for other

30 The syphon was a very simple mechanism which was limited to amplifying very weak signals. See : Ludovic A. Ternant, *Transmission des signaux par les cables sous-marins*, Parigi, Ducher, 1875; Id., *Le siphon-recorder et le curb-sender automatique*, Paris, G. Masson, 1882.
nations. For this reason the following paragraph takes into consideration almost exclusively the case of British companies.

The entrepreneurial history of the submarine telegraph in the nineteenth century has at least two important moments of evolution: 1) the pioneer stage from 1850 to 1870; 2) the big business stage from 1870 to 1900\(^\text{32}\). They have at least two elements in common: 1) the organization of the activity into joint-stock companies; 2) the fact that these companies were established thanks to the energy of fund-raisers. The principal difference between them lay instead in the different nature of the fund raisers in the two periods.

In the first twenty years of its development, submarine telegraphy was associated with experimental technology, and any practical applications aroused feelings of uncertainty and doubt. For this reason business men considered it a hazardous enterprise with low returns. The engineers, the creators of the cables, were the first great entrepreneurs in the sector. Their knowledge of the subject and desire to realize the utopian dream of connecting up continents with telegraphing and making great profits induced them to turn into fund raisers, poised to travel anywhere in the UK just to convince investors to buy shares in their companies. The most famous were the Brett brothers, designers and promoters of the first submarine cable to be activated, across the English Channel in 1851.

The pioneer period ended with the venture of the transatlantic cable, which involved the participation of numerous capitalists from both sides of the ocean, in particular Cyrus Field, an American business man\(^\text{33}\). But the failure of the first 1858 attempt, caused by a broken cable, and the setting up of the British parliamentary commission delayed the second stage\(^\text{34}\), which began with the laying of the second transatlantic cable, destined to keep functioning for decades. A big contribution, especially financial, came from John Pender, a British textile industrialist who had gone into the world of telecommunications investing and taking part in the management of the second biggest land telegraphy company in the 1860s. During the transatlantic venture, which Pender had promoted very fervently, he became proprietor and/or president of numerous submarine companies spread worldwide over seas and oceans. In the 1870s and 1880s,

\(^{32}\) BRIGHT, *Submarine telegraphs*, cit., pp. 154-161.


he directed an aggressive campaign for acquiring and merging submarine telegraph companies, partly by exploiting the British desire to create the famous “red line”, i.e. a network of cables linking all the Empire’s dominions, owned totally and run completely by the British.

From the 1870s, the big business world threw itself into the adventure of the submarine cables just as it had done thirty years earlier in the railways and this allowed an extraordinary international expansion of the sector, led above all by British capital, men and technologies. The technological characteristics and financial needs of land and submarine infrastructures were poles apart: the former low-cost, state-constructed and state-run, the latter capital and risk intensive and therefore created and run by joint-stock companies. These two worlds, so distant from each other, found a exceptional meeting point during the important historic event of the nationalization of British telegraphy in 1869.
The nationalization of British telegraphy: an attempt to find capital for submarine telegraphy?

Great Britain was the first country in which the electric telegraph was patented and then offered as a public service\(^{35}\). The first patent was deposited by Charles Wheatstone and William Fothergill Cooke\(^{36}\) in 1837 and the latter was to become one of the founding members of Electric Telegraph Company, the country's first telegraph society\(^{37}\). It was to operate as a monopoly until the early fifties, when other companies came on to the market, including the British Telegraph Company and the English and Irish Magnetic Telegraph Company. The two merged in 1857 under the name Magnetic, thus giving life to Electric's greatest rival. Electric and Magnetic operated as a duopoly until another three big companies were started up: the United Kingdom Electric Telegraph Company, the London District Telegraph Company and the Universal Private Telegraph Company. In this way, right on the threshold of nationalisation the telegraph service market was actually an oligarchy dominated by three companies - Electric, Magnetic and United, at the side of which operated two lesser companies, London District and Universal, specialized in metropolitan and private transmissions respectively\(^{38}\). In general the shareholders were businessmen with connections to the Stock Exchange or particularly in the case of Electric and Magnetic, entrepreneurs managing railway companies. The capital invested was all British.

The British telegraph service was never run in a system of pure competition, given the entry barriers making access very difficult for newcomers. The telegraph service market presented at least two: 1) patents protecting all technical innovations; 2) obligatory payment of the so-called “way leaves”, where telegraph lines were built alongside railway lines, roads or canals\(^{39}\). These constraints finished by favouring first mover

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\(^{39}\) Railways, highroad and canals were run by private companies, so that a rent had to be paid for building alongside telegraph wires. Siting telegraph wires alongside accessible lines of communication obviously facilitated surveillance and maintenance.
companies like Electric and Magnetic, which managed to maintain their position of privilege in the market even after the arrival of other competitors.

In the sixties the companies worked in an oligopoly, keeping to unspoken real and proper cartel agreements in the early part of the decade and then making them explicit in the later part. What happened was that between 1860 and 1865, the five major companies specialized in different niches of the market so as not to cause damage to one another\footnote{The Electric linked the main English and Scottish cities, the Magnetic connected Irish cities with English ones, the United only sent telegrams between the main commercial and industrial centres, London District sent and received messages only within the city boundaries, while Universal built and maintained private telegraph lines, like those connecting a business man's home and his office.}

In 1865 the three most important companies signed a tariff agreement which abolished the single charge in force since 1861 in services between the major cities. In reality, the first to introduce a single tariff had been United back in 1860; to avoid losing customers Electric and Magnetic had decided to adopt the same tariff only in links between the cities also served by United. Thus none of the three drew any advantage from the price change, which was the reason why the cartel agreement came into force\footnote{J. FOREMAN-PECK, \textit{Competition, co-operation and nationalisation in the nineteenth century telegraph system}, "Business History", 31, July 1989, n°3.}. However, the disappearance of the single tariff led to an increase in the average telegram charge, so causing a savage reaction from the main users. Chambers of commerce, acting in the interests of businessmen and the press, started a public campaign against private companies, which was to lead a few years later to nationalisation.

The motivations behind businessmen, press, railway companies, Parliament and Government (which represented widely the first three power groups) backing nationalisation were more numerous than those which emerged during the debates preceding the passing of the \textit{Telegraph Acts}. They fall into three categories: economic, political and technological. The economic reasons were partly linked to the definition of a natural monopoly, according to which a monopolistic management of some services allows it to be extended also to less profitable areas and dispense it with lower prices. To these official motivations were added; 1) the desire to put communications under government control, also to guarantee free competition 2) the desire to join the International Telegraph Union which was only open to nations who ran their service directly; 3) the need for a higher level of technical standardization\footnote{Simone FAR, \textit{"Heads and Tails": the nationalisation of the British telegraph service (1867-1870),} 2011, stored in London Science Museum, London.}. However the international policy motive more cogent for the purposes of this paper was the desire of
the British Government to create a “red line” for controlling all the territory in the Empire. In the second half of the nineteenth century the United Kingdom was in fact the only nation to possess the technology and financial resources to construct long intercontinental telegraph cables.\footnote{For further information on the features of under seas cables and their evolution see Charles BRIGHT, Submarine telegraphs, pp. 214-494.} Given that it was aiming to set up an under seas telegraph network connecting all the territories of the Empire with the Mother Country without passing over foreign soil, it was felt such a network had to be run by British companies alone.\footnote{D. HEADRICK, The invisible weapon, pp. 20-24.} In this way the Government wanted to guarantee for itself “red lines” of communication with its own territories so that no one could break in easily in time of war.\footnote{Robert BOYCE, Submarine cables as a factor in Britain’s ascendency, in Michael NORTH (Editor), Kommunikationsrevolutionen. Die neunen Medien des 16. und 19. Jahrhunderts, Köln-Weimar-Wein, Böhlau Verlag, 1995, pp. 73-80.} The project was brought to termination in the 1890s, thanks to the considerable contribution by John Pender.\footnote{P.J. HUGILL, Global Communications, pp. 25-52.}

Following the exemplary case of John Pender, it could be conjectured that one of the main reasons underlying the British landline telegraphs nationalisation had been to make available the capital to invest in under seas companies. In other words, the ample compensation for all the shareholders of the landline telegraphs favoured the use of these freed resources in buying into under seas telegraph companies. In this way Government and Parliament favoured indirectly the construction of the desired services wholly in British hands. And these, unlike landlines, exacted heavy fixed costs, and therefore a heavy initial capital investment. This would justify the need to free financial resources to favour the expansion and completion of the “red lines”.\footnote{P.M. KENNEDY, Imperial Cable Communications and Strategy, 1870-1914, in «The English Historical Review», Vol. 86, No. 341 (Oct., 1971), pp. 728-752.} Furthermore the hypothesis of a indirect incentive rather than direct help in building links with the dominions would be reinforced by the failure of the subsidies policy to submarine companies adopted in some famous cases in the 1860s.\footnote{In particular, the reference here is to the line bound for India (Malta-Alessandria-Aden-Kurachee).}

However fascinating this theory is, and however personified in John Pender’s vicissitudes, its point of weakness lies in the difference between landline and under seas telegraph companies. In the 1860s the former were a fairly solid medium-long period investment: the main landline companies (Electric and Magnetic) yielded in fact quite high profits for almost a decade while the under seas companies, instead, were
notoriously high-risk investments. In conclusion, telegraph landlines could be a sure investment for businessmen while under seas ones were high-risk and therefore a good buy for speculators and carpetbaggers. Consequently, most of the shareholders from the private landline telegraphs were unlikely to throw themselves into buying under seas telegraph shares. They proved more attractive to expert businessmen, more inclined to wager. And they, well represented by John Pender, would hurl themselves into the new market of under seas cables with the same audacity with which some years earlier they had acquired shares in landline telegraphy, a service which at its origins had been semi-unknown and little used.

**Conclusion**

From an examination of the international system of telecommunications on the whole, it has been possible to isolate the technologies, forms of organization and therefore dynamics of financing most used in the sector. Furthermore from the two great subsystems of nineteenth century (overland and under seas) it has emerged that the grade of complexity and therefore the level of cost of the technology necessary influenced decisively the choice of managerial typology and type of entrepreneurial organization. The easy availability of basic materials and simplified structure of the land lines favoured the choice of a public management, entrusted to a public administration. Diversely, the high costs and risks caused by the complexity of submarine telegraphy made the first engineers create joint-stock companies, a model then followed by more expert business men once the sector was revealed as highly profitable. Nevertheless, the British case shows quite clearly that deterministic conclusions must be avoided and that technology was an important variable, but not the only one, to influence the choice of a managerial model and financing technologies. The United Kingdom was in fact the only European case in which the initial running of land telegraphy was entrusted to private companies. That happened because traditionally other great communications (roads, canals and railways) had always been run by privates and because the liberal economic policies dominant in Victorian Britain wielded more power than technology. Furthermore, it needs to be remembered that the United Kingdom was the first country to adopt the telegraph service and at the very beginning the land telegraphy too seemed a costly, experimental technology just like the first submarine telegraphy and therefore a model run privately by means of a joint stock company was judged the most appropriate.
Beyond the real motives causing it, the nationalisation of the British telegraphs is an emblematic case of a strong correlation between two subsystems featuring completely different technological and organizational paradigms. Given the aim of this paper, it is important to underline that such a correlation took place when submarine telegraphy was suffering from an urgent need for capital. Submarine cables were a sub system of the international macro-system of telecommunications and not an independent system. It is in the light of this macro-system that can best be understood a phenomenon like the nationalisation of telegraphy, in part conditioned by the need for a high level of capitalization for one subsystem at the cost of the other, which could be maintained with a lower level of investment.