

**NEW INFORMATION AND COMMUNICATIONS TECHNOLOGIES:  
CHALLENGES AND OPPORTUNITIES  
FOR THE SENEGALESE ECONOMY  
Final Report**

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## Introduction

In the course of the last three decades, information and communications technologies have become an essential, indeed a primary vector of economic and social activity in virtually all parts of the world. New information and communications technologies (NICTs) are generally defined as the totality of information storage, communications, data management and data processing systems and devices. They constitute a “converging set of technologies in microelectronics, computing (hardware and software), telecommunications/broadcasting and optoelectronics.”<sup>1</sup> This convergence and interaction between electronics and informatics accounts for the ability that NICT applications have demonstrated in meeting the needs not only of government and business, but of households and individuals.

Subject to the same laws of the market as any other market production activity, ICTs represent, moreover, a sector in which competition operates directly, at a global level. The globalization of enterprises, markets and financial networks has led to a reorganization of economic structures and trade flows, as well as to the professionalization of communications and information. In addition, it has produced more extensive integration of the phases of product conception, creation and use, as well as a parallel merging of previously separate and even opposing areas of activity.

Following in the footsteps of the industrial giants which, during the 20<sup>th</sup> century, took over telephone networks, electric power, and rail and air transport, small and medium-sized enterprises proceeded to build vast empires in record time. Every day, new technological advances are making previous achievements obsolete, while huge fortunes are created (and vanish) with blinding speed.<sup>2</sup>

While Africa is still relatively under-equipped in terms of information and communications media, the progress achieved in a single decade is nevertheless impressive. The development of these technologies promises to move Africa decisively into the modern industrial age, while offering hope that the vast technical and scientific potential unleashed by these technologies will help in solving the long-standing problems of under-development and economic stagnation.

Within Sub-Saharan Africa, Senegal is a pioneer in the field of new information and communications technologies. In the wake of the serious problems experienced by Senegal since the end of the 1970s, the State has come to regard NICTs as a basic ingredient in restoring the national economy's role in world trade. In this respect, Senegal brings a unique combination of assets to bear: its geographic proximity to Europe and the Americas; a highly educated population; a vast commercial and financial trade network drawing on a young and energetic émigré population; and a relatively well-developed telecommunications infrastructure capable of providing highly competitive services.

Thus, the Senegalese economy is well positioned to attract increasing foreign investment in information and communications technologies (ICTs) and to benefit from the sector's continuing expansion. However, despite increased growth and the influx of capital made possible by the 1994 devaluation of the CFA franc, Senegal has been slow to take advantage of this enormous potential and of the opportunity to become a service economy.

This paper attempts to analyze the challenges – both in terms of opportunities and of the risk of marginalization – that ICTs represent for Senegal's growth and social development, examining the steps that Senegal must take to leverage the opportunities that NICTs provide for regaining a share in the international division of labor.

The analysis is divided into five parts. The first describes the major structural characteristics of the economy; the second details the methods and means by which ICTs are being developed; the third evaluates supply and demand for services related to various ICT applications; the fourth, focusing on telecommunications as the centerpiece of these technologies, examines the current relationship between this industry and others within the economy, using Senegal's national accounts and the 1996 input-output table (IOT) as a reference point; the fifth and final section examines the nature of the constraints that the Senegalese economy must overcome in order to become part of the technological revolution.

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<sup>1</sup> Castells (1998)

<sup>2</sup> Shapiro and Varian (1999)

## Socio-economic context

Current trends, along with the general state of economic structures, suggest that Senegal has not taken advantage of the historic lead it enjoyed over other African nations, at the time of its independence, and has failed to capitalize on the modernization efforts undertaken by the newly independent state and on diversification and development within new and old agricultural, industrial and service sectors.

### *Socio-demographic characteristics*

In addition to having an Atlantic coastline of more than 500 km., Senegal has common borders with six other countries: The Gambia, Guinea, Guinea-Bissau, Mali and Mauritania. Senegal, whose territory covers 196.190 km<sup>2</sup>, is divided into ten regions and thirty departments varying widely in geographic size.

With an inter-census growth rate (1976-1988) of 2.7 per cent, Senegal's population grew from nearly 7 million in 1988 to 9.3 million in 1999 (DPS, 1992). Forty-five percent of the population is under 15 years of age. Along with the wide variation in population density, there is great variation in rate of growth from one region to another, ranging from 1 per cent in the region of Louga to 3.7 per cent in the Dakar region. Moreover, the latter region accounts for almost one third of the total population, with two-thirds of Senegal's population residing in 14 per cent of the national territory.

Despite a long educational tradition, the gross enrollment rate has remained fairly low: 65 per cent for elementary school, 16 per cent for middle and secondary school and 1 per cent for tertiary education institutions in 1998. Technical-school recruitment has experienced a decline: the number of students enrolled in 1997 was less than 46 per cent of those enrolled in 1992.

Senegal is a republic with a history of deep democratic traditions, except for the period in which a single-party regime was in power. Public life is structured around a dynamic press and broadcast media, consisting of numerous newspapers, public and private radio stations and a national television channel, as well as several foreign channels. This presence served as the backdrop for the country's first change in political administration, which occurred in March 2000, after forty years of single-party reign.<sup>3</sup>

### *Status of the economy*

**Growth profile.** The trend characterizing the Senegalese economy is more one of stagnation than of growth. The GDP growth rate, which fluctuates widely, was also very low in past times. Until the end of the 60s, the economy was based on a prosperous peanut industry and on the relatively developed industrial base inherited from the colonial period. Peanut production – the heart of economic activity – which at that time was controlled entirely by the State, set the pace for the country's economic life and lent vitality to other sectors.

However, the successive droughts that plagued agriculture, along with the long subsequent phase of industrial decline led to a distinct slowing of growth beginning in the mid-70s. Weak growth was accentuated by a decline in the level of investment during that period. After having grown from 7.1 per cent in the 60s to 14.6 per cent in the 70s, the rate of investment plateaued at around 12 per cent until the mid-90s. In the period from 1994-2000 (Table 1), it climbed to 19 per cent. Because of the low savings rate, this investment was financed largely by funds from abroad.

The major economic and social development efforts of the first fifteen years of independence were followed, during the 80s and 90s, by stabilization and adjustment programs designed to improve public finance and restore external accounts.

Following the devaluation of the CFA franc in 1994, there was a revival of economic growth, increasing from a rate of 2-3 per cent to 5 per cent of GDP (Table 1). This revival led to the longest continuous period of per capita GDP growth in the country's history.

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<sup>3</sup> The Socialist Party was the first to govern, in 1960, and it remained in power until the most recent presidential election, in March 2000, in which a coalition of opposition parties won, running as their common candidate in the second round Abdoulaye Wade of the Senegalese Democratic Party (PDS).

During the 1994-2000 period, the transportation and telecommunications sub-sector had the highest and most stable growth rates, with the exception of construction and public works. Indeed, despite the poor performance of land and rail transportation in recent years, the sub-sector has had an average annual growth rate of 6 per cent, compared to 5.3 per cent for the tertiary sector as a whole (see Table 2). The explosion in mobile telephony and teleservices is primarily responsible for this dynamic growth. Structural characteristics of the economy. The respective contributions to GDP growth by different sectors are both unequal and highly inconsistent. While the tertiary sector was characterized by a high level of activity and stability, this was not true for the primary and secondary sectors. The contribution to the GDP by the primary sector, whose growth never exceeded 4.3 per cent for any of the periods under consideration, fell from 24.4 per cent in the 1960-1969 period to 19.3 per cent in the 1994-2000 period (Table 1). On the other hand, while progress in the secondary sector has relied more on energy, construction and public works than on industry per se, its contribution to the GDP has increased from 12.1 per cent to 20.4 per cent in the two periods being considered.

Thus, despite modern industrial facilities and ambitious projects launched by the country's early heads of State, Senegal has not managed to industrialize its economy. From an annual average growth rate of 5-6 per cent in the 60s and 70s, growth in industrial production fell to 1.2 per cent in the 1980-85 period, before dropping to a negative rate of growth during the 1985-91 period. Industrial activity is hindered not only by a lack of diversification, but also by an imbalance in geographic distribution. A survey of the industrial sector<sup>4</sup> indicated that in 1995 the Dakar region alone accounted for nearly 90 per cent of enterprises surveyed, as well as for 75 per cent of permanent jobs and total production.

The tertiary sector's share of GDP (excluding non-market services) has remained stable at around 50 per cent since the 1960s. If non-market services are included, this figure increases to 62.5 per cent on average (see Table 1). The relative weight of tertiary activities as a share of the economy appears even more pronounced given the fact that, rather than representing what could be considered "natural" sectoral development, this appears to be a constant of the Senegalese economy.<sup>5</sup>

The tertiary sector's contribution to GDP is primarily from trade (including import taxes and duties and the VAT), which, with an estimated 21.1 per cent share in 2000, represents 41.2 per cent of the value added created in the sector. With an 11.8 per cent share of GDP in 2000, compared to 9.7 per cent in 1988, transportation and telecommunications constitute a sub-sector that is growing slowly but steadily. Their share represents nearly a quarter (23.3 per cent) of the value added for the tertiary market sector.

Prior to being drastically reduced as a result of recent privatizations, public enterprises have for years had a quasi-monopolistic role in strategic sectors, such as telecommunications and distribution of water and electricity. Even today, they continue to play a major role in industrial activity, investment and labor. Prior to the first privatization program in 1987, according to the World Bank (1994), the public sector was comprised of 66 national corporations or corporations with minority private ownership. Thus, it represented 29 per cent of investments and 17 per cent of jobs, but contributed only 7 per cent to GDP. In 1995, just before the second wave of privatizations, public enterprises still employed a third of industrial workers and were responsible for half of the sold output and nearly three-fifths of exports.<sup>6</sup>

Unlike the public sector, the private sector is, by nature, highly disparate in terms of the age, size and type of activities of the enterprises within the sector. While a limited number of large industries, controlled by foreign capital, were installed before or during the early years of independence, there is a vast number of (often informal) microenterprises. According to the last industrial sector survey<sup>7</sup>, large industries, while comprising merely 10 per cent of enterprises in operation between 1992 and 1995, represent 70 per cent of investments and jobs and 75 per cent of sales for the industrial sector as a whole. On the other hand, with 60 per cent of enterprises surveyed, small industry accounted for only 13 per cent of jobs and 8 per cent of total sales. Moreover, since the early 80s, while private Senegalese operators have been involved in forming industrial groups, foreign interests continue to occupy a strong presence at the head of the oldest and most powerful groups.

<sup>4</sup> Senegal/UNDP (1997)

<sup>5</sup> In the 1960s, market and non-market services already accounted for 63% of GDP on average.

<sup>6</sup> Senegal/UNDP (1997)

<sup>7</sup> Senegal/UNDP (1997)

## Development of new information and communications technologies

The telecommunications infrastructure inherited from colonial times, and the investment in maintenance that was agreed upon following independence have placed Senegal among Africa's top ranking countries in regard to information and communications technologies. This section examines the development of these technologies as related to other sectors, and how they can become a driving force for growth.

### *Senegal's leveraging of the technological revolution*

The development of information and communications technologies in Senegal is closely linked to the political, geostrategic and economic role the country has played in the expansion of French colonialism in West Africa. The introduction of means of communication in Senegal is generally considered to date from 1859, with the installation of the first St.-Louis/Gandiole telegraph line.<sup>8</sup> The expansion of the telegraph network within French West Africa as a whole was followed by the creation, in 1939, of the first radio station, "Radio-Dakar." The launch of national television in 1973 transformed public service, under the direction of the Senegal Office of Radio and Television Broadcasting (ORTS).<sup>9</sup> It was not until the 1990s that the first public and private radio stations, broadcasting in FM, were developed.

With SONATEL's launch, in 1988, of the packet data transmission network (SENPAC), Senegal got in on the ground floor of the era of new information and communications technologies. However, as has been noted, this technological leap in the area of telecommunications was preceded, long before, by the expansion of the national telecommunications network and by the installation of the public radio/television channel.

According to Ndiaye (1995), it was in 1948 that the first data processing equipment was installed in Senegal by the National Institute of Statistics and Economic Studies (INSEE), a French institution concerned with customs statistics, as well as with handling data from demographic surveys and later, in 1953, with applications related to civil service wages.

At the start of the 1960s, following the advent of data processing, automation of accounting procedures and of methods of dealing with wages began within the Ministry of Economy and Finance, as well as within the public banking sector (Ndiaye, 1995). The André Peytavin Accounting Center, precursor of the current Automatic Data Processing Office (DTAI), gradually extended applications to encompass all of the State's financial operations (taxes, customs, etc.).

Created in 1972, the National Information Technology Committee (CNI) is responsible for coordinating different strategies and actions regarding the development of information technology. An Information Technology Development Office (Délégation à l'Informatique, DINFO) was also formed in 1987, with the four-fold task of applying the policies established by the CNI, conceiving inter-ministerial projects, assisting the public and parastatal sector in defining their mandate, and coordinating computer training programs.

While, up until 1983, there were, according to NDiaye (1995), less than 100 computers (all categories included), the number grew rapidly in succeeding years. For 1988 alone, computer sales reached close to a thousand units. A study by the World Bank, conducted in 1995, estimated that there were 7.2 computers per thousand inhabitants, slightly higher than the figure for Tunisia (6.7) and for Nigeria (4.3), and far above that of Morocco (1.7) and Ghana (1.2).<sup>10</sup> Another study conducted by the Office of International Economic Relations concluded that the number of computers, in June 1999, was between 40,000 and 60,000.<sup>11</sup>

However, as was true almost everywhere else, the Internet would be the main engine driving the explosive growth in new information and communications technologies. Introduced at the end of the 80s by the French Institute of Scientific Research for Cooperative Development (ORSTOM) – later known as the Development Research Institute (IRD) – the Internet became highly successful, following SONATEL's signing, in 1996, of an agreement

<sup>8</sup> Sagna (2001)

<sup>9</sup> In 1991, the ORTS was, in turn, dismantled and replaced by Radio Télévision Sénégalaise (RTS), an autonomously managed national corporation with a public service mandate.

<sup>10</sup> Technopolis, No. 2, April 1998

<sup>11</sup> OSIRIS and ESMT (1999).

with the oversight body, allowing for marketing access to the worldwide web in Senegal. Supply increased quickly with the arrival of other Internet operators and access providers.

### *Institutional and policy framework for development of the sector*

In Senegal, the development policy formulated since independence has always emphasized the importance of incorporating the most modern techniques in communications and information technologies. However, as has been mentioned, it was only with the formation of the National Information Technology Committee (CNI) in 1972 that a national information technology policy took form. Following a description of public programs for telecommunications development, attention will be given to the major institutional reforms that have occurred throughout this process.

**Planned public investment.** Since independence, the State has been perceived as a major player in the nation's economic life. Adopting the "African road to socialism" doctrine – which was actually closer to State capitalism than to socialism – the early heads of the newly independent State implemented political, administrative and economic structures capable of taking over the productive apparatus of the colonial State. Set forth in the first development plan (1961-64), this plan was conceived as representing a way to make the State a driving force, not only in modernizing agriculture, but also in industrializing the nation.<sup>12</sup> While there have been changes in the strategies for implementation (Rocheteau 1982), the principles remained in force until the end of the 70s and beyond.

In terms of telecommunications, specifically, the need to assume responsibility from the colonial State for maintaining basic infrastructure, coupled with the complexity and breadth of investment needed for its development, made State intervention in the sector even more vital. Graph 1 and Table 4 trace the changes in investment in telecommunications between 1973 and 1998, pointing to three major phases in public programs for telecommunications development: the phase prior to 1978, the period from 1979 to 1990, and the period after 1990.

During the first phase, public investment in telecommunications represented a very small share of spending. In the 1973-77 period, investment in the sub-sector – which was directed primarily to maintenance and training activities – represented, on average, 2.5 per cent of total public investment and 10 per cent of public investment in the tertiary sector (Table 4).

Up until 1977, Senegal survived using the telecommunications infrastructure and equipment installed to serve the needs of the former French West Africa. In accordance with the guidelines of the Third Plan (1969-1973)<sup>13</sup>, this involved maintaining the existing infrastructure inherited from previous times, modernizing and developing the services provided and improving the productivity of the Office of Post and Telecommunications (OPT). The Fourth Plan (1973-1977)<sup>14</sup> preserved the same guidelines by adding new links, particularly in the areas stretching from Dakar to St.-Louis and from St.-Louis to Bakel.

The Fifth Plan (1977-1981)<sup>15</sup> initiated a second phase in telecommunications policy and development. This plan, in force until 1990, involves a marked acceleration in government investment in the sub-sector. In one year (from 1977 to 1978), this grew from less than half a billion CFA francs to more than 5 billion CFA francs. As a share of total government investment, telecommunications increased from 2.5 per cent to 5.7 per cent, while its share of total tertiary-sector investment grew from 10.1 per cent to 38.9 per cent (see Table 4). Table 5 reflects operations carried out as part of the public investment program for telecommunications during the 1977-81 period.

Along with this change in telecommunications policy and development, and the corresponding change in the perceived socioeconomic importance thereof, came a new approach to managing the sub-sector, aimed at making telecommunications services profitable – based on a more commercial style of management that included bringing the

<sup>12</sup> The first plan explains that while the State "relies on the intervention of large amounts of private capital," it does not "remain passive, but plays a driving role in defining a programme of industrialization, creating and maintaining a climate that promotes industrial expansion, undertaking studies and research that are indispensable for the establishment of new industries, and owning shares where appropriate." (Quoted by Rocheteau, 1982).

<sup>13</sup> Ministry of Planning and Industry (1969): Third Economic and Social Development Plan (1969-1973).

<sup>14</sup> Ministry of Planning and Cooperation (1977)

<sup>15</sup> *idem*.

conduct of its agents into line with that of private-sector workers. This approach meant the “decommissioning” of a large number of OPT staff and the initiation of a training program for upper management and technical staff.<sup>16</sup>

Modeled on the set of guidelines for information technology, a national telecommunications master plan (1975-2000) was implemented as a strategic framework for developing the domestic telecommunications network.<sup>17</sup>

Though important, the investments were insufficient to meet the needs of upgrading and modernizing equipment and meeting growing subscriber demand. These needs led authorities, in the Seventh Plan (1985-1989), to assign SONATEL the task of developing a highly productive national telecommunications infrastructure with the capacity to stimulate domestic economic activity, improve access to the telecommunications system, promote the development of national data bases and promote the implementation of a local or regional telecommunications industry. In addition, it was designed to encourage financing of telecommunications through domestic savings. The strategy consisted of implementing a plan to narrow the telecommunications lag, initiating a rural communications development program and concluding a three-year performance contract between SONATEL and the State.<sup>18</sup>

In the 1990s – in the final phase of implementing public programs to establish telecommunications systems – there was a sharp reduction in public investment in the telecommunications sub-sector. The failure to include an investment project in the Tenth Plan is attributable to SONATEL’s prospects for privatization and the self-financing policy it initiated. The amounts allocated to operations of this type were cut in half, from 13.3 billion CFA francs in 1989 to 5.2 billion CFA francs in 1990, matching 1978 levels. The decline continued until 1995, when the sub-sector’s share of total investment fell to 1.4 per cent (9.2 per cent of investment in the tertiary sector).

**Development of the telecommunications infrastructure.** Investment efforts undertaken by the State in the 80s provided Senegal the telecommunications infrastructure and equipment needed to develop cutting-edge technologies. These efforts also helped make telecommunications one of the main sectors of the economy in terms of heavy investment. Taking over the role occupied previously by public investment programs, SONATEL’s finance policy in the mid-90s was based on near-total self-financing of telecommunications infrastructure, with self-financing increasing to 85.4 per cent in 1995 and to 90.6 per cent in 1996 (see Table 7). SONATEL’s decision to go public, the appearance of France-Télécom as a strategic partner, and the company’s entry on the stock exchange were viewed as indispensable elements in the infrastructure development process.

As shown in Table 7, investment made by SONATEL grew from 32.8 billion CFA francs in 1995 to 57.9 billion CFA francs in 1996. After a drop in 1997, investment again began to grow, to 48 billion CFA francs in 1998 and to 55 billion CFA francs in 1999. In September 1999 alone, the company invested 4 billion CFA francs to renovate its mobile telephone network in the Dakar region. Since then, SONATEL has been the largest investor, with 17 per cent of gross fixed capital investment, and has been the number-one creator of jobs in Senegal.<sup>19</sup>

Table 7 shows that most of the investment was allocated to large national projects, representing, in 1996, 88.4 per cent (32.8 billion CFA francs) of total investment, compared to 11.6 per cent for regional projects. The latter are made up primarily of desert operations in

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