



# Policy Brief

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## **The use of ICT and its Impact on the Living Standards of Congo-Brazzaville's Population: A Cross-sectional Analysis**

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### **1. Background to and justification of the study**

#### **1.1. The international context**

The introduction and dissemination of ICT is a major challenge for developing countries in general and for those in Africa in particular. The opportunities offered by ICT and the challenges posed by it have been pointed out in a number of publications. Among these are those by Hitt and Brynjolfsson (1996) and Brynjolfsson and Yang (1996), which analysed the impact of ICT on productivity, and those by Jorgenson and Stiroh (1995), Mansell and Wehn (1998), and Pohjola (2000, 2001), which examined its impact on growth and development. For their part, the studies by Bresnahan, Brynjolfsson and Hitt (1999) laid emphasis on the role of organizations while those by Acemoglu (1998) and Hwang (2000) put emphasis on the development of human capital.

It transpires from all those studies that ICT is a determinant of the improvement of people's living standards. The use of ICT has indeed brought about visible socioeconomic changes such as the improvement in management efficiency. Further, greater access to information and knowledge has led to people's greater participation in community life and to human development [Hadden (1996) and UNDP (1993, 2001)]. According to Krueger (1998), by improving communication and increasing access to information, ICT reduces information asymmetry and transaction costs and increases institutional organizations' effective awareness.

However, contrary to expectations, the introduction and dissemination of ICT is not a linear phenomenon: as a matter of fact, disparities and inequalities within and between countries seem to widen with ICT. In this connection, a number of studies have revealed important gaps in the penetration of ICT between North America and Europe on the one hand, and Africa and Asia on the other (Chinn and Fairlie, 2004). This disparity can be

explained by a number of factors, among which gaps in income, the level of human capital, infrastructure [Dasgupta et al. (2001); Oyelaran-Oyeyinka and Lal (2003); Pohjola (2003); and Wallsten (2003)], demographic features and the type of activity regulation (Wallsten, 2003).

Little research has been devoted to the local dimension of the phenomenon. The digital divide does not concern only developed and developing countries; it can also be observed within the same region and within the same country [Gareis and Osimo (2004); Ramsay (2004)]. The African country is actually characterized by a huge digital divide: North Africa is clearly ahead of sub-Saharan Africa in relation to fixed telephony, mobile telephony and the Internet. With regard to each one of these three dimensions of ICT, Congo-Brazzaville lags well behind. Considering the rate at which the new technology is introduced and made part of the production process, the dissemination or introduction of this new technology is seen as a major determinant for economic growth [Roger (1995), Rosenberg (1982)]. It was therefore important to carry out an investigation in order to better understand the causes of the slow development of ICT in Congo.

## **1.2. The national context**

The history of telecommunications in Congo goes back to the 1960s, when the country inherited the facilities of the Afrique équatoriale des postes et télécommunication [Post Office and Telecommunications Equatorial Africa] (AEPT). In this connection, in 1964 the country's first telecommunication company was born, namely the National Office for Post Offices and Telecommunications (ONPT); it was instituted by law No. 16/64 of 24 July 1964. For more than 30 years, this company enjoyed a monopoly in the country. Because of this, the state-owned company did not record a good performance. Instead, it experienced a lot of management difficulties which did not enable it to achieve a nation-wide communication cover.

These difficulties were aggravated by the sociopolitical conflict that the country experienced in 1997 and 1999. This conflict situation split the communications network into two inter-urban areas: one between Brazzaville and Pointe Noire and another between Brazzaville and Oyo, serving a population of about 15 million subscribers, corresponding to a density of 0.4%. In the face of such a situation, the government privatized the ONPT corporation by law No. 08/2000 of 2<sup>nd</sup> July 2000 that modified the 1994 law on the privatization of state-owned enterprises. In the process of privatizing the ONPT, it was split into two different entities: the Congo Post Office and Savings Company (SOPECO), to be in charge of the post office sub-sector, and the Congo Telecommunication Company (SOTELCO), to be in charge of the telecommunications sub-sector. In spite of this change in legal status, the performance of the new company remained mediocre. As Tsassa and Kimpolo (2002) point out, the ONPT always had fewer telephone lines than those needed, which seriously limited the communication opportunities of non-major towns. If even in the parts of Congo where the ONPT had operational facilities demand outstripped supply, one can easily imagine that the situation was much worse in the numerous parts of the country which could hardly be reached for lack of roads.

So, realizing that the traditional operator was not able to establish a telecommunications network throughout the country, the government decided to open the market to competition. As Makosso (2005) points out, the law No. 14-97 of 26 May 1997, which instituted the opening of the telecommunications sector to competition, was the beginning of a deregulation process, that is, the putting in place of new regulations<sup>1</sup> which laid down the rules governing this competition. Since the opening of the market, telephone services have been provided by five operators that use three different systems grouped under two types of networks: the wire networks and the mobile ones.

The wire network, the older of the two types, is the sole remit of the historical operator, SOTELCO. But when it comes to the mobile network, two operators using two different operating systems share the market: the D-AMPS standard system, the operating licence for which was granted, in 1997 to Cyrus, the operator of the Cyrtel network, and the GSM system. The latter has been jointly operated by Celtel-Congo (since December 1999), MTN, which was born in 2005 from the take-over of Libertis Télécom (which had been in existence for six years) and, more recently (in January 2008), Warid-Congo.

While Cyrus has collapsed, the other three operators function normally and provide services almost throughout the country. Indeed, 150 localities are today covered by Celtel-Congo, 66 by MTN, and only two by Warid-Congo—which has just begun its operations. In spite of this fairly significant opening of the market, the telephone is still not widely spread, notable in the rural areas: the results of the Household Survey in Congo (ECOM) carried out in 2005 showed that only 32% of the households had a telephone (be it fixed or mobile). Telephone services are relatively more widespread in Pointe Noire than in other areas of the country: 67% of the households in that area were reported to have a telephone, against 58% of those in the Brazzaville area, 56% in other communes, 51% of those living in rural areas, and 47% of those living in semi-urban areas. Having a telephone enables a clear-cut distinction between poor and non-poor households.

In view of what is said in the previous paragraphs, the present study was justified for several reasons. Firstly, since the telephone network is fast expanding and is contributing in certain ways to improving people's living conditions, it is indispensable to know the determinants of access to ICT in order to promote the introduction and use of this technology. Secondly, the digital divide that is clearly visible in Congo between the rural and urban populations deserves a deep investigation in order to identify the factors that are behind such a divide and to suggest ways of reducing it. The introduction and use of new technology means costs and benefits for the user. In this respect, the ultimate decision to use a new technology is based on a series of individual decisions based on a comparison of costs and benefits. It can thus be advanced that different economic

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<sup>1</sup> The law No. 14-97 of 26 May 1997 defines regulation as an essential function that consists in ensuring that the entire telecommunications sector functions well and develops within the institutional framework described in the said law.

players have different preferences based on a multitude of factors that need to be brought to light.

Furthermore, since ICT is a means of establishing a communication link between people, it follows that disseminating it should improve people's living standards. That is why it is important to study the extent to which ICT has indeed improved people's lives.

Finally, what has been said in the preceding paragraphs about the ICT in Congo largely concerns the telephone, since the Internet is still facing difficulty in taking off in the country. That said, operating permits have been granted to certain Internet service providers, namely AMC Télécom; AFRIPA Télécom, Celtel-Congo and some holders of independent networks such as oil magnates, forestry developers and other enterprises. The number of people having access to ICT is so low in Congo (less than 2% of the entire population) that it is important to study what determines the acquisition of a microcomputer, which is an indispensable tool for accessing the Internet. After all, it should be noted that with the exorbitant costs of computer equipment in Congo, very few Congolese can afford to buy it.

## **2. Statement of the problem**

According to the results of the Household Survey in Congo (ECOM, 2005), the level of poverty is estimated to be 50.7%. The distribution of poverty according to areas of residence shows that the towns of Pointe Noire and Brazzaville have the lowest proportions of poor people, 33.5% and 42.5% respectively. Much higher proportions of poor people will be found in semi-urban and rural areas, with rates of 67.4% and 64.8% respectively. Among the factors that account for these high levels of poverty are the insufficient number and the low quality of basic social and economic facilities. The poor state in which these facilities are does not enable the Congolese populations to have improved access to basic social services and to the development of their activities. That is why the development of ICT, notably mobile telephony, offers great prospects for improving the living conditions of Congo's populations, especially those that live in semi-urban and rural areas where the communication network is quite limited. However, it is not enough for there to be a wide spatial coverage of the telephone network for people to have access to it.

There are several factors for deciding to use or not use the mobile telephone. These factors are linked to the costs and benefits of using this technology. So, since it is generally accepted that the mobile telephone is a technology that is capable of getting populations out of their isolation and giving them access to information that will improve their living conditions, it is imperative to try to determine the factors that are likely to promote the use of this technology by populations living in disadvantaged areas.

There is even lesser access to the Internet than to the telephone: the former is only available in the big towns, mainly Brazzaville (the political city) and Pointe Noire (the economic capital). One of the obstacles to having the Internet is the lack of the equipment required for this type of technology. Indeed, very few households in Congo own computer equipment. That is why it is important to examine the determinants of a household's ownership of a computer, which will be the starting point for Congo's populations' use of the Internet.

In view of what precedes, the present study had to address two key questions: What are the determinants of the use of the mobile telephone and the computer in Congo-Brazzaville? What is the impact of the mobile telephone on the living standards of Congo's populations?

### **3. Objectives of the study**

The general objectives of this study were to analyse the determinants of the use of the telephone and the computer on the one hand and, on the other hand, to examine the effect of the mobile telephone on Congo's populations' living standards. The specific objectives were:

- to identify the principal determinants of the use of ICT by households throughout the country;
- to highlight the specificities of urban, semi-urban and rural areas in their use of ICT;
- to assess the impact of the mobile telephone and the microcomputer on people's living standards;
- to draw economic policy implications for the use and dissemination of ICT by the majority of the population.

### **4. Methodology**

The research on the use and impact of ICT on people's living conditions has led to the specification of two econometric models. The first model was used to analyse the determinants of the use of ICT in the Republic of Congo, while the second was used to study the impact of the dissemination of ICT on people's living conditions.

#### **4.1. Analysis of the determinants of the use of ICT**

To carry out this analysis, the study considered that an individual  $I$  (with  $i = 1, 2, \dots, I$ ) gains a utility for each one of his or her  $j$  choices (with  $j = 1, 2, \dots, j$ ). This utility, written as  $U_{ij}$ , is composed of a deterministic part ( $V_{ij}$ ), which depends on various observable variables, and a random term (the vector  $\varepsilon_{ij}$ ). This random term corresponds to the unobservable

factors that can influence an individual's decision. Thus, the utility function for individual  $i$  can be implicitly written as follows:

$$U_{ij} = V_{ij} + \varepsilon_{ij}$$

The term of error is supposed to be identically and independently distributed by a law of a type-1 extreme value. The decision rule for each one of  $i$  individuals consists in selecting the alternative  $j$  that maximizes the utility function.

Thus, two logistical models were estimated in the present study. The first has to do with the choice to buy or not to buy a mobile phone, while the second concerns the choice to buy or not to buy a computer. Into the most model, the indicator variable  $Y_{1i}$ , was included; it takes the value 1 if the household owns a telephone and 0 if it does not. Likewise, the indicator variable  $Y_{2i}$ , was included; it takes the value 1 when the household owns a microcomputer and 0 if it does not. The explanatory variables included in the model are the size of the household, the age of the head of the household, his or her sex, his or her level of education, his or her employment status, the migration of a member of the household, the level of infrastructure, the area of residence, and income.

#### 4.2. Impact of ICT on people's living conditions in Congo

The analysis of the impact of ICT on people's living conditions was based on semi-logarithmic regression model. It enabled the explanation of the logarithm of a household's annual total expenses (as a proxy for the household's living standards) using a set of variables that enable one to capture the effect of ICT and a set of control variables. This model looks like this:

$$\ln(NV_i) = \alpha_0 + \sum_{k=1}^n \beta_k TIC_{ki} + \sum_{j=1}^m \gamma_j X_{ji} + \varepsilon_i$$

In this equation,  $NV_i$  represents the living standards of household  $i$ ;  $TIC_{ki}$  represents a series of four variables ( $n = 4$ ) that enable one to capture the effect of ICT (radio, television, mobile telephone and microcomputer). Each one of these variables is dichotomous: it takes the value 1 when the household owns ICT equipment and 0 if it does not.  $X_j$  is a vector of control variables including the size of the household, the level of education of the head of the household, his or her status on the employment market, and the household's area of residence.

The study used the database of the Household Survey in Congo (ECOM) conducted in 2005. It enabled the present to carry out statistical and econometric analyses. The ECOM survey has three components: the first is related to household consumption, from which levels of poverty were analysed. The second is about the basic well-being indicators, as

assessed by the QUIBB Questionnaire, which is a tool designed by the World Bank in conjunction with the UNDP, the ILO and UNICEF to enable a given country to quickly produce essential statistical indicators. It enables the production of indicators of basic well-being with reference to people's current living conditions. The third component is about the prices gathered to complete the system.

## **5. Main results and economic policy implications**

This paper has examined the determinants of the use of ICT on the one hand, and the impact of this technology on Congo-Brazzaville's populations' living standards on the other. With regard to the use of ICT, the results obtained suggest that there are six major determinants of the use of the mobile telephone in the country: human capital, the employment status of the head of the household, the migratory movement of at least one member of the household, access to electricity, the level of income, and the area of residence. From the results by geographical region, the specificities of semi-urban and rural areas stand out from those of urban areas. For instance, out of the six determinants identified for the whole country and the urban areas, two were not found to be significant for the semi-urban areas. The two are: human capital and the migration phenomenon. And for rural areas, only two of the six were found to be significant, namely access to electricity and level of income.

With regard to the use of the microcomputer, from the results obtained almost the same determinants emerged as in the case of the use of the mobile phone: the age of the head of the household, human capital, access to electricity for the household, and the household's level of income. The results confirm the first hypothesis of the study, which said that income, level of education and migration of the members of the household would be determining factors for the use of ICT. The differences observed between areas of residence are a reflection of differences in the availability of basic facilities and human and physical capital; thus, differences that explain the digital divide observed in Congo-Brazzaville.

In view of the results mentioned above, it can be observed that while ICT is increasingly acknowledged as a means to achieve development goals, it is evident that Congo-Brazzaville must take up the challenge of reducing the digital divide within itself, as new technologies remain out of reach for the poor populations living in the country's semi-urban and rural areas. This state of affairs is due to their low level of income (even though rates for access to ICT services have been drastically reduced in the recent past), the lack of basic socio-economic facilities, the low level of human capital development, etc.

The results obtained from the analysis of the impact of ICT on Congo's populations' living standards showed that the older instruments of ICT (radio and television) had a positive

and significant impact on living conditions. This finding applies to urban areas, semi-urban areas and rural ones as well. Regarding the other forms of ICT studied, the findings showed that the use of the microcomputer was not significant for the semi-urban areas while that of the mobile telephone was not significant for the rural areas. However, despite the low level of significance of the impact of the use of ICT on the living standards of the households in semi-urban and rural areas, it can still be claimed that the second hypothesis of the present study was also borne out. The result after all confirms the fact that ICT fosters the emergence of network firms and thus increases opportunities for sources of income, thereby contributing to improving people's living conditions.

Two comments are in order from the results mentioned above: first, it should be noted that ICT contributes to improving people's well-being by enabling them to diversify their sources of income through access to information on various income-generating opportunities. In this respect, the massive use of ICT is a major asset for the country especially in relation to the fight against poverty. Second, the finding that basic facilities are a major determinant of the use of ICT means that Congo-Brazzaville must take up the challenge of establishing a network of basic socioeconomic infrastructure in order to reduce the digital divide between the urban areas on the one hand and the semi-urban and rural ones on the other. This would enable ICT to fully play its role of improving the country's populations' well-being.

It should be stressed, though, that Congo's development challenge will not be taken up simply through investing in ICT. Nonetheless, it is undeniable that ICT is now a key element of the environment within which the country's development will take place. So, a great deal of political goodwill will be necessary on the part of the country's government: this must allocate enough resources to the implementation of the national plan for the development of ICT if it is to prove that it is really committed to a substantial reduction of poverty. This is a key demand because today the use of ICT is so widespread in the world economy that Congo-Brazzaville can no longer, for one reason or another, continue refraining from investing in this technology. The country needs ICT to speed up its progress towards achieving the Millennium Development Goals.