MINISTRY OF HIGHER EDUCATION AND SCIENTIFIC RESEARCH

NATIONAL HIGHER SCHOOL OF MANAGEMENT

ENSM - KOLEA

A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER DEGREE IN E-GOVERNMENT MANAGEMENT.

Bridging the Digital Divide in Algeria: What's the Role of Universal Service Program?

Case study: Universal Service Program in Bordj Bou Arreridj Province

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2021 / 2022

Abstract:

Every country in the world aims to enable all its citizens to use Information and Communication Technologies (ICT), regardless of where they live by adopting strategies and methods that contribute to supplying remote places with the necessary equipment for the purpose of connecting villages and areas characterized by difficult terrain and rough roads to enable communication for their people, among the strategies adopted by the state of Algeria is the Universal Service Program, the purpose of this research is to highlight the role of this program in providing telephone and internet services in remote areas which leads to bridge the Digital Divide by analysis the research results of one of its cities (Bordj Bou Arreridj Province). The data for this study was collected through semi-structured interviews with the Executive Director of Post and Telecommunication as the first responsible of monitoring this program in the province and with 4 managers at the department of ICT, as well as through documentary sources existing at the same organisation. Through this study we concluded that the role of this program is to connect rural areas with ICT, provide electronic services, integrate citizens in the digital age and promote equality among them, as a final result, we discovered that the program contributed really in bridging the Digital Divide in Algeria.

Key words: Information and Communication Technologies (ICT), Universal Service Program, Digital Divide.

Résumé :

Chaque pays du monde vise à fournir à sa propre citoyenneté l'utilisation de Technologies de l'Information et de la Communication (TIC) sans tenir compte aux paramètres de lieux de leurs propres résidences, en adoptant à l'effet, toutes les stratégies et des méthodes qui contribuent à doter les zones rurales par des équipements nécessaires qui menant à la fois, à renforcer le lien entre villages et les endroits à reliefs durs et ardus entre eux , et d'assurer parallèlement la communication entre populations sans aucune entrave.

Parmi les stratégies adoptées par l'État Algérien le programme du Service Universel ; le but de ce projet est de mettre en évidence le rôle de ce programme dans la fourniture de services téléphoniques et Internet dans les zones d'ombres qui conduit à réduire la fracture numérique à travers des analyses et des résultats de recherches effectuées sur un site (cas de la Wilaya de Bordj Bou Arreridj) Les données de cette étude ont été recueillies via des entretiens semi-directifs avec le Directeur Exécutif de la Poste et des Télécommunications en tant que premier responsable du suivi de ce programme dans la Wilaya et avec quatre (4) responsables

du département des TIC, ainsi qu'à travers les ressources documentaires existantes dans la même organisation.

Grâce à cette attitude (Etude), nous avons conclus que le rôle de ce programme ; c'est de connecter les zones rurales par les moyennes des TIC, la présentation aux publics des services en lignes, et de faire intégrer les citoyens à l'ère numérique avec égalité et sans distinction.

Compte tenu de ce qui précède, nous avons distingués que l'importance de ce programme contribue de part et d'autre à réduire et à éliminer au fur et à mesure la fracture numérique en Algérie.

Mots clés : Technologies de l'Information et de la Communication (TIC), Service Universel, Fracture Numérique

ملخص:

تهدف كل دولة في العالم إلى تمكين كل مواطنيها من استعمال تكنولوجيات الإعلام والاتصال بغض النظر عن المكان الذي يقطنون فيه وهذا من خلال تبني استراتيجيات وطرق تساهم في إمداد المناطق النائية بالمعدات اللازمة وربط القرى والأماكن التي تتصف بصعوبة التضاريس والطرق الوعرة وهذا لتمكين الاتصال لأهاليها، من بين الاستراتيجيات التي تبنتها الدولة الجزائرية برنامج الخدمة الشاملة، الهدف من هذا المشروع هو تسليط الضوء على دور برنامج الخدمة الشاملة في توفير خدمات الهاتف والأنترنات في المناطق النائية مما يؤدي إلى تجسير الفجوة الرقمية من خلال تحليل نتائج بحث ولاية من ولاياتها (ولاية برج بوعريريج)، البيانات الخاصة بهذه الدراسة جمعت من خلال اجراء مقابلات شبه منظمة مع كل من المدير التنفيذي للبريد والمواصلات السلكية واللاسلكية باعتباره المسؤول الأول عن مراقبة هذا البرنامج في الولاية ومع 04 مسؤولين بقسم تكنولوجيات الإعلام والاتصال، وكذلك من خلال مصادر وثائقية متواجدة بنفس المنظمة، استنتجنا من خلال هذه الدراسة إلى أن دور هذا البرنامج هو ربط المناطق الريفية بتكنولوجيا المعلومات والاتصال، تقديم الخدمات الإلكترونية، دمج المواطنين في العصر الرقمي وتعزيز المساواة بينهم. وكنتيجة نهائية وجدنا أن برنامج الخدمة الشاملة يساهم في سد الفجوة الرقمية في الجزائر.

الكلمات المفتاحية: تكنولوجيات الإعلام والاتصال، الخدمة الشاملة، الفجوة الرقمية.

Acknowledgements

This master thesis presents the results of the study about the role of the Universal Service Program in bridging the Digital Divide in Algeria, which was conducted between March 2022 to August 2022 at the Department of Information and Communication technologies at the Directorate of Post and Telecommunications of Bordj Bou Arreridj province, Algeria.

I would like to thank my supervisor, Professor Abdelmalik Mezhouda for his great inspiration, competent ideas, comments and wonderful support during the entire process. Additionally, I would like to extend my thanks to all our interviewees for their input towards our empirical research.

Finally, I wish to express my gratitude to my family, friends and colleagues for their inspiration and unconditional support during the research process.

ENSM, August 2022.

Houssem OUNOUGHI

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List of abbreviations and acronyms

ICT	Information and Communication Technologies
NTIA	The National Telecommunications and Information Administration
CPS	Current Population Survey
PCR	Privatization, Competition and Independent regulation
UNCTAD	United Nations Conference on Trade and Development
MENA	the Middle East and North Africa
KADO	the Korea Agency for Digital Opportunity and Promotion
OECD	The Organisation for Economic Cooperation and Development
IT	Information Technology
TDI	The Tele-Density Indicator
TPI	The Technology Progress Indicator
TAI	The Technology Achievement Indicator
IIQ	The Information Intelligence Quotient
MUI	Media Usage Indicator
ITU	the International Telecommunication Union
LDCs	the least developed countries
PCRD	The Purdue Center for Regional Development
DDI	Digital Divide Index
INFA	the infrastructure/adoption
SE	the socioeconomic
ACS	American Community Survey
MPTT	The Ministry of Post and Telecommunication
OUSRATIC	composed of two words, OUSRA which means family and TIC stands for Information and Communication Technologies
WLL	Wireless Local Loop
PSTN	the Public Switched Telephone Network
VSAT	Very Small Aperture Terminal
ATS	Algerie Telecom Satellite
INMARSAT	The mobile satellite company
LTE	Long Term Evolution
4G WBB	4G Wireless Broadband
FBB	Fixed Broadband
WiMAX	World Interoperability for Microwave Access
MAN	Metropolitan Area Network
SLC	Smart Link Communication
OFTEL	The Office of Telecommunications
PPPs	private public partnerships
NRAs	national regulatory authorities
USF	universal service fund
MSAN	Multi-Service Access Node

INTRODUCTION

I. Introduction

1.1- Background

Nowadays, enabling every citizen to benefit from electronic services and telecommunications at an affordable price from various areas (rural or urban) is considered as a mandatory right for him, in order to make public and private institutions closer to all individuals without exception and promote economic growth, this is why developing countries like Algeria support and provide different ways that can reduce the digital divide. Nevertheless, information and communications technology are still lagging behind in these countries due to many reasons, according to Eshetu and Kinuthia (2011) there are four reasons, the first one refers to the poor quality of internet and facilities where there is a general lack of computer and equipment, just few people have internet access, the second reason is the existence of diverse local languages, scripts and dialects, the third reason is computer illiteracy and shortage of skilled Professionals where there is a weak computer education infrastructure, the last reason is the lack of national guideline and consistent information in communication policy, this affects all aspects of human activity and lifestyle in a country. By improving ICT, we can increase communication and bridge the Digital Divide in a certain country.

ICT discrimination is a form of social exclusion, depriving some citizens of benefiting from electronic services. During the Covid-19 pandemic several students and workers couldn't work and follow their online courses due to the effects of the Digital Divide below:

Lack of communication:

Most of people who live in rural areas are disconnected, they don't have access to the Internet and they cannot communicate, this leads to the social isolation.

Barrier to studies:

The coronavirus pandemic has shown the effects of the digital divide in education, teachers and students out of the loop because they lack sufficient technology and digital skills. It also prevents access to knowledge.

Barrier to electronic services:

Wilson (1998) mentioned that "an e-service is an activity or series of activities that takes place during the interaction between a provider and a customer through an electronic channel", the Digital Divide can't allow citizens or customer to benefit from e-services.

Digital Illiteracy:

Digital illiteracy which refers to a lack of ability and skills to create, evaluate, learn, and find information on online media and digital platforms through the usage of technology, this cause inequality between intellectual and illiterate people.

Many countries in the world adopted some strategies to narrow the Digital Divide, among the strategies adopted in Algeria is "the Universal Service Program".

1.2- Problem Statement:

The lack of phone and internet coverage in rural places prevents citizens who living in there of access to the digital world, and everyone knows that telecommunications companies are of an economic sectors and the investment in these areas is not profitable at all, because providing the services of the telephone network, computer networks and the Internet requires huge amounts of money and the population density is very small, the Algerian government intervened and found a way to solve this problem in order to bridge the digital divide and enable everyone to benefit from digital services by adopting the Universal Service Program. According to Datareportal (2022) internet penetration in Algeria stood at 59,6% in January 2021, it means 40,4% of population still offline. This study aims to answer this question:

What is the role of Universal Service Program in bridging the Digital Divide in Algeria?

From this main question, the following sub-questions are to be asked:

- What is the Current situation of ICTs infrastructures in the province?
- What is the Digital Divide?
- What are the solutions to bridge the Digital Divide?
- What is the Universal Service Program?
- What are the obstacles and problems facing this program?

In order to get answers to all these questions, we adopt an exploratory research which leads to analyse an issue to determine what is happening in order to establish ideas and have a better understanding of the existing problem. According to Naido (2005) exploratory research is useful for the researcher because it increases the researcher's familiarity with the incident in question and aids to clarify concepts. we intend to carry out an exploratory research to find out if the Universal Service Program can bridge the Digital Divide in Algeria. We have conducted semi- structured interviews with the managers of the Directorate of Post and Telecommunications (Bordj Bou Arreridj province in this study), and with 5 managers in order to gather solid information about the topic.

1.3- The objective of the study

In Algeria, there are many social, political, economic, geographic inequality problems in telecommunications, there is also lack of knowledge about the Universal Service Program of electronic communication adopted by the government, the objective of this study is to create an understanding of the role of this program in bridging the Digital Divide in the country.

1.4- Structure of the thesis:

This research is divided into three chapters, the first chapter, for the presentation of a literature review that summarizes some previous studies dealing with similar themes. Then, a conceptual framework will be provided to allow the explanation of the main notions to clarify the research's problem and giving the study direction to the reader. Chapter two will begin the description of the methodological framework adopted for the research through the methodological approach, methods and tools used to collect reliable data. After that I will present the Directorate of Post and Telecommunications where I did my final-year internship. The last Chapter refers to the analysis and the interpretation of the results obtained through this study.

CHAPTER I: THE THEORITICAL FRAMEWORK

Today, most stuff has become available by using Information and Communications Technology (ICT), but on the other hand there are people who live in some rural areas that can't benefit from these services for several reasons including the lack of ICT infrastructures and because of the low-income, those who cannot pay the subscription fees to access to the digital world. Telecommunication companies avoid investing in these far localities that have a small number of populations for the reason that they are unprofitable areas, which results an inequality between zones where these services are available and those where not, also results an equality between people who are able to pay fees and those who aren't, these existing differences led to the appearance of the what we call the Digital Divide. In order to solve the problem of the digital divide, some countries adopted a strategy called the Universal Service in telecommunication.

The first section: Literature review

The digital divide topic has attracted the attention of many researchers from different communities and in a wide range of research fields. From this point, many definitions were chosen here to clarify the diversity of views related to the Digital Divide starting from 1999 when National Telecommunications and Information Administration (NTIA) agency noticed in its second report titled Falling Through the Net II: New Data on the Digital Divide that the idea of a Digital Divide first appeared in the United States in 1998. The agency noticed that overall U.S. households are significantly more connected by telephone, computer, and the Internet since NTIA issued the first Falling Through the Net report, which was based on 1994 Current Population Survey (CPS) results. At the end of the report, the NTIA deduced that penetration rates have risen across all demographic groups and geographic areas (NTIA, 1998). From this analysis we understand that the digital divide is related to the widespread of the use of ICTs (telephone, computer, internet. etc) in all localities.

Benjamin (2001) mentions that the Digital Divide refers to the perceived gap between those who have access to the latest information technologies and those who do not have access to this information. In his opinion those having not access to the information are considered in some quarters to be handicaps and those who have access will further their distance from those who do not. The author discovered that when internet technology becomes pervasive and cheap, it will offer an enormous opportunity to diminish the digital divide. This is the critical divide between those who can take full advantage of the treasures of information that will be so widely available, and those who cannot take advantage of easily accessible information resources.

Kenneth and Deepak (2003) state that the "digital divide" is widely regarded as a unitary phenomenon. And as a first approximation, it is indeed useful to distinguish, in a general way, between the rich and powerful who are part of the Information Age and the poor and powerless who are not. Kenneth and Deepak divided the digital gap into four types. The first one exists within every nation, industrialized or developing, between those who are rich, educated, and powerful, and those who are not. A second one, less often noted, is linguistic and cultural. In many nations this divide separates those who speak English or another West European language from those who do not. But even in the United States, where well over 95% of all inhabitants speak fluent English, there are large differences in access to ICTs among different ethnic and cultural groups. The third digital divide results inevitably from the first two -- it is the growing digital gap between the rich and the poor nations. To these three digital divides Kenneth added the fourth related to countries like India and America where the emergence of a new elite group, which can be called the "digerati." By "digerati" he meant the beneficiaries of the enormous successful information technology industry and the other knowledge-based sectors of the economy such as biotechnology and pharmacology. Kenneth asked this question "*Can ICTs Help Bridge the Digital Divide?"* he replied by "Several years ago, when I mentioned to the great scholar of India, Myron Weiner, my interest in information technology in India, he asked whether I meant the use of computers in Indian schools. I allowed that this was indeed an interest. He burst out, "Are you insane? Don't you realize that there are 60 million Indian children who are not in school at all? For the cost of a computer, you can have a school." Weiner's response underlines the most important question for India, for America, and for the world about information and communication technologies and the digital divide. When hundreds of millions of people lack basic education, essential health care, adequate nutrition, or simple justice, how can investment in ICTs be justified? When resources are limited (as in fact they always are) should they not be allocated to meeting more "fundamental" needs like.

Tenio and Dehane (2019) give their opinion about the Digital Divide and they mentioned that the digital gap can be defined as a 'technological' gap between individuals, families, social groups, countries and geographic areas based on their opportunities to access ICT and use the Internet for a wide range of activities. They noticed that the Digital gap is one of the most challenge in the world especially in developing countries.

Many researchers in the domain of Information and Communication Technologies have searched for the reasons that lead to increase the digital divide in different countries of the world and found that the reasons are due to various fields (technology, economic, sociology...). Ali and Hejazi (2005) take a part in this point and explain the reasons as follows:

Technological reasons:

- The speed of technological development.
- Technological monopoly.
- Intensity of cognitive integration.
- Technological closure exacerbated.

Economic reasons: Among them:

- The high cost of implementing information technology.
- Multinational corporations devouring local markets.

Political reasons: most notably:

- The difficulty of setting information development policies.
- Global dominance of the United States over the geoinformation environment.

Social reasons: most notably:

- Low education and lack of learning opportunities.
- illiterates are mostly women.
- Absence of scientific and technological culture.

On the other side, many associated research have been focused on how to redress the digital divide, Larry Irving the assistant Secretary for Communications and Information Administrator at the National Telecommunications and Information Administration (NTIA 1998) discusses in the third part of the second report mentioned above the challenges ahead in solving the digital divide and highlights the significance of several key policies in promoting access. In the Appendix to the report, they also provide a Trendline Study depicting the trends in household telephone, computer, and Internet access at various points since 1984. This historic survey adds critical information regarding how far they have come in the last fourteen years, and how far they have yet to go in connecting Americans to critical information resources.

Supachai (2006) mentions that if they are to close the digital divide, they must go beyond PCR (privatization, competition and independent regulation) policy by coupling it with pro-active government planning, investment and procurement. Supachai declared that proactive governments have gone beyond PCR to create successful ICT policy after updating UNCTAD's (United Nations Conference on Trade and Development) Information and Communication Technology Diffusion Index for 2005 and documenting the digital divide.

To the same issue "*How to redress the digital divide?*" Lynette and Mark (2006) took the example of the two American cities Atlanta and LaGranrge where Atlanta's initiative has taken the form of community technology centres where citizens can come to get exposure to the internet, and learn something about computers and their applications and LaGrange has taken a very different approach, providing free internet access to the home via a digital cable set-top box, these two initiatives conducted Lynette and Mark to conclude that the Atlanta and LaGrange programmes could be classified as successes in the sense that they provided access and basic computer literacy to people lacking these resources. However, both programmes were, at least initially, conceived rather narrowly and represent short-term, technology-centric fixes to a problem that is deeply rooted in long-standing and systemic patterns of spatial, political and economic disadvantage. A persistent divide exists even when cities are giving away theoretically 'free' goods and services.

Venkatesh and Sykes (2013) develop a model of technology use and economic outcomes of digital divide initiatives in developing countries. They used social networks as the guiding theoretical lens as it is well-suited to this context given the low literacy, high poverty, high collectivism and an oral tradition of information dissemination in developing countries. then they tested their model with longitudinal data gathered from 210 families in a rural village in India in the context of a digital divide initiative. As theorized, they found that the social network constructs contributed significantly to the explanation of technology use. Also, as they predicted, technology use partially mediated the effect of social network constructs on economic outcomes.

Edmond, Jolly and Rosamund (2009) on the same topic "bridging the digital divide" share the educational challenges and opportunities in Rwanda "Due to social inequalities, Rwandan schools and sections of the population traditionally left out from the mainstream education benefit less from the introduction of ICTS in education. The 1994 Genocide introduced a population group, which to this day is more vulnerable, and without extra assistance may

not fit well into the mainstream development process. These include the orphans, child-headed households, and widows, all of whom are susceptible to the forces of marginalization. To tap them will require concerted efforts including the use of modern ICTs to ensure that they acquire knowledge and skills that will make them useful members of society". The authors noticed that Schools in Rwanda can be categorised as urban and rural. Urban schools tend to be well resourced as opposed to rural schools. Urban schools benefit from economies of scale and externalities which exist as a result of urban planning and development. The urban schools therefore have an opportunity to benefit from good road networks, electricity and fixed and mobile telephone networks. Rural schools tend to lack most of the amenities of urban areas and yet the number of children in rural schools is more than that in urban schools. Rwandan schools are also commonly categorised as private and public, whereby, in most instances, public schools are resource advantaged as opposed to the many emerging private schools. It is also the public schools that admit the better performing students, the majority of whom (60%) are usually male students, and where the reverse is also true for the private schools with majority female population (Rwandan Ministry of Education, 2006). This may have implications for female students' participation and access to ICT facilities. However, there are a few private schools which are elitist and hence have the resources to invest in information communication technologies and these are growing in number".

Chiheb (2018) treats in his research the issue of the digital divide in the Arab world, through his analysis of this concept in terms of the extent of access to information technology and the disparity of skills to the responsibility of decision makers in governments and Arab countries, the decision makers who adopted the discourse of the digital divide, which focused exclusively on access to information technology and intervened politically to suppose reducing the digital gap in a short time by adopting the provision of infrastructure with the continuous preservation of information literacy, these assumptions contributed to changing public opinion about who is responsible for solving this problem (government, private-sectors), but reality has proven the opposite which led to the activation of the public-private partnership system as a force to address this problem.

Hamadouch and Amani (2021) concludes in their research under the title of *"The prospect of bridging digital divide in Algeria to achieving financial inclusion"* that Algeria concerned with digital transformation and the transition to government and private digital transactions to contribute to reducing the Digital Divide .They recommend that it is necessary to ensure safe, affordable and highest-quality access to Internet services and benefiting from the

experiences of the Middle East and North Africa (MENA) region to engage in digital transformation through cooperation between the public and private sectors.

One of the solutions proposed to bridge the Digital Divide is the Universal Service, this term entered the vocabulary of American telecommunications in 1907. The slogan "one system, one policy, universal service" was coined by Theodore Vail, the President of AT&T, and propagated in the company's annual reports from 1907 to 1914. (Mueller, 1997)

The second section: Conceptual framework

According to Miles and Huberman (1994), a conceptual framework "lays out the key factors, constructs, or variables, and presumes relationships among them". This section serves as an instrument to give the reader a detailed explanation through the identification of the specific concepts/variables described in the literature review and figuring out their interactions for a comprehensive understanding of the subject.

1- Defining the Digital Divide:

There is no doubt that the concept of Digital Divide is important to be defined and taken into consideration by Governments and private sectors to provide all individuals without exception ICTs services which allow them to receive clear information and help them to make decisions and facilitate their life.

Gore (2000) says 'We must also promote global access to the Internet. We need to bridge the digital divide not just within our country. But among countries. Only by giving people around the world access to this technology can they tap into the potential. Of the information age.' Gore declared that it is an obligation to provide access to internet and bridge the Digital Divide in his country and in all countries of the world. Ballmer (2013) supports the same idea when he says 'The number one benefit of information technology is that it empowers people to do what they want to do. It lets people be creative. It lets people be productive. It lets people learn things they didn't think they could learn before, and so in a sense it is all about potential'. This shows that ICT is power and have a positive impact in people's life.

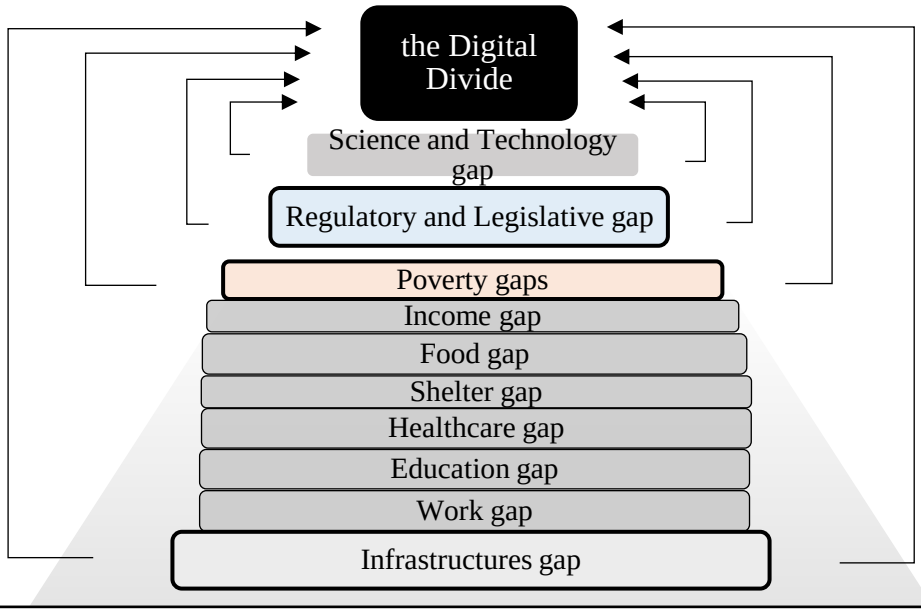
Through these two quotations we can understand the importance of knowing about the Digital Divide and the benefits of ICTs granted to human, this leads public and private sectors to deal with this point seriously.

MacNamara and O'Donnell (2001) mention that the digital divide is seen to be on a par with the divisions in class and basic literacy that existed in the industrial age as well as the persistence of social and economic divisions between the First and Third Worlds."

Roger (2001) release that the Digital Divide is the latest evocative term that refers to differences in access to and uses of information technology that are correlated with income, race and ethnicity, gender, age, place of residence, and other measures of socioeconomic status.

Ali and Hejazi (2005) define the Digital Divide as the gap of the gaps (the gap of an accumulated layers of inequality gaps), the Figure below presents those layers in a pyramid form. (See Figure 1).

Figure 1. the Digital Divide: the gap of the gaps



Source: https://down.ketabpedia.com/files/bnr/bnr4666-1.pdf Accessed on May 15,2022

Ali and Hejazi (2005) gave three other definitions of the Digital Divide from the perspective of the full cycle of knowledge acquisition which include four tasks (Access to knowledge sources, absorbing knowledge, use of existing knowledge, generate new knowledge) in terms of coverage as follows:

A- A narrow definition: by limiting the concept of the digital divide to “access to sources of knowledge” in terms of the availability of the necessary infrastructures that allow obtaining information and knowledge sources. This definition focuses on the difference between the availability of telecommunication networks and the

means of access to them and the elements of linking them to global networks especially internet.

B- A clearer definition: accessing to knowledge sources and absorbing them through awareness-rising, education and training, employing them economically, socially and culturally.

C- A more comprehensive definition: it covers the full scope of the cycle of knowledge acquisition and also includes the generation of new knowledge through research and development institutions and through production and services establishments.

The authors mentioned that there is a fourth definition that sees the digital divide as a set of challenges posed by the accelerating rate of development of ICTs and the difficulties that developing countries face in spreading it and implanting it in the core of the societal entity.

The Digital Divide can be defined in different aspects (sociology, economics, education, politics, Telecommunication…).

In sociology:

Van Dijk (2005) Defines the Digital Divide as stratification in the access and use of the Internet, and it is inevitably tied with the concept of social inequalities.

"social stratification is a crucial part of all human organization ever observed, it was in the writings of the "fathers of sociology" such as Marx, Weber, and Durkheim, that the study of this topic became more systematic, articulated using concepts that remain with us to this day. It is inevitable therefore, from a sociological point of view, to study the digital divide using these conceptual and analytical tools." (Massimo and Glenn, 2013)

In economic:

The digital divide is a socio-economic problem that has been exacerbated by the recent growth in ICT use and the Internet in particular (Tsiavos et al., 2001). The Digital Divide can be seen as an expression of social and economic inequities, with ICT having the potential to reproduce and increase the social and economic inequities already existing throughout society (Gomez & Martinez, 2000).

In education:

The use of the term "Digital Divide" has become prominent in the education realm to describe variances of accessibility, utilization and networking among teachers and learners around the world. (Edmond et al. ,2009)

According to Africa News, the Digital Divide is not just countries without computers, it is also when you have a computer but you do not know how to use it. This is what happens in third world countries that do have little access to computers. They cannot use them because they do not have the means of education to learn. (Belden 2004; Edmond et al. ,2009)

In politic:

Andrea (2010) defines the Digital Divide in building political e-practices as the unequal participation by people in constructing the meaning of the Internet. This is determinant for exploring whether and how the Internet is a participatory instrument. He believed that only by bridging the Digital Participation Divide can they expect the Internet to be representative of worldwide cultures and its use shaped according to local needs and contextual specificities.

Dari and Adam (2010) focus on physical access to Internet technologies, which they believe to be one of the more understudied aspects of the digital divide and the impact of Internet use on participation. They reported that recent studies have shown that certain segments of the population have disproportionately lower rates of Internet access; specifically, homes located within rural areas and areas that are far from major central cities are more likely to have no home connectivity (U.S. GAO,2006). The authors lay out previous literature on political participation in general and the impact of the Internet on civic engagement.

In Telecommunication:

The term “digital divide” refers to the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard both to their opportunities to access information and communication technologies (ICTs) and to their use of the Internet for a wide variety of activities. (OECD, 2001). It is also defined as "the spiral of uneven access to and usage of information and communication technologies and the socio-economic rebound caused" (Husing & Selhofer, 2002) which caused the appearance of information inequality around the world.

As it is mentioned previously, Digital Divide has different perspectives but there is no conflict between these explanations, all these aspects emphasize the following points:

- Unequal patterns of rights between individuals.
- Inequality in the access of the internet.
- Social and economic inequities.
- Variances of accessibility, utilisation and networking among teachers and learners throughout the world.
- Inequality on participation by people in political issues.
- The gap between individuals, households, business and geographic zones in access to ICTs.

2- Types of Digital Divide:

There are numerous types of Digital Divide presented by researchers, in the literature review of this research we mentioned that the digital divide has four types according to Kenneth & Deepak (2003). In this section we provide the types of Digital Divide in telecommunications field between individuals in terms of accessing, using and quality.

According to the Korea Agency for Digital Opportunity and Promotion (KADO) the Digital Divide in Telecommunication has three types:

- **Access divide:** This divide describes the difference between persons who can access to internet and those who cannot, it concentrates on physical access, according to Van djik (2017) physical access means obtaining the hardware and software of digital media and their connection to the Internet. He reported that physical access was correlated with general demographics such as income, level of education, age, gender and race.
- **Usage divide:** the digital divide in usage refers to the difference between users of internet and not users, Avi & Jeff (2008) used a survey of 18 438 Americans from December 2001, they discovered that the patterns of internet adoption and usage differ by demographics. As a result, they found that high-income and educated people were more likely to adopt the internet.

- **Divide stemming from the quality of use:** This third divide concerns the quality service of accessing internet between the users, Simsim (2011) explores in his study of internet service and related issues in Saudi Arabia the importance of speed, price

and capacity of connection from users' perspectives. This type of divide refers to the difference between access within users.

3- *Measuring the Digital Divide:*

Doreen (2021) declares that it is impossible to close the Digital Divide without measuring it. And it's impossible to connect the unconnected without knowing who they are, where they live, and why they remain offline – nor to measure the success of our policies to bridge the gap.

Through Doreen's announcement we understand that we cannot narrow the Digital Divide without measuring it, so "How can we measure the Digital Divide?"

Responding to this question and because of Government current interest in these issues, the OECD (2001) has begun efforts to measure the Digital Divide in 2001. In addition to communications infrastructures, important indicators appear to be computer availability – and potentially the availability of alternative access through TVs or mobile phones – and Internet access (these are "readiness" indicators). The Digital Divide among households appears to depend primarily on two variables, income and education. Other variables, such as household size and type, age, gender, racial and linguistic backgrounds and location also play an important role. The differences in PC and Internet access by household income are very large and increasing, but access in lower income groups is rising. Largely through its effects on income, the higher the level of education, the more likely individuals are to have access to ICTs. Other important indicators concern differences in the profiles of countries, individuals and businesses that use, and make the most use of, the possibilities offered by the new information technologies and the Internet. (OECD, 2001)

4- The indicators of measurement:

The indicators of measurement are defined and classified by many researchers and organizations. According to Fabiola and Mauro (2002) measuring the digital divide involves a lot of criteria that concern infrastructures access, human capabilities, knowledge and education, IT expertise. They divide the measurement into two types international and national measurement as follows:

- International measurement takes in consideration the main current ICT international variables and can be grouped into these relevant themes:
  - Infrastructure readiness, that is:

- Fixed tele-density;
- Mobile tele-density;
- Personal computer density;
- Internet host density;
- Secure servers density.

❖ Socio-economic enablers to use:

- Internet access cost;
- Levels of education;
- Computer or digital literacy;
- ICT penetration: computer and other ICT technologies diffusion on households, business and government;
- Intensity indicators: how much electronic commerce, which sectors, size classes or local areas
- Regulatory framework.

➢ National measurement related to the:

❖ Access issue: individuals, households, rural and urban areas, ICT skills, age, gender, etc.

❖ Business issue: use of ICTs in the firms, company size and structure, public/private, sectors, ICT skills shortage, local areas etc.

❖ Government issue: e-government, ICT usage by public employees, on line public services, ICT equipment in the public administration, etc.

Ali and Hejazi (2005) listed the indicators as follows:

A- The Tele-Density Indicator (TDI): measured by the number of mobile and fixed phones per hundred population and the capacity of telecommunication networks in terms of the volume of data flow through them.

B- The Technology Progress Indicator (TPI): measured by the number of computers, the number of users of internet and possession of electronic devices such as fax machines and others.

C- The Technology Achievement Indicator (TAI): measured by the number of patents, the number of licences to use technology, the volume of exports of high and medium technology products, in addition to the average years of schooling.

D- The Information Intelligence Quotient (IIQ): it is one of the most difficult indicators to measure due to the novelty of the concept and it can be roughly measured by the number of online discussion forums and scientific papers in which more than one author participate, the number of scientific meetings and the range of topics address.

E- Media Usage Indicator (MUI): measured in terms of the number of mass media such as radios, televisions, newspapers and magazines, the number of hours of listening and viewing, reading rates and paper consumption rates, in addition to the extent to which the mass media relies on local sources, relative to external sources, as agencies global news and imported TV shows.

F- Standard Number of Digital Access: it is based on several factors that affect a country's ability to access information and communication technology, namely: infrastructure, physical capacity, knowledge and awareness in terms of the extent of information exchange.

G- Indicator of the extent of involvement in the movement of globalization: it is an indirect indicator to measure the Digital Divide and it's usually measured by the extent of integration into the world, which includes the degree of convergence of global prices from the local, the extent to which the human element is competitive globally, the volume of foreign investments and financial exchanges across borders, the volume of phone calls international outgoing and incoming.

H- Access indicators (ICT Access): measured by the number of fixed communication lines per hundred population, number of mobile communication lines per hundred population, per capita international network frequency for the internet, percentage of houses that have a computer and the percentage of dwellings which has an internet connection.

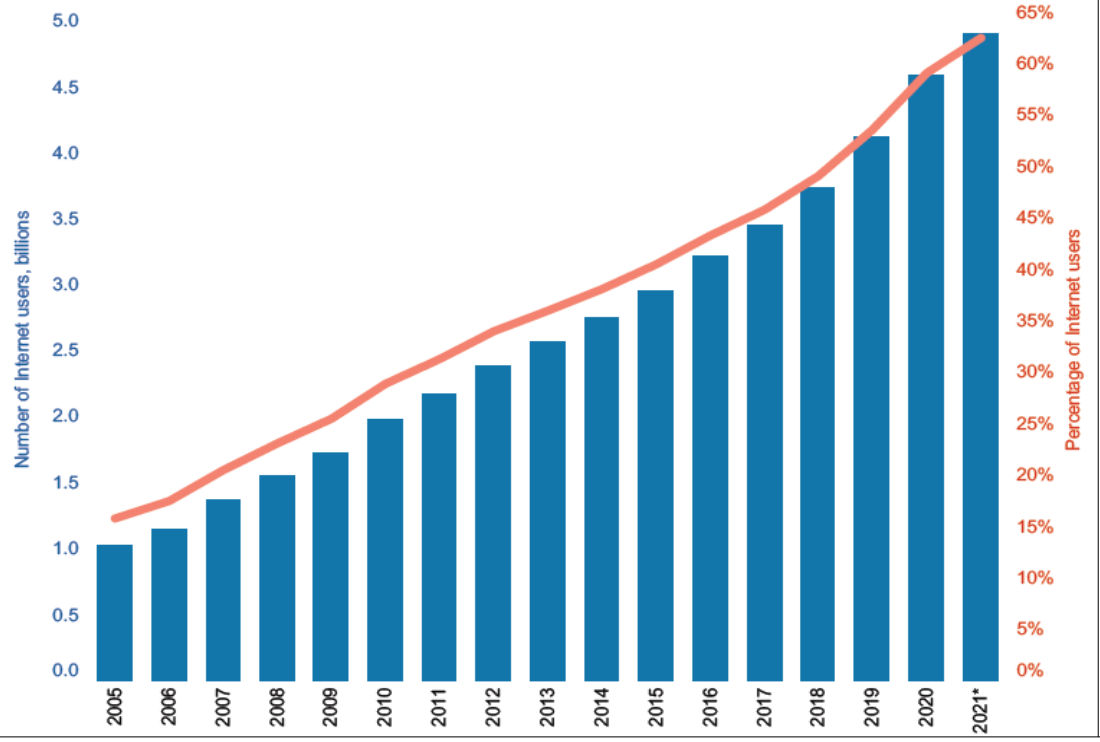
I- Indicators of Use (ICT Use): measured by the number of internet users per hundred population, the number of high-speed internet subscribers per hundred population and the high-speed mobile phone lines per hundred population.

Skills Indicators (ICT Skills): the average number of years of study, the total enrolment ratio in secondary education, the total enrolment ratio in higher education.

In the last year the International Telecommunication Union ITU reported that Internet uptake has accelerated especially during the pandemic. Figure (4) refers to the indicator of the

number of individuals using the internet from 2005 to 2021 around the world provided by the International Telecommunication Union report. (ITU, 2021)

Figure 2. Individuals using the Internet



Source : https://www.itu.int/en/ITU-D/Statistics/Documents/facts/FactsFigures2021.pdf

ITU (2021), Accessed on April 20, 2022

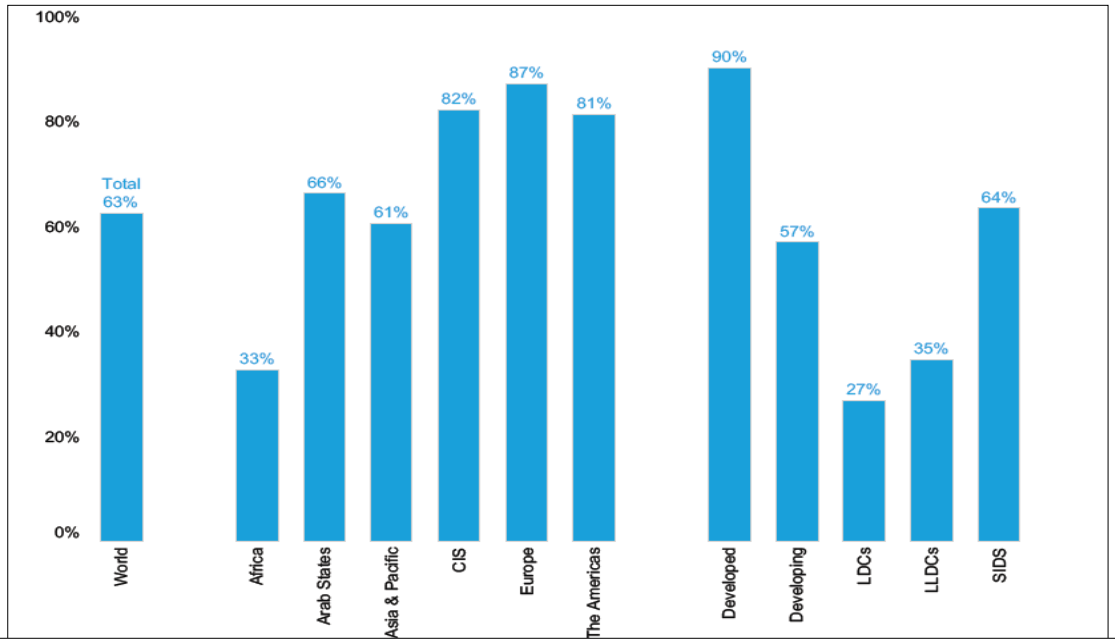
The Internet has long been a source of countless opportunities for personal fulfilment, professional development and value creation. With the COVID-19 pandemic, it has become a vital necessity for working, learning, accessing basic services and keeping in touch.

The latest ITU data show that uptake of the Internet has accelerated during the pandemic. In 2019, 4.1 billion people (or 54 per cent of the world's population) were using the Internet. Since then the number of users has surged by 800 million to reach 4.9 billion people in 2021, or 63 per cent of the population.

Nonetheless, this means that some 2.9 billion people remain offline, 96 per cent of whom live in developing countries. Those who remain unconnected face multiple barriers, including a lack of access: some 390 million people are not even covered by a mobile broadband signal (see below).

In 2020, the first year of the pandemic, the number of Internet users grew by 10.2 per cent, the largest increase in a decade, driven by developing countries where Internet use went up 13.3 per cent. In 2021, growth has returned to a more modest 5.8 per cent, in line with pre-crisis rates.

Figure 3. Percentage of individuals using the Internet, 2021*



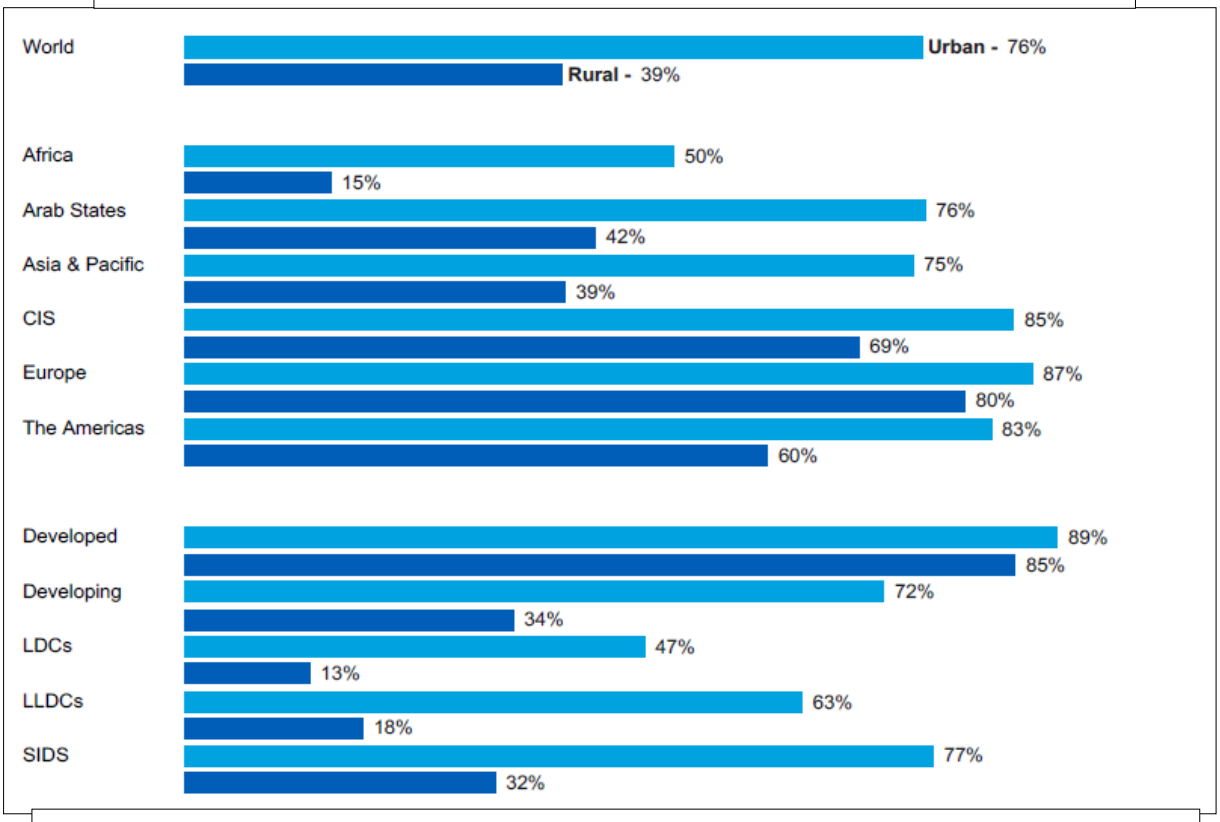
Source : https://www.itu.int/en/ITU-D/Statistics/Documents/facts/FactsFigures2021.pdf

ITU (2021), Accessed on April 20, 2022

Between 2019 and 2021, Internet use in Africa and the Asia-Pacific region jumped by 23 per cent and 24 per cent, respectively. Over the same period, the number of Internet users in the least developed countries (LDCs) increased by 20 per cent and now accounts for 27 per cent of the population. Growth has been necessarily much weaker in developed economies, given that Internet use is already almost universal, at more than 90 per cent.

This growth differential has contributed to a modest narrowing of the divide between the world's most and least-connected countries: for example, the divide between developed economies and the LDCs went from 66 percentage points in 2017 to 63 percentage points in 2021

Figure 4. Percentage of individuals using the Internet by location, 2020



Source : https://www.itu.int/en/ITU-D/Statistics/Documents/facts/FactsFigures2021.pdf

ITU (2021), Accessed on April 20, 2022

Globally, people in urban areas are twice more likely to use the Internet than those in rural areas. In Africa the gap is greater: one-half of urban dwellers are online, compared with just 15 per cent of the rural population. And in the LDCs, urban dwellers are almost four times as likely to use the Internet as are people living in rural areas (47 per cent versus 13).

Where connectivity is close to universal, the urban-rural gap has almost disappeared, unsurprisingly. Thus, in the developed economies the connectivity rate in urban areas (89 per cent) is only four percentage points higher than in rural areas.

In this research measuring the Digital Divide refers to determine the gap between urban and rural places in providing ICTs based on the number of remote areas connected to the internet before and after adopting the Universal Service Program in Algeria by taking the case of one of its provinces.

The Purdue Center for Regional Development (PCRD) has taken the issue of the Digital Divide into consideration and defined the concept as the number one threat to community economic development in the 21st century, the centre put the notion of Digital Divide Index

(DDI) which ranges in value from 0 to 100, where 100 indicates the highest digital divide. DDI is composed of two scores, also ranging from 0 to 100: the infrastructure/adoption (INFA) score and the socioeconomic (SE) score. (Gallardo, 2022). Gallardo mentioned that both of scores have five variables as follows:

INFA score groups variables related to broadband infrastructure and adoption:

1- Percentage of total 2020 population without access to fixed broadband of at least 100 Mbps download and 20 Mbps upload as of 2020.
2- Percent of homes without a computing device (desktops, laptops, smartphones, tablets, etc.).
3- Percent of homes with no internet access (have no internet subscription, including cellular data plans or dial-up).
4- Median maximum advertised download speeds.
5- Median maximum advertised upload speeds.

The **SE** score groups five variables known to impact technology adoption:

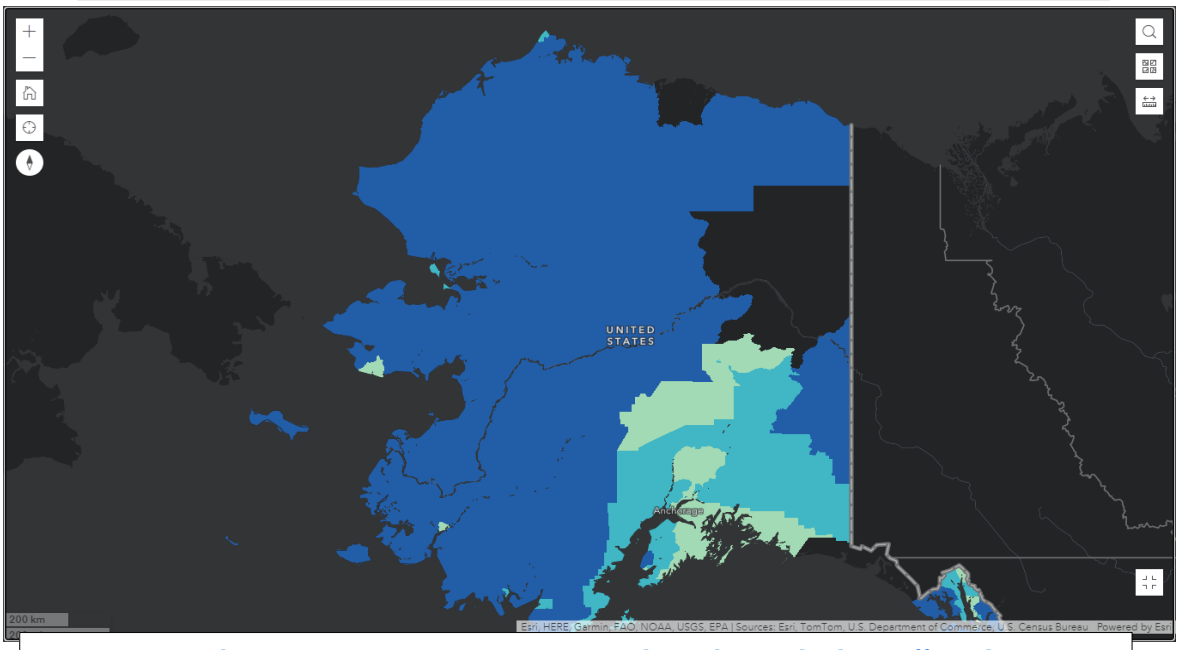
1- Percent population ages 65 and over.
2- Percent population 25 and over with less than high school.
3- Individual poverty rate.
4- Percent of noninstitutionalized civilian population with a disability.
5- A brand-new digital inequality or internet income ratio measure (IIR).

Gallardo (2022) relies on the infrastructure/adoption (INFA) score and the socioeconomic (SE) score to calculate the overall DDI score. In his opinion if a particular county or census tract has a higher INFA score versus a SE score, efforts should be made to improve broadband infrastructure. If on the other hand, a particular geography has a higher SE score versus an INFA score, efforts should be made to increase digital literacy and exposure to the technology's benefits. He added that The DDI measures primarily physical access/adoption and socioeconomic characteristics that may limit motivation, skills, and usage. Due to data limitations, it was designed as a descriptive and pragmatic tool and is not intended to be comprehensive. Rather it should help initiate important discussions among community leaders and residents.

According to Gallardo (2022), data for the digital divide index (DDI) was obtained from the 5-year American Community Survey (ACS) and Ookla Speedtest® open dataset.

Through the Interactive Map posted on the official website of DDI (see Figure 5).

Figure 5. Interactive Map provided by DDI, 2020



Source: https://storymaps.arcgis.com/stories/8ad45c48ba5c43d8ad36240ff0ea0dc7

Acceseed on May 14, 2022.

Taking the example of Denali Borough County, Alaska (see Figure 6), the Digital Divide Score in this country is: 21,89%, the result obtained from the indicators below:

Census Tract: 02068000100

Average Download Speed (Mbps): 38,7

Average Upload Speed (Mbps): 16,1

Population with no access to 100/20 (Mbps): 96.6%

No internet access: 8.8%

No computer device: 4.4%

Less than HS degree: 2.3%

Poverty Rate: 14.1%

Age 65+: 10.5%

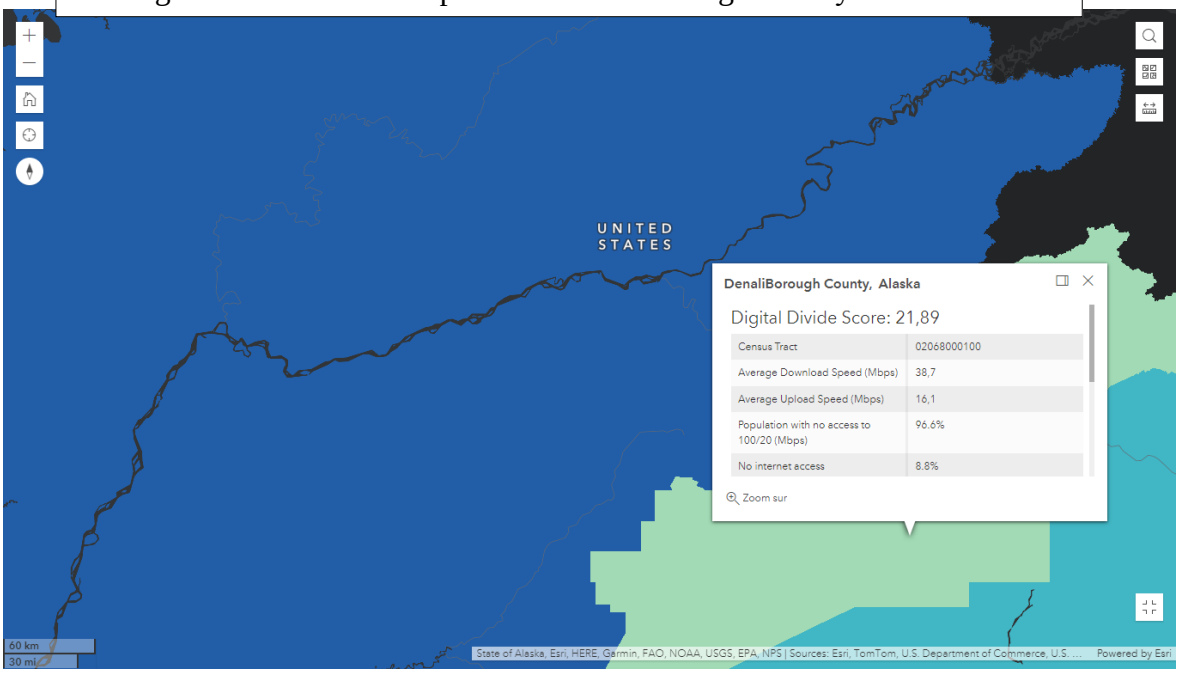
Disability Rate: 16.3%

Internet Income Ratio: 4,61

Infrastructure Score: 21,73

Socioeconomic Score: 14,93

Figure 6. Interactive Map shows DenaliBorough County's DD Score



Source: https://storymaps.arcgis.com/stories/8ad45c48ba5c43d8ad36240ff0ea0dc7

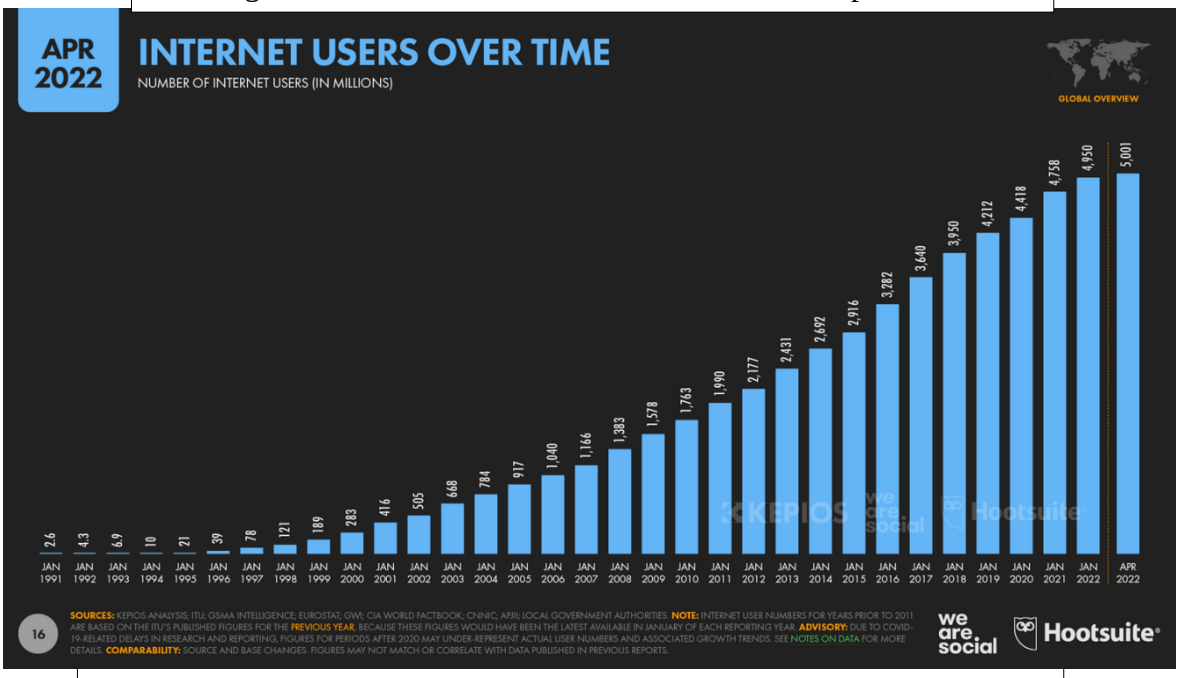
Acceseed on May 14, 2022.

The statistics below refers to the adoption and use of connected tech around the world in April 2022, the report provided by Datareportal (2022) as follows:

- **World population:** there are 7.93 billion people living on Earth in April 2022, with 57 percent of those people residing in urban areas.
- **Mobile users:** 5.32 billion people around the world now use a mobile phone, equating to 67 percent of the total global population. Smartphones account for roughly 4 in 5 of the mobile handsets in use today.
- **Internet users:** 5.00 billion people now use the internet, with the global total increasing by almost 200 million over the past year. 63 percent of the world's population is now online, but there are still important differences in the "quality" of internet access around the world.
- **Social media users:** there are 4.65 billion social media users around the world today, which equates to 58.7 percent of the total global population. However, if we focus just on 'eligible' audiences aged 13 and above, data suggests that roughly three-quarters of all those people who can use social media already do.

Datareportal posted the statistics of the number of internet users during the time from January 1991 to April 2022 (Figure 7), the percentage of the world's unconnected population by region (Figure 8) and internet adoption over the world (Figure 9).

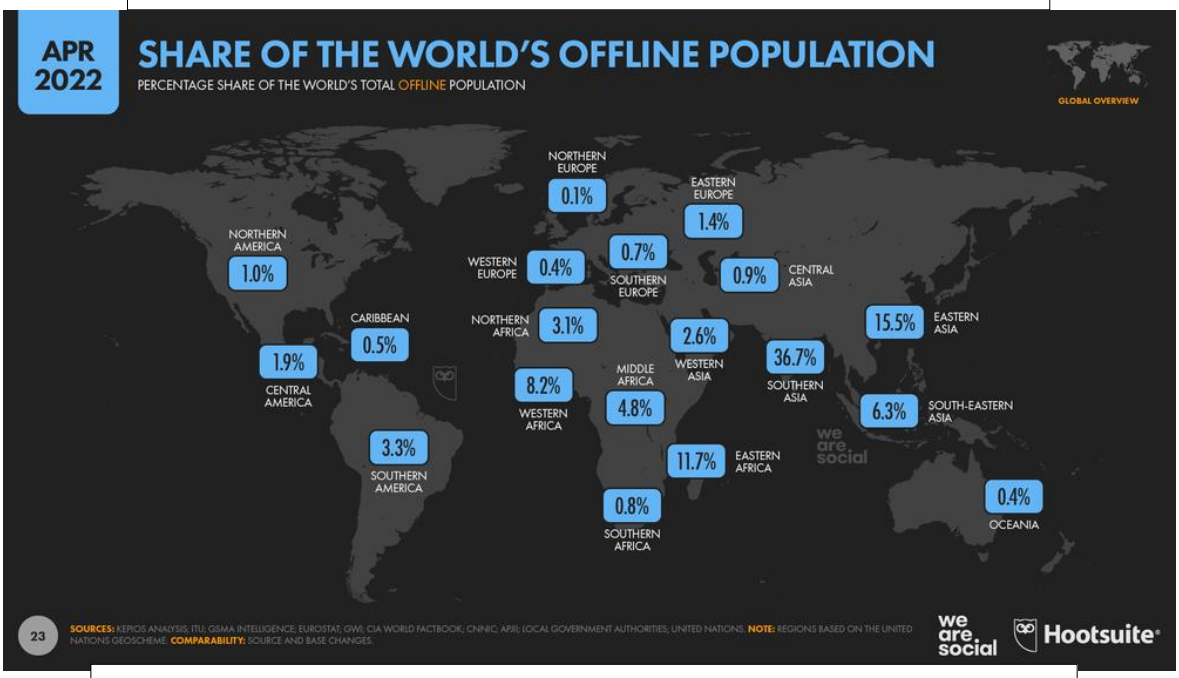
Figure 7. Internet users over time from 1991 to April 2022



Source: https://datareportal.com/reports/digital-2022-april-global-statshot

Acceseed on May 14, 2022.

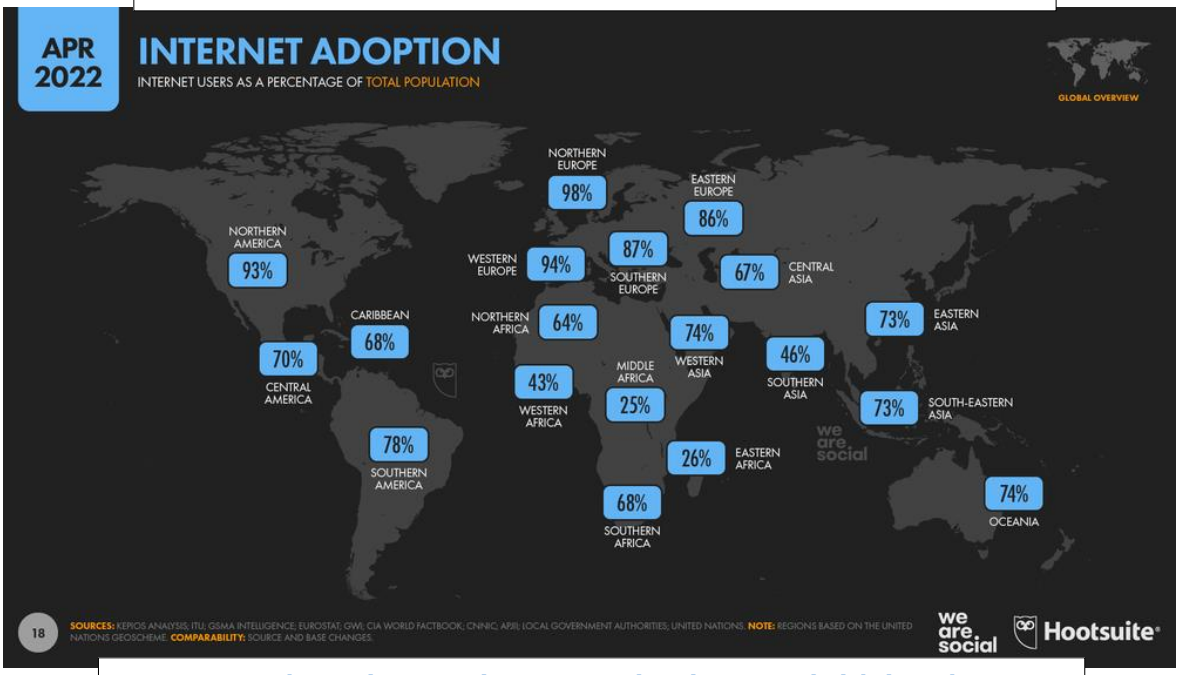
Figure 8. World's unconnected population (April 2022)



Source: https://datareportal.com/reports/digital-2022-april-global-statshot

Acceseed on May 14, 2022.

Figure 9. Internet adoption rates (April 2022)



Source: https://datareportal.com/reports/digital-2022-april-global-statshot

Acceseed on May 14, 2022.

The next step after mentioning the indicators that allow to measure the Digital Divide at both national and international level and providing the statistics presented by OECD, ITU, DDI and Datareportel is to know the points of view and the methods adopted to narrow this gap.

5- *Bridging the digital divide: Programs and initiatives*

OECD (2001) consider the importance of policy and regulatory reform needs to be underlined. OECD countries' policies and programmes aimed at reducing the digital divide range from general approaches aimed at strengthening and extending the infrastructure, to policies to diffuse access and information more widely and to improve the skills of individuals and workers. Particular attention is paid to policies to improve access in public institutions (libraries, local and regional government facilities, post offices, etc.) so that individuals can access ICTs at low or no cost, build familiarity and develop skills. Policies for making available low-cost and subsidised access in schools seek to build the future skills base of the workforce and to enhance diffusion. Measures have also been taken to improve access for underprivileged groups, the disabled and the elderly, and for rural, remote and low-income areas, for reasons of equity and to enhance overall economic efficiency via network effects. Given the importance of education and its close links to income, policies to improve computer/Internet literacy and build the related skills base in educational institutions and through vocational training are seen as particularly important over the long term. All OECD countries have support programmes for small businesses, which in general are slower to adopt new

technologies and which face particular information asymmetries, management and skills issues. Support for small businesses increasingly has a component aimed at increasing the rate of uptake and use of ICTs. Governments also assist some regions and rural areas owing to particular problems associated with lagging regions.

There were many initiatives adopted from different countries to narrow the Digital Divide, one of the projects adopted in India is Gyandoot Project which defined and described by Bansode and Patil (2011) as an intranet in Dhar district connecting rural cybercafes catering to the everyday needs of the masses, this web site of GYANDOOT is an extension of Gyandoot intranet, for giving global access. Gyandoot is the first ever project in India for a rural information network in the Dhar district of Madhya Pradesh which has the highest percentage of tribes and dense forest. Every village has a computer centre or "soochnalayas" at prominent market places or major roads. People can easily log in and complain or request information on crops, forest fields, water resources, etc. of the district. Twenty–one village Panchayats in the District have been connected with computers or information centres; several private sector information centres called "Soochnalays" have also been opened. One such popular centre is in "Manwar Agriculture Mandi," where the latest crop prices are made available to the farmers. The land records of a few tehsils of district Dhar are also available on these computers. Also, Internet connections have been provided to get global information by linking to the World Wide Web. The government of Madhya Pradesh is attempting to make Gyandoot Project a great success by extending it to other districts. The state is in the process of starting 7,800 IT kiosks with the help of the private sector. To train common people to be computer literate, 7,500 "Jan Shksha" public instruction centres have also been identified, and policy is being formulated to bring IT to the common people's need and benefit. Efforts are also being made by the government to involve public libraries in this project.

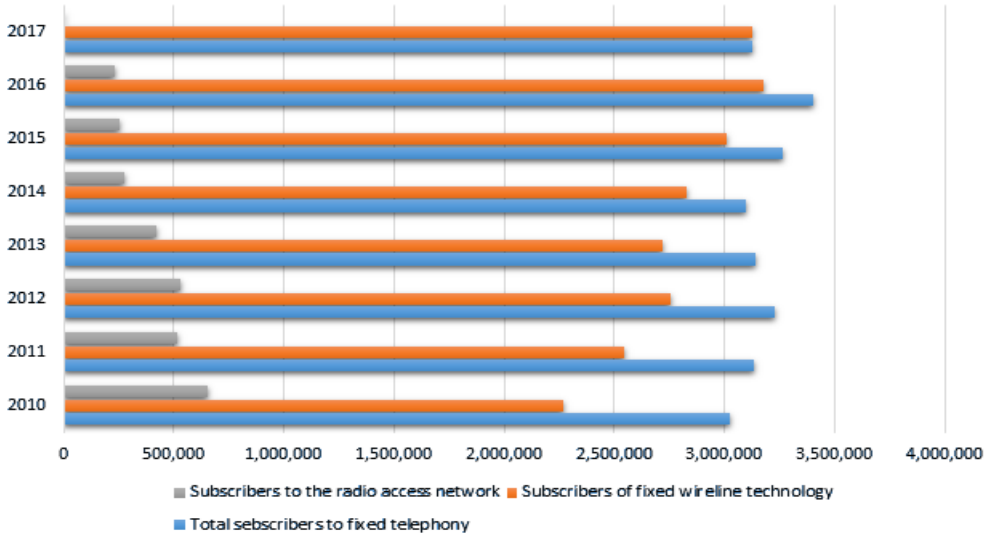
6- Digital Divide in Algeria:

There has been a wide interest in understanding the Digital Divide in different countries in the world, Algeria was among the countries those taken this issue into consideration, this led Algerian government to invest in the field of communications in order to be able to bridge the gap between its citizens and between the country and the other countries, one of the procedures taken was the ratification of a law related to post and telecommunications in August 2000, which greatly contributed to the promotion of information and communication technologies and reducing the digital divide.

7- Statistics and indexes in Algeria:

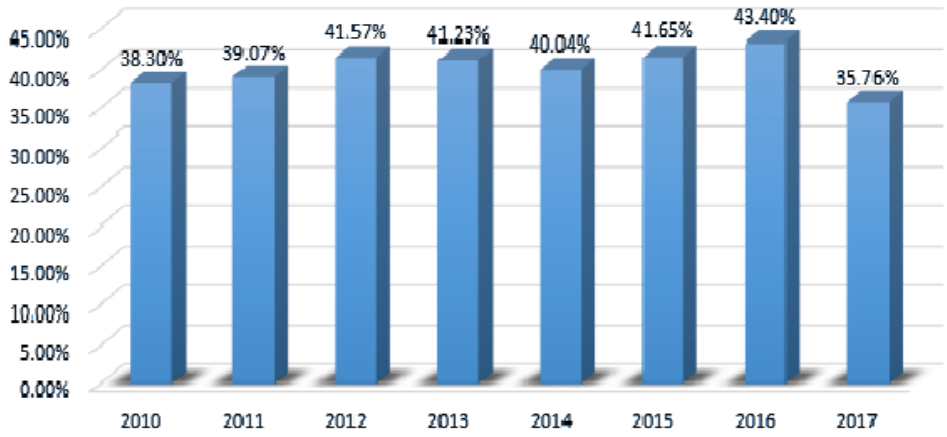
According to MPTT's indicators of development of information society:

Figure 10. Number of subscribers in fixed telephony



Source: **https://www.mpt.gov.dz/en/content/ict-indicators**, accessed on April 20, 2022

Figure 11. Penetration in household



Source: **https://www.mpt.gov.dz/en/content/ict-indicators**, accessed on April 20, 2022

The fixed network penetration rate for households decreased in 2017 to reach 35.76%, due to the trend towards mobile technology.

Datareportal (2022) gives also all the data, insights, and trends about how people in Algeria use connected devices and services in 2022, Algeria's total population was 44.98 million in January 2022, data show that Algeria's population increased by 750

thousand (+1.7 percent) between 2021 and 2022, 49.5% of Algeria's population is female, while 50.5 % of the population is male and at the start of 2022, 74.7 % of Algeria's population lived in urban centres, while 25.3 % lived in rural areas. According to the same source of information, the median age of the population in Algeria is 29.0, here's a look at how the population in Algeria breaks down by age group:

- 10.9 % of Algeria's population is between the ages of 0 and 4.
- 16.5 % of Algeria's population is between the ages of 5 and 12.
- 8.0 % of Algeria's population is between the ages of 13 and 17.
- 8.8 % of Algeria's population is between the ages of 18 and 24.
- 15.6 % of Algeria's population is between the ages of 25 and 34.
- 15.2 % of Algeria's population is between the ages of 35 and 44.
- 10.6 % of Algeria's population is between the ages of 45 and 54.
- 7.4 % of Algeria's population is between the ages of 55 and 64.
- 7.1 % of Algeria's population is aged 65 and above.

Datareportel reported that there were 27.28 million internet users in Algeria in January 2022 and the Algeria's internet penetration rate stood at 60.6 % of the total population at the start of 2022.

Data published by Ookla (2021) indicate that internet users in Algeria could have expected the following internet connection speeds at the start of 2022:

- Median mobile internet connection speed via cellular networks: 11.44 Mbps.
- Median fixed internet connection speed: 9.78 Mbps.

Ookla's data reveals that the median mobile internet connection speed in Algeria increased by 3.58 Mbps (+45.5 percent) in the twelve months to the start of 2022.
Meanwhile, Ookla's data shows that fixed internet connection speeds in Algeria increased by 6.16 Mbps (+170 percent) during the same period.

Algerian government and private sectors of telecommunications adopted several methods and programs to reduce the digital divide and encourage the use of Information and Communication Technologies, some of these solutions are as follows:

- **Governmental program:**

Among the programs adopted by the Algerian government to narrow the digital divide is "OUSTRATIC operation", OUSRATIC is composed of two words, OUSRA which means

family and TIC stands for Information and Communication Technologies, the program aims to provide each household with a computer and high-speed Internet access, companies and banks join this project to allow citizens to grant credit to buy a microcomputer at a promotional price, the objective of this program is to equip six millions Algerian household with computers and internet connections by the end of 2008, unfortunately this program failed due to mismanagement of this operation, this failure prompted the experts to propose a new version of this program "OUSTRATIC 2" based on the segmentation of offers taking into account the specificities of each socio-professional category, as well as the reduction (bonus) of the bank interest rate.(Joradp,2007)

- ❖ **Public economic operator of telecommunications (Algerie-Telecom) solutions:**

- **WLL (Wireless Local Loop):**

Mugo and Donyaprueth (1999) believe that the deployment of wireless networks is the optimal solution to the information infrastructure gap in developing countries and they define the Wireless Local Loop as a system that connects subscribers to the public switched telephone network (PSTN) using radio signals as a substitute for copper for all or part of the connection between the subscriber and the switch. It is a modification of the cellular system and may be based on mobile cellular, cordless or proprietary technologies.

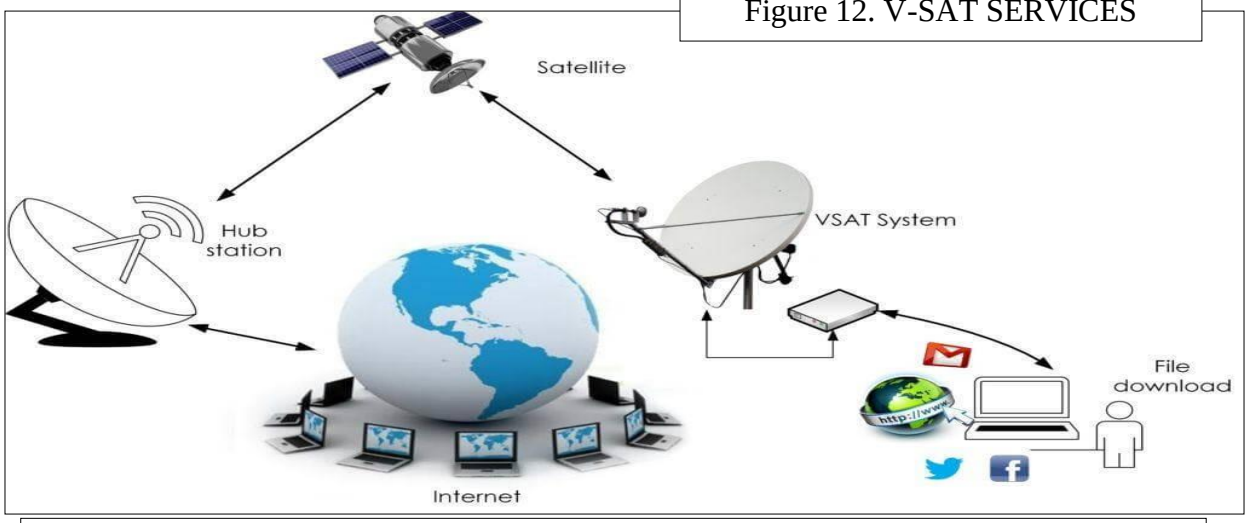
Due to the flexibility and reliability of integration of wireless solutions and in order to reduce the significant delay in terms of telephone penetration in urban, suburban and rural areas, Algérie Télécom has opted for the technology of CDMA-WLL access. (Cosob, 2005)

- **VSAT:**

In recent years, the most attractive technology is satellite technology which helps in improving the rural telecommunication scenario. (Abdullah et al., 2003)

VSAT or Very Small Aperture Terminal is a media of telecommunications technology that utilizes geosynchronous satellites as a transfer of information for point to point or broadcast communications. There are many advantages by using this VSAT technology when contrasted with traditional land-based telecommunication system. This technology is more flexible when compared with the terrestrial systems this is the major advantage of this VSAT technology. The conceptualization of this VSAT's was first started in the 1970's and the large-scale manufacturing of VSAT terminals was started in the late 1980's. (Violi et al., 2017)

Figure 12. V-SAT SERVICES



Source: https://www.spiderlink.in/v-sat-services , accessed on April 21, 2022

In Algeria, ATS (Algerie Telecom Satellite) provides a satellite solution based on the VSAT (Very Small Aperture Terminal) that allows a high-speed interconnection between several sites localized in isolated areas (rural sites, mountains, desert, land mobile machinery, aeronautic, etc..) or in areas uncovered with ground telecommunication infrastructures (non-equipped areas, stricken areas…), The VSAT offers a multitude of services, such as: Intranet, Extranet, Internet, VoIP. (ATS, n.d.)

- **INMARSAT (The mobile satellite company):**

The leading provider of global, mobile satellite communications services, creating fast, reliable connectivity - on land, at sea and in the air. Their continuing commitment to innovation - enabling the deployment of advanced, new technologies in industries and regions where the lack of terrestrial infrastructure has previously held back development. Our global networks are renowned for providing

highly robust broadband services and connectivity throughout the world, including to the most remote communities. Worldwide, dependable access to mission-critical communications from an operator you can trust. (ITU, 2015)

- **GMPCS Thuraya:**

A mobile phone that works everywhere, even on areas not covered by GSM. A phone that combines two systems: GSM and satellite, offering a maximum security and a complete mobility at an affordable price. That's the entire power of THURAYA service that offers Algérie Telecom Satellite. (ATS, n.d.)

- **4G LTE (Long Term Evolution) Network:**

This technology has many terms as 4G Wireless Broadband (4G WBB), 4G LTE Fixed Wireless, Fixed Wireless Access, "Algérie Télécom" the historical operator of telecommunications in Algeria adopted this technology under the name of 4G LTE (Long Term Evolution) Network. 4G Wireless Broadband (4G WBB) is a good choice for governments and operators to construct national broadband and /or offer home broadband service alternatively with Fixed Broadband (FBB) due to its advanced technologies and mature eco-system. 4G WBB is a prior choice to minimize the "Digital Divide", to connect the unconnected and improve the internet broadband penetration for its low cost; to speed up the existing broadband for better digital experience for its super high spectrum efficiency. (Huawei, 2017)

4G LTE Fixed Wireless is more efficient and economical alternative to fibre, cable, and copper networks, it delivers equivalent broadband speeds and capacity in the city to rural areas. Easier installing, faster speed, lower latency, and cost-effective, Fixed Wireless is the solution for network operators to offer broadband access to unserved and underserved areas! (Boweryit, 2018)

Fixed wireless access: Wireless access (end-user radio connection(s) to core networks) application in which the location of the end-user termination (the end-user radio equipment antenna) and the network access point to be connected to the end user are fixed. (John and Aminata, 2020)

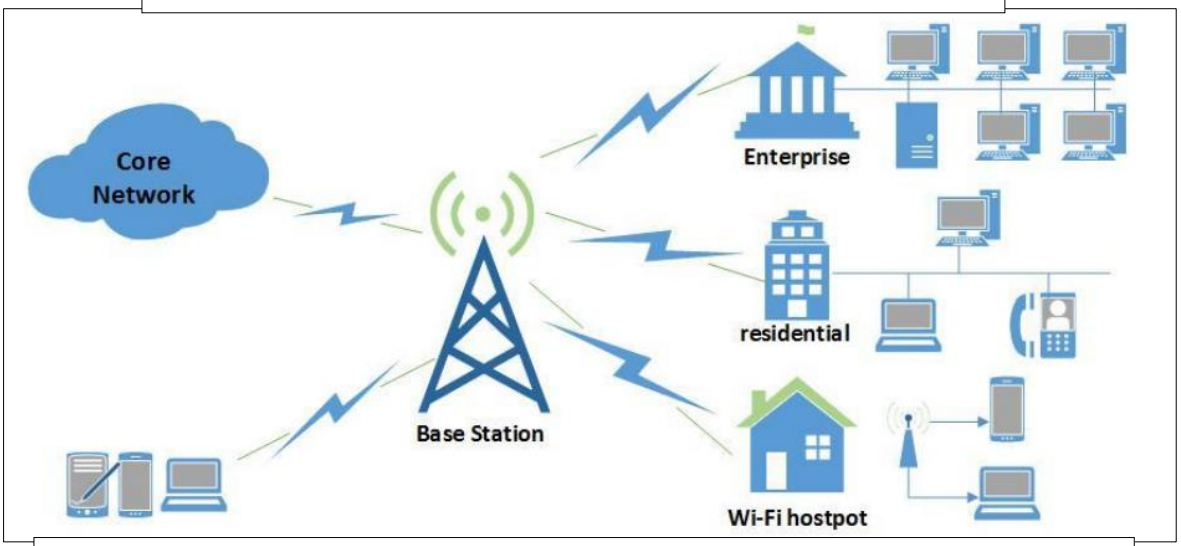
The Ministry of Post and Telecommunications of Algeria reported that the deployment of 4G LTE network is primarily intended to provide top services and high-speed broadband in inaccessible areas with wired network with the use of aggregation devices for an optimal network operation. The 4G LTE technology network experienced during phase 1, the

installing radio stations of type NodeB of covering the administrative centers of the wilaya. The expansion of 4G LTE network (phase 2) is to expand the network by deploying additional access nodes to provide broadband and ultra-broadband services to subscribers located in border areas and those of the south. (MPTT, 2022)

- **WIMAX:**

WiMAX that stands for World Interoperability for Microwave Access, is a standard based on IEEE 802.16 broadband wireless access metropolitan area technology, and it is an air-interface standard for microwave and millimeter-wave band. WiMAX also known as IEEE Wireless MAN (Metropolitan Area Network), can provide an effective interoperability broadband wireless access method under the MAN of a point to multipoint multi-vendor environment. WiMAX provides high-speed connectivity for the Internet and can be used to connect 802.11x wireless access hotspots to the Internet. The signal coverage of WiMAX technology ups to 50km, this technology can operate data communication within the range of 50km at a very fast speed. (Shuang and Biju, 2014)

Figure 13. Wireless coexistence (Wi-Fi, WiMAX and 2G/3G)



Source: International Journal of Computer Networks & Communications, 2014 https://arxiv.org/ftp/arxiv/papers/1412/1412.0721.pdf, accessed on April 21, 2022

SLC (Smart Link Communication) is a WiMAX and a Broad band operator in Algeria, created in 2001 to set up and utilize the high-speed wireless broadband telecommunication network, SLC was one of the first operators that had marketed WiMAX in July 2005. (MPTT, 2022)

- **Optical fibre deployment:**

This concerns the connection to the national backbone network in all municipalities, secondary agglomerations and localities of over 1,000 inhabitants as well as increasing access capabilities of telephones and the Internet through a program which seeks to connect via Optical Fibre 2000. (MPTT, 2022)

- **The modernization and development of the access network:**

Regarding the development of telephone access network, the number of accesses increased from 5,127,000 in 2013 to 6,810,000 at July 31, 2015, i.e. an increase of 33%. The rate of modernization telephone access equipment climbed from 15% to 43%, from 2013 to 31 July 2015. The internet equipment increased from 2,400,000 in 2013 to 4,030,000 of access by the end-July 2015, i.e. an increase of 68%. (MPTT, 2022)

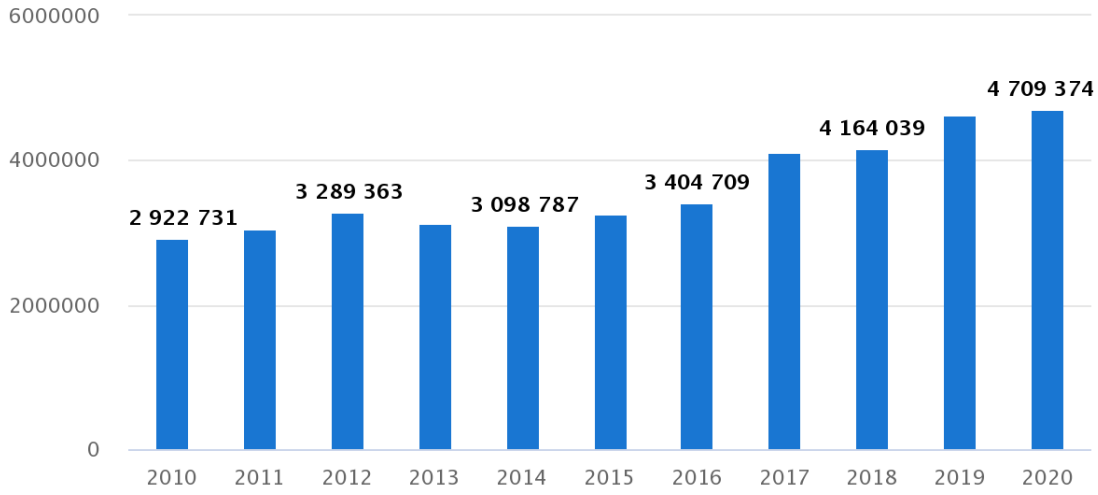
Before moving to the next chapter, the data below shows the indicators of development of Information and Communication Technologies in Algeria from 2010 to 2020, the data taken from the official website of MPTT. (MPTT, 2022)

Table 1: Indicators of development of ICTs

Indicators: Internet Subscribers	2013	2014	2015	2016	2017
ADSL subscribers	1 283 241	1 518 629	1 838 492	2 083 114	2246727
4G fixed LTE	--	80 693	423 280	775 792	919368
WIMAX	179	216	233	661	621
3G mobile	308 019	8 509 053	18 021 881	25 214 732	23701023
4G mobile	--	--	--	1 464 811	10968495
Fixed internet (ADSL +4G LTE fixed+ WIMAX)	1 283 420	1 599 538	2 262 005	2 859 567	3166907
Mobile internet (3G+4G)	308 019	8 509 053	18 021 881	26 679 543	34669518
Total internet subscribers (Fixed and Mobile)	1 591 439	10 108 591	20 283 886	29 539 110	37836425

Source: https://www.mpt.gov.dz/en/content/ict-indicators, accessed on April 22, 2022

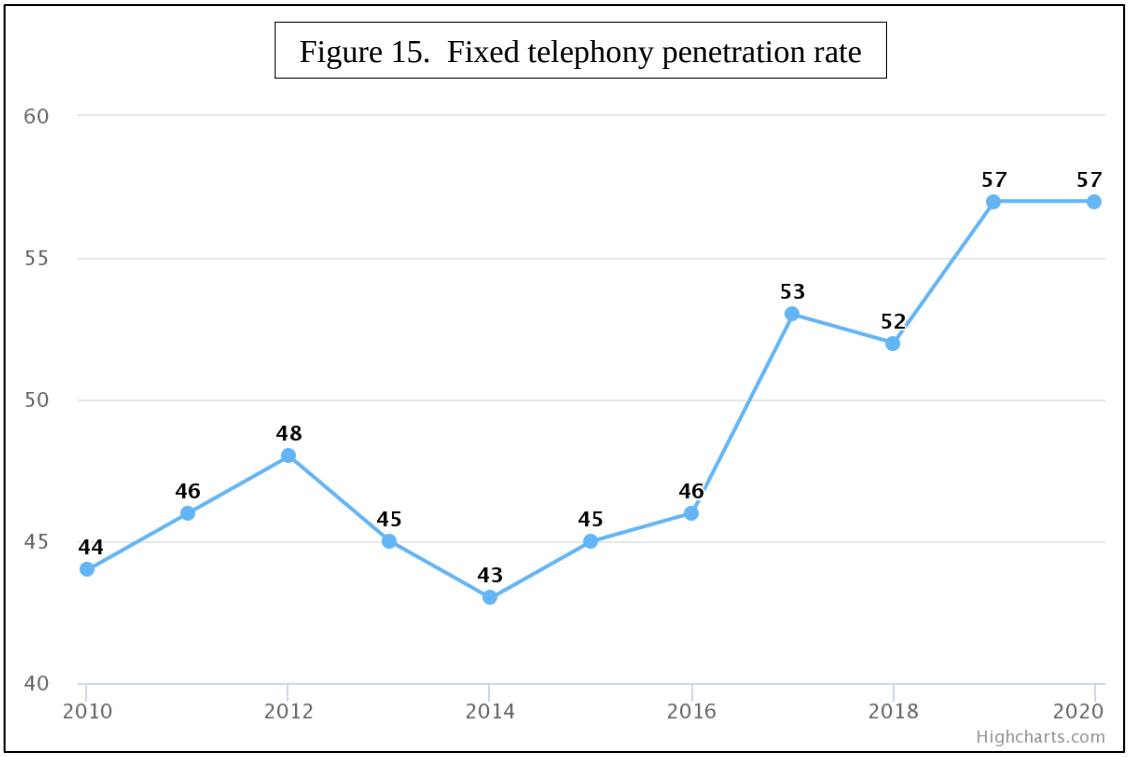
Figure 14. Fixed telephone subscriptions



Source: https://www.mpt.gov.dz/fr/content/indicateurs-tic, accessed on August 21, 2022

Figure 14. the bar graph shows the number of fixed telephone subscriptions from 2010 to 2020, the number increased significantly from 2 922 731 to 4 709 374 in this decade.

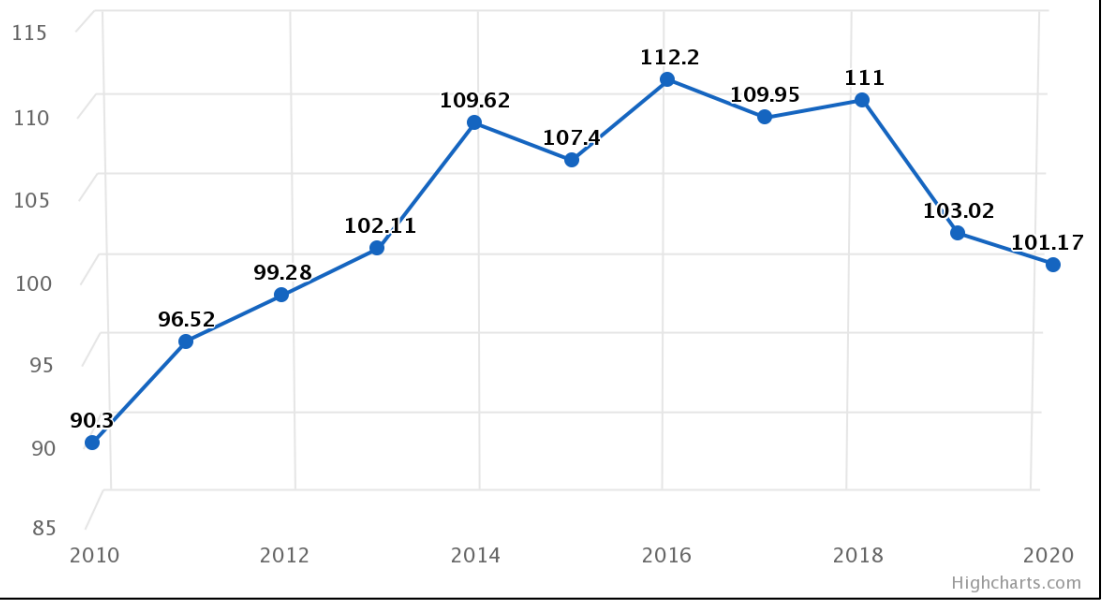
Figure 15. Fixed telephony penetration rate



Source: https://www.mpt.gov.dz/fr/content/penetration-telephonie-fixe, accessed on August 21, 2022

Figure 15. the graph illustrates the percentage of fixed telephony penetration from 2010 to 2020, the rate increased significantly from 44% to 57% in this decade.

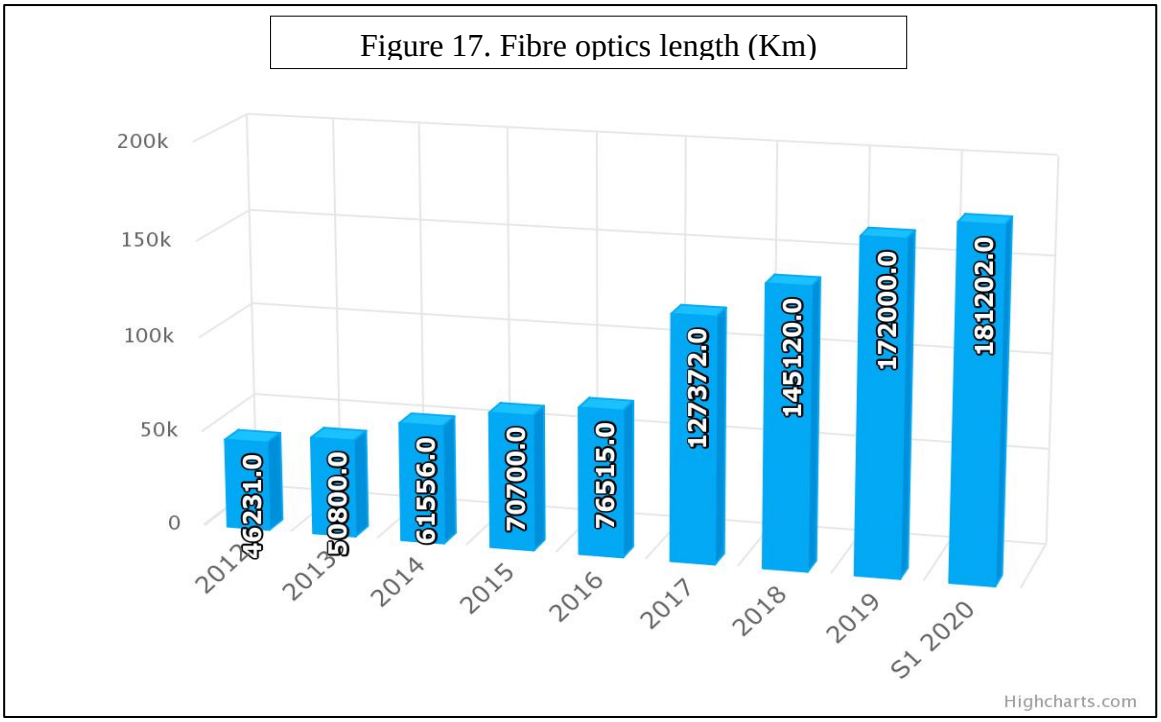
Figure 16. Mobile phone density (GSM, 3G, 4G)



Source: https://www.mpt.gov.dz/fr/content/densite-cellulaire, accessed on August 21, 2022

Figure 16. the graph illustrates the percentage of mobile telephony density (GSM, 3G,4G) from 2010 to 2020, the rate increased from 90,3 % to 112,2% in 2016 then decreased to 101.17% in 2020.

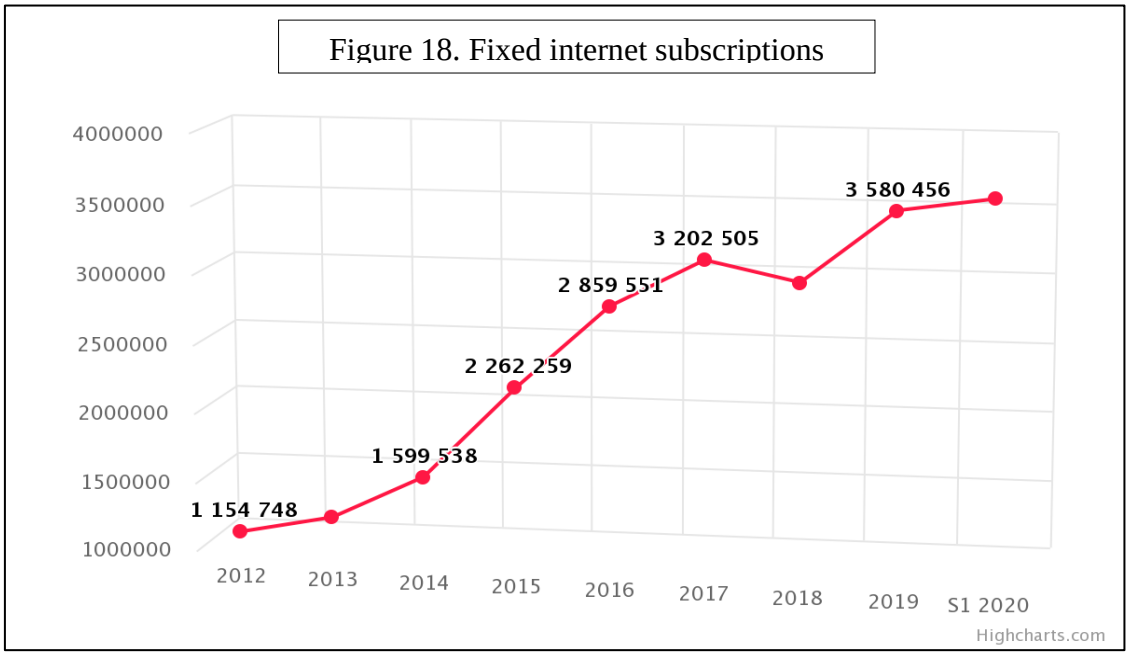
Figure 17. Fibre optics length (Km)



Source: https://www.mpt.gov.dz/fr/content/infrastructure-passive, accessed on August 21, 2022

Figure 17. the bar graph above shows the length of fibre optics (km) installed from 2010 to S1 2020 (first semester), the length increased significantly from 46 231 km to 181 202 km during this period.

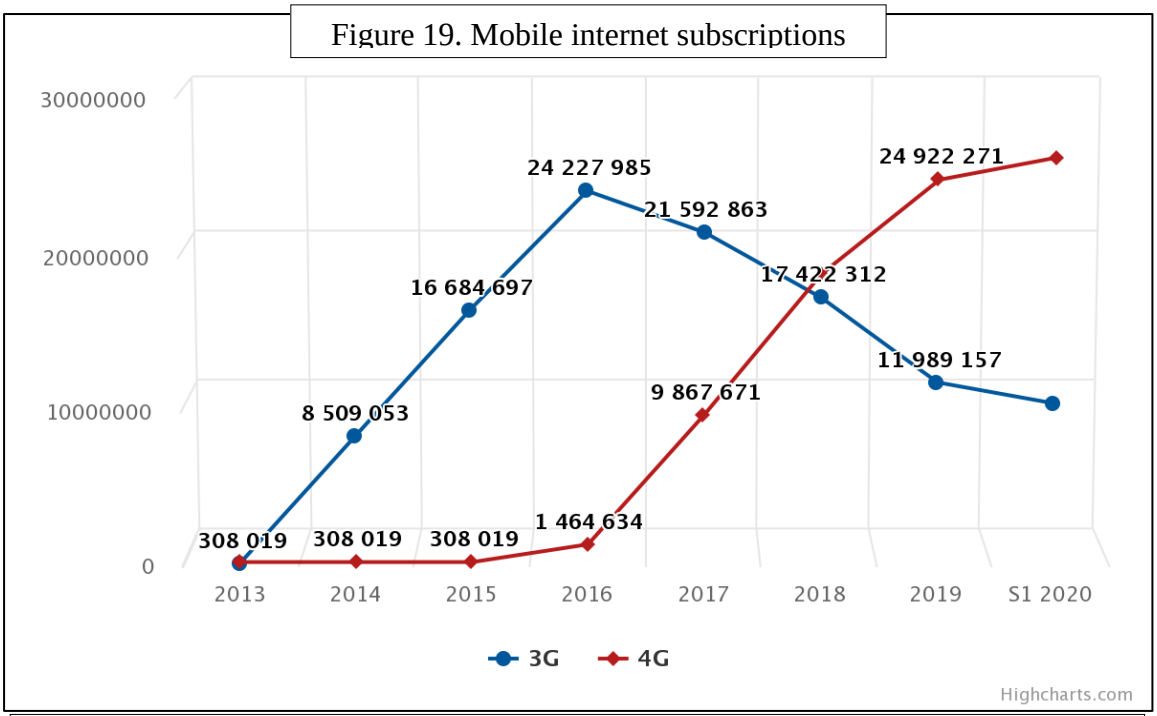
Figure 18. Fixed internet subscriptions



Source: https://www.mpt.gov.dz/fr/content/evolution-abonnes-fixe, accessed on August 21, 2022

Figure 18. the graph above shows the number of fixed internet subscriptions from 2012 to S1 2020, the percentage increased significantly from 1 154 748 to 3 580 456 during this period.

Figure 19. Mobile internet subscriptions



Source: https://www.mpt.gov.dz/fr/content/evolution-abonnes-internet, accessed on August 21, 2022

Figure 19. the graph illustrates the number of mobile internet subscriptions (3G and 4G) from 2013 to S1 2020, the number of 3G subscriptions increased from 308 019 to 24 227 985 between 2013 and mid-2016 where the number of subscriptions of 4G were stable before mid-2016, from S2 2016 the number of 3G subscription was decreasing to reach 11 989 157 in mid-2019, per contra the number of 4G subscription was increasing in this period to reach 24 922 271.

- **The common solution between Governmental and public economic sector of telecommunications (Algerie-Telecom):**

  - **Universal Service:**

The Office of Telecommunications OFTEL defines the universal service in Telecom as the provision of "affordable access to basic telecommunication services for all those reasonably requesting it regardless of where they live." (Oftel, 1995)

Hank and McCarthy (2000) declare that the Universal Service can be defined as the provision of "universal" availability of connections by individual households to public communications networks.

"Universal Service is intended to serve as a reference tool to assist countries of the Americas region in forming the best policies and practices with the goal of making universal service/access available to all of the regions inhabitants". (Hamadoun, 2000)

James and Paul (2003) consider the universal service as the provision of exchange telephone access at prices which are below their costs. However, this definition embodies three notions: the goal, the instrument and the funding mechanism.

"Universal service policy is synonymous with government policies to promote the affordability of telephone service and access to the network. Sometimes this means direct subsidies to telecommunications construction in remote areas, such as the Rural Electrification Administration loan program. More commonly, it refers to attempts to maintain affordable local rates". (Mueller, 2013)

The Director of Telecommunication Development Bureau Brahima Sanou (Report ITU 2013) mentions that the underlying concept of Universal Service is to ensure that telecommunication services are accessible to the widest number of people (and communities) at affordable prices. As has been widely discussed in a number of publications, the concept of universal service is underpinned by the three following principles:

• Availability: the level of service is the same for all users in their place of work or residence, at all times and without geographical discrimination

• Affordability: for all users, the price of the service should not be a factor that limits service access

• Accessibility: all telephone subscribers should be treated in a non-discriminatory manner with respect to the price, service and quality of the service, in all places, without distinction of race, sex, religion, etc.

The Director found that There are a number of different approaches used by various jurisdictions to address universal service requirements. These include1:

• market-based reforms.
• mandatory service obligations.
• cross subsidies.
• access deficit charges.
• private public partnerships (PPPs).
• universal funds.

However, increasingly over the last two decades, telecommunication administrations and national regulatory authorities (NRAs) have been turning to the concept of a specific universal service funding mechanism designed as an incentive to encourage operators to assist these administrations in achieving their universal service goals. This funding mechanism is referred to as a universal service fund (USF).

One of the major challenges for the development in Algeria is ensuring ICT services to all citizens.

- **Universal Service Telecommunications Expansion Project in Algeria:**

Based on the official website of MPTT, the access to telecommunications services, in accordance with Executive Decree No. 03-232 of 23 Rabie Ethani 1424 corresponding to June 24, 2003, amended and supplemented, determines the content of the universal postal service and telecommunications, the applied tariffs and the way it is financed, voice and data aspects is a right to all citizens that the government is committed to guarantee. The Universal Service of Telecommunications is the mechanism through which this right is assured. It expresses the availability of a minimum service for everyone, in particular telephone service of a consistent quality, an agreed, routing of emergency calls, and access to internet services at a

minimum speed of 512 kbps in respect of principles of equality, continuity, universality and adaptability. The Universal Telecommunications Service is intended for areas that are not deemed economically viable and where operators are not obliged to cover as part of their operating licenses. It concerns towns which are not served with voice and data communications and where the number of inhabitants is less than two thousand (2000). A census of all the localities that meet the eligibility criteria for the Telecommunications Universal Service has been performed regularly in order to cover it progressively. (MPTT, 2022)

According to Algerian government official journals, the Executive Decree No. 18-246 of 29 Moharram 1440 corresponding to October 9, 2018 determining the content and quality of the universal postal service and the universal service of electronic communications, the tariffs applied to them and their method of financing:

Art. 5. — The universal service of electronic communications service must contribute to:

— guaranteeing the availability of access to electronic communications networks for all citizens, throughout the national territory;

— the sustainability of the provision of electronic communications services, including the Internet;

— connection to public networks to ensure continuity of service;

— the development and sustainability of basic infrastructure, which guarantees access for all;

— the guarantee of relief for the management of disasters, in particular those resulting from the occurrence of major risks, within the framework of "ORSEC plans" in terms of telecommunications.

Art. 6. — The universal service of electronic communications covers, in particular:

— the routing of emergency calls;

— telephone service;

— access to electronic communications services, in particular fixed and mobile telephony and Internet, in areas not covered, at a minimum speed of two (2) mbits/second;

— the interconnection of public educational establishments and specialized public educational establishments for people with special needs through private networks;

— special measures ensuring that end users with specific needs, within public establishments, have access equivalent to that enjoyed by other end users;

— the interconnection of public health establishments by private networks;

— the establishment of basic infrastructures allowing the consolidation, security and sustainability of electronic communications for the entire national territory;

— the availability of the material means necessary for the deployment of the ORSEC plans in terms of telecommunications.

Conclusion

This review of literature and conceptual framework illuminate important information concerning the concepts of the Digital Divide and the Universal Service. In the first, we presented different definitions of the literature review and how to employ them in a research, then we explained the origin of the term Digital Divide which appeared in the nineties, we noticed that a majority of the concepts addressed by the researchers in this field touched on the existence of a difference or inequality In providing services between two elements, two environments or others, some of them defined it as the inequality between those who are rich, educated and powerful and those who are poor and uneducated, between those who have access to the digital world and those who cannot connect to internet, and also those who have the cognitive skills in the use of information and communication technologies and those who do not. There are some researchers believe that the Digital Divide is the difference between those who enjoy high internet speed and those who do not have the opportunity to be pleased by this feature, then we mentioned the indicators for measuring the Digital Divide depend on the research specialty. After that we moved to the ways that some countries have taken the issue of reducing the Digital Gap and the decisions that can be made to help achieving this goal. Among the solutions, we provided the conclusion of a researcher who gave a study and an analysis of the Digital Divide issue in the Arab world, he deduced that it will be bridged by the decision makers and the political decisions taken. Finally, we conveyed what researchers reported about the Universal Service, a program referring to the practice of providing a baseline level of services to every citizen of a country and promote equality between individuals. This research treats the Universal Service Program in telecommunication to provide various services related to ICTs to Algerian citizens, the subject is to know how does this program work in Algeria and whether it really contributes to bridging the Digital Divide related to information and communication technologies in the country.

CHAPTER II THE METHODOLOGICAL FRAMEWORK AND ORGANIZATIONAL CONTEXT

The purpose of this chapter is to clarify the methodological framework chosen to conduct this study and presents the host organisation "Directorate of Post and Telecommunications of Bordj Bou Arreridj province" where we did our internship.

The first section: The methodological framework

This section presents the research design and the methodology that was applied in carrying out this study with giving justifications for using a specific research design. This section also highlights the type of research data, data collection tools, data collection procedures and finally explains the suitable data analysis techniques.

1- Methodological approach and research design:

Ogula (2005) considers the research design as a plan, structure and strategy used to generate answers to research questions and control variance. Merton (1957) believes that among the reasons for using an exploratory study is the lack of knowledge about some topic that was important to study, when There is a need to know more about some topic; and since very little information existed, the study had to be exploratory in nature."

This study will adopt a methodological approach that explores research questions that have not previously been studied in depth, we aim to discover the implementation of programs adopted by the Algerian government to reduce the digital divide in the province of study with a particular emphasize on the Universal Service Program, based on interviews with a sample of managers of the organisation and documentary sources.

2- Research approach:

Qualitative research relies on a flexible and interactive research strategy, this includes interviewing, focus group discussions and questionnaires. In qualitative research, feelings and insights are considered important (Orodho and Kombo, 2002). Creswell (1994) defines Quantitative research as 'explaining phenomena by collecting numerical data that are analysed using mathematically based methods (in particular statistics)'. In this study an interview need to be held with the key person involved in the project, the Director of the Directorate of Post and telecommunications which is the representative of the MPTT at the local level (province of study) , his role in this case is monitoring and evaluating the progress of the Universal Service Program in the province, then we conduct interviews with the managers of ICT department at the same organisation in order to know their opinions about this program and gain an understanding of operations on the reality. Depend on the explanation

mentioned above the appropriate type of research approach that can be used in this study is qualitative.

3- Data collection tools:

According to Paul and Jeanne (2010), a research tool is a specific mechanism or strategy that the researcher uses to collect, manipulate, or interpret data.

In this research, data was collected from secondary sources which include official journals, reports and existing documents in internal sources of ICTs service at the directorate of wilaya (province) of post and telecommunications of Bordj Bou Arreridj.

Then, for the purpose of knowing and understanding the implementation of the Universal Service Program in the target province, to conduct some semi-structured interviews with a sample of managers and responsible at the directorate starting with the Executive Director of the organisation, the head department of ICTs and then with responsible charged for conducting, monitoring and evaluating this project.

3.1- The interviews:

Interviews are designed to collect data from a small number of people about attributes, behaviours, preferences, feelings, attitudes, opinions and knowledge. Interviews help researchers to explain, understand and explore research themes' opinions, experiences, phenomenon, etc. The purpose of the interviews in this study is to build solid evidence, verify findings and get comprehensive responses on respondents' experiences and opinions about the universal service program and the digital divide in Bordj Bou Arreridj province.

- **Interviews guide structure:**

The interview questions were open-ended and semi-structured to allow the interviewees to provide responses and thoughts using their own words. The selection of the questions was aimed at findings answers to the research questions as well as to create insight about the implementation of the Universal Service Program in the province of study.

Through these interviews we need to determine the main goals of this research that can include the following:

- Exploring the Universal Service Program.
- Understanding how the process of implementation of this program works in the province.

- Determining the obstacles and problems face this program
- Confirming (or disconfirming) results from other methods.

The table below shows the role of the interviewees at the organisation and interviews' details.

Table 2. Interviewees' background

Inter-viewee	Interviewee function	Experience
I1	The Executive Director of the organisation	-17 years as the head department of ICT. - 02 years as Director.
I2	Head department of ICT at the directorate	08 years
I3	Office administrator of the development of information and communication technology infrastructures at ICT department	09 years
I4	Office administrator of information society development at ICT department	15 years
I5	Office administrator of statistics and monitoring the execution of projects in the sector at ICT department	09 years

Source: Made by ourselves

The interviews were conducted in Arabic language, it took approximately 40 minutes with each interview, I documented the proceeding with handwritten notes (verbatim) which were later carefully expounded upon in English language. The structure was as follows:

- **Introduction**:
  - Greeting:
    - Introducing myself (the interviewer) to the Director.
    - Explaining to the Director that I am doing a project of final thesis of studies to see the role of the universal service program in bridging the digital divide in Bordj Bou Arreridj province.
    - Ask the interviewee to read the manifesto (Appendix A) carefully before the interview.
  - Confidentiality:

- All information collected during the course of this project will only use for research purposes.

- Study identifier:

  - I will not use your name or any other identifying information and everything that you say will only use for research purposes.

- **Themes:**

  - **Theme 1:** Background.
  - **Theme 2:** Current situation of ICTs infrastructures in the province (rural and urban areas)
  - **Theme 3:** The digital divide.
  - **Theme 4:** The universal service program.
  - **Theme 5:** Solutions to bridge the digital divide "access and usage" in the province and in Algeria.
  - **Theme 6:** Government future trends in bridging the digital divide.
  - **Theme 7:** Closure**.**

3.2- Documentary sources:

Scott (1990) defines a document as an artefact which has as its central feature an inscribed text, Scott took into consideration the use of administrative papers produced by governmental and private agencies, he was interested in the handling of documents in relation to specific problems in social and historical research.

According to Scott's definition we realise that a documentary source contains a very valuable information for a researcher, we consider this material as the second tool for collecting data in our study.

4- Data analysis tools:

As it is mentioned previously, the nature of the research data in this study is qualitative, content analysis is possibly the most common and straightforward qualitative data analysis method that is used to evaluate patterns within a piece of content (interviews, texts, images, newspapers, records…). Krippendorff (2004) defines the concept of content analysis as "the systematic reading of a body of texts, images, and symbolic matter, not necessarily from an

author's or user's perspective". Krippendorff considers the content analysis as a scientific tool which provides new insights, increases a researcher's understanding of particular phenomena, or inform practical actions.

In order to analyse the data collected from interviews (open-ended questions) and from documentary sources (internal data) in this study, content analysis tool leads us to getting new insights from different sources and understanding more about the universal service program implementation and its impact on the digital divide.

In our research we will focus on the method of thematic analysis outlined by Braun and Clarke (2006), because they believe that it is an appropriate and powerful method to use when seeking to understand a set of experiences, thoughts, or behaviours across a data set (Braun and Clarke 2012) and because it has become the most widely adopted method within the qualitative literature (Clarke & Braun, 2017).

This method consists of six (6) steps:

Step 1: Familiarizing with the data: The first step is to get to know our data. It's important to get a thorough overview of all the data we collected before we start analysing individual items.

Step 2: Generating initial codes: In this step we need to code the data collected. It means highlighting sections of our text (phrases or sentences) and coming up with shorthand labels or "codes" to describe their content.

Step 3: Searching for themes: Next up, we look over the codes we've created, identify patterns among them, and start coming up with themes.

Step 4: Reviewing themes: we make sure that our themes are useful and accurate representations of the data. Here, we return to the data set and compare our themes against it. Are we missing anything? Are these themes really present in the data? What can we change to make our themes work better?

Step 5: Defining and naming themes: Now that we have a final list of themes, it's time to name and define each of them by formulating exactly what we mean by each theme and figuring out how it helps us understand the data.

Step 6: Producing the report/manuscript: Finally, we'll write up our analysis of the data. Like all academic texts, writing up a thematic analysis requires an introduction to establish our research question, aims and approach.

The second section: Presenting the host organisation

The purpose of this section is to introduce the host organisation "The Directorate of Post and Telecommunications" by presenting the regulations governing the Post and ICT in Algeria, then defining the directorate (place of the internship) and its organisational structure, the missions of the organisation and finally presenting the province (case study place).

1- Telecommunication sector presentation:

Every nation has a regulation of its government on telecommunications sector which made up of telecom and mobile companies the providers of internet and telephone services in the country. According to the official portal of the Ministry of Post and Telecommunications[67] of Algeria, the Legislation governing the sector of Post and ICTs has gone through two (02) major steps:

- The stage of single operator enshrined in ordinance No. 75-89 establishing the Code of Posts and Telecommunications was a step during which the State was the direct and sole supplier of the activities of the post and telecommunications. The post and telecommunications were then a public service provided by the administration to the user.
- The step of opening to competition was initiated by the law 2000-03 which introduced market mechanisms in the area of Post and ICT.

During this era of single operator, post and telecommunications experienced several flaws:

- A management method characterized by quiet heavy procedure
- A slowed development due to the absence of competition
- Insufficient capacity of self-financing

As a result, and following the global trend of opening up public services networks to market economy, the 2000-03 legislation was passed with the core objective was to introduce competition in the telecommunications sector. An economic transition supported by the strong growth potential of this sector and by popular enthusiasm for ICT services. This objective is precisely mentioned in the first article of the Law 2000-03: " The objectives of this law is to develop and provide quality postal and telecommunications services in a neutral, transparent and non-discriminatory manner within a competitive environment ".

Three major changes were needed to achieve this goal of monopolization of this sector:

- Separate between the activities of post and the activities of telecommunications on the one hand and separate between these activities as commercial activity from the strategic missions of State on the other hand.
- Establishing appropriate operational plans taking into account the peculiarities of each service and telecommunications network
- Establishing a legal framework to economically regulate the market of the postal and telecommunications by creating a sectorial regulating authority Indeed the transition from single operator to competition involves the withdrawal of the state from the commercial sphere has been attended by the creation of two public economic sectors (i.e. commercial) commonly known as the historical operators (Art 12 of Law 2000-03)
    - ALGERIE TELECOM (Public Joint Stock Company)
    - ALGERIE POSTE

It must be underlined that despite the transfer of its public service activities to commercial ones in favour of these two operators, the State kept its sovereign prerogatives by enacting standards, laws and industry regulations, the exclusive use frequency spectrum, monitoring of telecommunications ...

Moreover, because the competition is likely to be violated and liable to distortion, it was necessary to create of a regulatory authority to preserve and promote competition in the postal and telecommunications markets or restore it in case it is deemed necessary. The 2000-03 legislation was inspired by the universal principles arising from the recommendations of the International Telecommunication Union which include:

- Functional independence of the regulator which guarantees impartiality in handling the disputes
- The transparency of competition rules
- The non-discrimination between operators

Following the adoption of 2000-03 law, the regulation of the sector has undergone profound changes and the adoption of several new executive decrees dealing mainly with the following aspects:

1. Set the operating regimes of postal services and telecommunications
2. Define the procedures of granting telecommunications licenses so as to enshrine it in national legislation the universal principles of competition, transparency and non-discrimination in licensing
3. Set the telecommunications services tariffs terms to preserve competition against all forms of anti-competitive pricing practices by allotting the regulator an a priori and a posteriori control of tariffs
4. Set the interconnection arrangements for telecommunications networks to streamline the interconnection by connecting all networks existing in Algeria in one large national network.

Legal and regulatory rules on interconnection are also intended to protect the competition against abusive practices to avert entry barriers on the new players by the already existing operators

- Defining of universal postal service and telecommunications and the means if funding
- Defining of charges for the use of radio electric frequency spectrum (when using the public airwaves)

2- The directorate of wilaya of Post and Telecommunications:

The directorate of wilaya of Post and Telecommunications has been created by the Executive Decree N°. 20-181 of Dhou El Kaada 14th 1441 corresponding to July 6th 2020 Creating a directorate of wilaya (province) of post and telecommunications.

3- The missions of the directorate of Post and Telecommunications:

According to the Executive Decree N°. 20-181 mentioned above, the missions of the directorate of wilaya (province) of post and telecommunications are:

- to ensure the application of the legislation and the regulations relating to the post, telecommunications, electronic communications and technologies information and communication;
- to ensure the normal functioning of the postal and telecommunications networks;

- to participate in the development of the annual and multi-annual plan for the deployment of the universal postal service and universal service of electronic communications;
- to determine the geographical areas without coverage of electronic communications networks open to the public and postal services;
- to monitor projects relating to the sector, in particular those relating to the provision of the universal postal service and the universal service of electronic communications;
- to coordinate with other sectors the generalisation of the use of information and communication technologies, and to participate in the implementation of actions related to the establishment of electronic government;
- to coordinate with the local representations of the operators, with a view:
    - to ensure the performance of a quality, permanent and sustainable public service;
    - to ensure the implementation of the universal postal service and the universal service of electronic communications provided by the operators concerned, in accordance with the regulations in force and to ensure its continuity;
    - to guarantee effective handling of requests and grievances;
    - to ensure compliance with the rules for the benefit of easements related to the deployment of telecommunications networks.
- to carry out a posteriori control of the operators' compliance with the clauses of the specifications relating to the provision of the universal service;
- to regularly ensure that operators of the sector carry out simulation exercises for the deployment of the ORSEC plan (Emergency Organisation plan) and implement emergency and security plans adapted to major risks;
- to coordinate with the competent authorities the use of telecommunications, information and communication networks for the purposes of national defence and public security;
- to participate in the elaboration of plans and studies and to implement the development programs registered in definitive competitions or in the funds for the appropriation of the uses and development of information and

communication technologies and the redeveloping of the radio frequency spectrum and evaluating the results;

- to ensure the collection and analysis of data and statistics of the sector at the local level, and participate in the creation of an integrated and multi-sector statistical database;
- to monitor litigation related to its activities;
- to elaborate and send to the Minister, annually, the report of the activities of the sector at the local level.

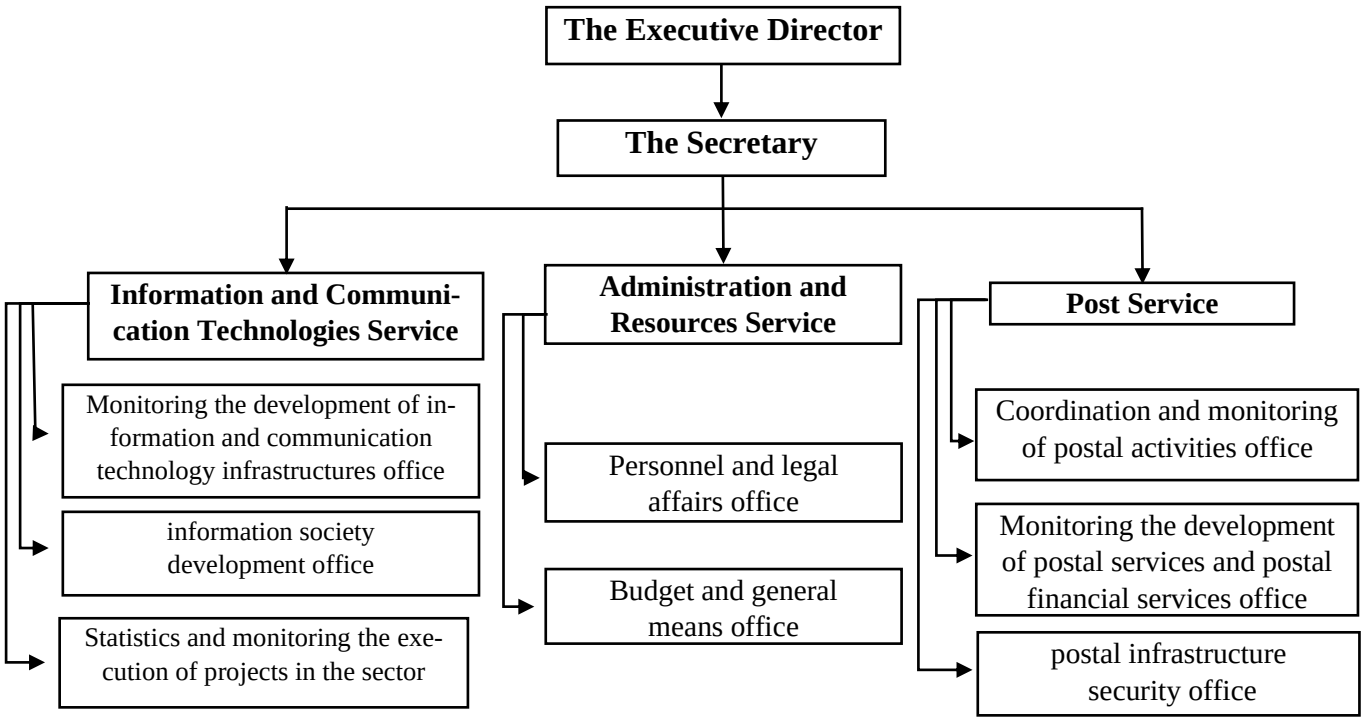
4- The organisational structure of the directorate of wilaya (province) of Post and Telecommunications:

According to the Executive Decree of Shaban 3rd 1442 corresponding to March 17th 2021 Organising the directorate of wilaya (province) of post and telecommunications in offices

Article 2. The directorates of post and telecommunications of wilaya are organized into three (3) services:

- Post service, which includes three (3) offices:
  1- Coordination and monitoring of postal activities office.
  2- Monitoring the development of postal services and postal financial services office
  3- Postal infrastructure security office
- Information and Communication Technologies service, which includes three (3) offices:
  1- Monitoring the development of information and communications technology infrastructures office
  2- information society development office
  3- Statistics and monitoring the execution of projects in the sector
- Administration and Resources service, which includes three (2) offices:
  1- Personnel and legal affairs office;
  2- Budget and general means office.

Figure 20. The organisational chart of the directorate of Post and Telecommunications

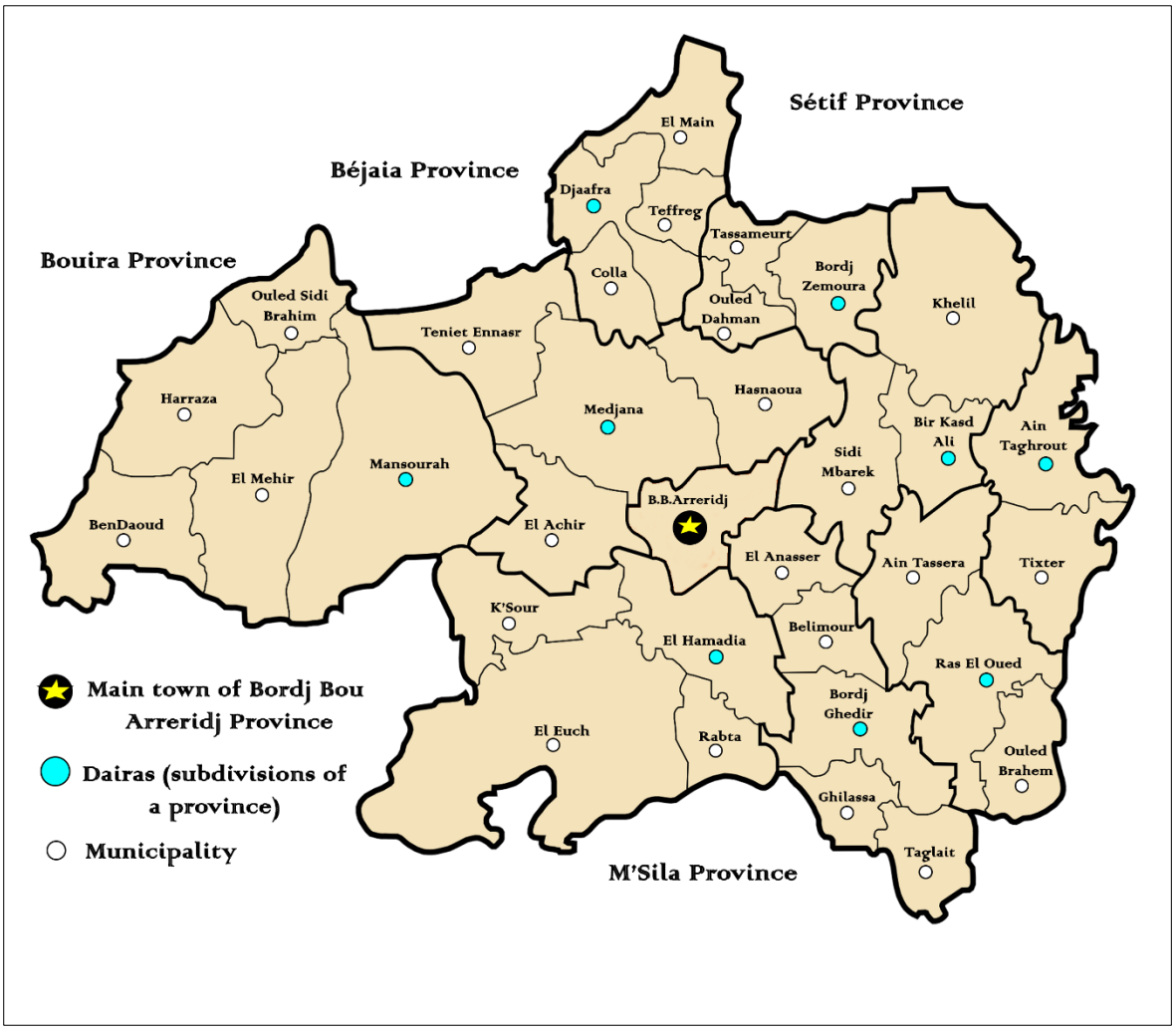


Source: The directorate of Post and Telecommunications of Bordj Bou Arreridj province

5- *Presenting the province (case study place):*

Bordj Bou Arreridj is a province in northern Algeria around 200 km from the capital Algiers. It is considered as a crossroads between the east and west, the north and south, it covers 3 920,42 Km² with a population of 721 326 according to the Directorate of planification and Territorial Development (statistics 2018), it contains 10 Dairas (subdivisions of a province in Algeria) and is divided into 34 municipalities. (Figure 21)

Figure 21. Cartography of Bordj Bou Arreridj Province



Source: The directorate of Post and Telecommunications of Bordj Bou Arreridj province (ICT Department)

CHAPTER III : RESULTS AND DISCUSSION

This third and last chapter presents the results obtained from comprehensive responses on respondents' roles and opinions about the Universal Service Program in the province of study and verify the validity of those findings from the documentary sources existing at the Directorate of Post and Telecommunications of Bordj Bou Arreridj province, indicates the remote areas approved by the Ministry of Post and Telecommunications to benefit from the Universal Service Program in the province and the reason for choosing them, after that we analyse the percentage of progress of the program in providing connectivity to the telecommunications network in the chosen localities, finally we arrive at the answer of the research questions with giving some notes and recommendations.

The first section: Presentation of the results

This section illustrates the results obtained from the responses of the interviewees and the results collected from the documentary sources.

1- Results of the qualitative study

This part contains two main axes, the first one presents the results obtained from the interviews conducted with the first responsible of the directorate and with the managers of ICT department at the same organisation, the second axe refers to the results gained from documentary sources.

1.1- Results from interviews:

- *ICT infrastructure situation in Bordj Bou Arreridj province:*

The question in this section addressed the current situation of information and communications technology infrastructures in Bordj Bou Arreridj province, all the interviewees shared similar thoughts that ICT infrastructures are in continuous expansion and modernisation by replacing the old copper network with fibre optics, and also expanding this network at a rapid pace throughout the province with the introduction of a new technology in 2015 represented in the fourth generation 4G LTE of fixed telephone network and internet, aiming to cover the mountainous areas, and it is in a state of expansion and development towards the use of devices and equipment for receiving high and very high flow of internet. I3 added that the development of infrastructures for each of Mobile phone operators (Djezzy, Mobilis, Ooredoo) are increasing and improving coverage especially in remote areas by switching the second generation to the third generation (3G) and then the fourth (4G).

The table below shows the results gained from documentary sources about the situation of modern ICT infrastructures installed in Bordj Bou Arreridj province between 2017 and 2021:

Table 3: Number of modern ICTs infrastructure 2017-2021

Modern ICT infrastructure	MSAN	4G-LTE
2017	**239**	**25**
2021	**336**	**85**

Source: The directorate of Post and Telecommunications of Bordj Bou Arreridj province (ICT Department)

- *The digital divide:*

When we asked the interviewees about the Digital Divide there were no difference between their responses, they all believe that it is the inability, or disparity in the use of modern means of communication, including the Internet between members of society, and this is due to many reasons. I1 stated that the reason of this phenomenon is the lack of ICT infrastructures to allow internet access in some regions. I2 considers that the reasons caused by political-economic problems. I3 mentioned that the main reason is the absence of qualifications for scientific culture (electronic illiteracy, language, the use of modern technologies, traditions, age). I4 believes that the digital divide mimics the divisions caused by income and education. I5 explained that the gap between regions that have access to modern information and communications technology and those that don't have access caused by geographical factors and because some people are simply not interested in plugging in to the internet.

According to the interviewees, the solutions to reduce the Digital Divide (access and usage) in the province and in Algeria in general are as follows:

- Ensure educational pathways to use the Internet and other digital technologies. (I3).
- The development of ICT infrastructures. (I1,I2,I3)
- Extension of the fibre optics network even in rugged areas (I1,I2,I3)
- Encouraging technological thoughts by supporting entrepreneurs and technological innovations. (I3, I5)
- Increasing the number of telephone/internet subscribers by offering affordable prices. (I5)

- Improving the quality of phone and Internet services and increasing the network bandwidth. (I5)
- Provide a quality technical support. (I3)
- Encouraging scientific research in the field of software development and design, digital applications, as well as cybersecurity. (I4, I5)
- Disseminate the use of information and communication technologies at the level of various public and private interests and services for the purpose of motivating people towards the use of these technologies. (I1)
- The pursuit of economy, electronic trade and digital transactions. (I2)
- Spread awareness in the community about the importance of computers and internet to build a society of knowledge (I4).

Concerning the current conditions to link remote areas with information and communication technologies. I1 and I2 mentioned that all the remote areas need to be linked without any condition because all citizens have the right to telephone and internet access. I3 said that these areas should be linked according to their priority in terms of population density and the availability of electrical energy. I4 and I5 declared that all rural zones must be linked and benefit from ICT services starting by linking the areas have less than 2000 inhabitants then areas which have a low population density.

- *The universal service program:*

I1 explained that the Universal service program in telecommunications is intended for areas that are not deemed economically viable and where operators are not obliged to cover as part of their operating licenses. It concerns villages which are not served with ICT and where the number of inhabitants is less than two thousand (2000). I2 and I3 mentioned that the Universal Service Program is the cornerstone of public policy that ensures social cohesion by reducing the difference between population groups in the use of ICT. According to I5 the Universal Service Program is a budget allocated by the government to support the generalisation of the use of information and communication technologies in remote areas with low population density (communication activity is very low), to motivate public economic operators such as Algerie Telecom and Mobilis to expand the telephone network as well as the Internet to connect and cover these areas.

I1 explained that the Universal Service Program in the province is working on the implementation of the Executive Decree No. 18-246 of 29 Moharram 1440 corresponding to

October 9, 2018 determining the content and quality of the universal postal service and the universal service of electronic communications, the tariffs applied to them and their method of financing. the Universal Service Program aims to guaranteeing the availability of access to electronic communications networks for all citizens, allow connection to public networks, ensure telephone services and the development of ICT infrastructures, connect public educational and public health establishments with ICT.

According to the answers of all the interviewees, the problems and obstacles facing the implementation of the Universal Service Program in the province are:

- Unavailability of electrical energy to supply stations, devices and equipment. (I3)
- Unavailability of devices and equipment, as well as wireless stations from time to time. (I3,I4)
- There are some obstacles that prevent the delivery of the fibre-optics network through private areas. (I2)
- The failure to receive devices and equipment required by the General Directorate of Algerie Telecom from the country of origin China (HUAWEI, ZTE, ERICSSON, NOKIA) during the epidemic (Covid-19). (I1,I5)

The situation of internet access and usage in remote areas before and after implementing the Universal Service Program. All the interviewees explained that the program was able to boost the percentage of telephone and internet coverage in remote areas, which led to an increase in the number of subscribers using the telephone/Internet, as it had an effective role in reducing the digital divide.

According to documentary sources of ICT department at the Directorate, the number of rural localities exist in Bordj Bou Arreridj province is 404, only 72 approved by the Ministry of Post and Telecommunications to benefit from the Universal Service Program as a fist stage (Appendix B).

- Before adopting the Universal Service Program (SUP) in the province:

Table 4: Number of localities covered by ICTs before SUP

	Wired telephony and internet	4G-LTE	4G-LTE and wired telephony and internet	**Total covered localities**
Number of localities covered by ICTs	64	69	20	**153**

Source: The directorate of Post and Telecommunications of Bordj Bou Arreridj province (ICT Department)

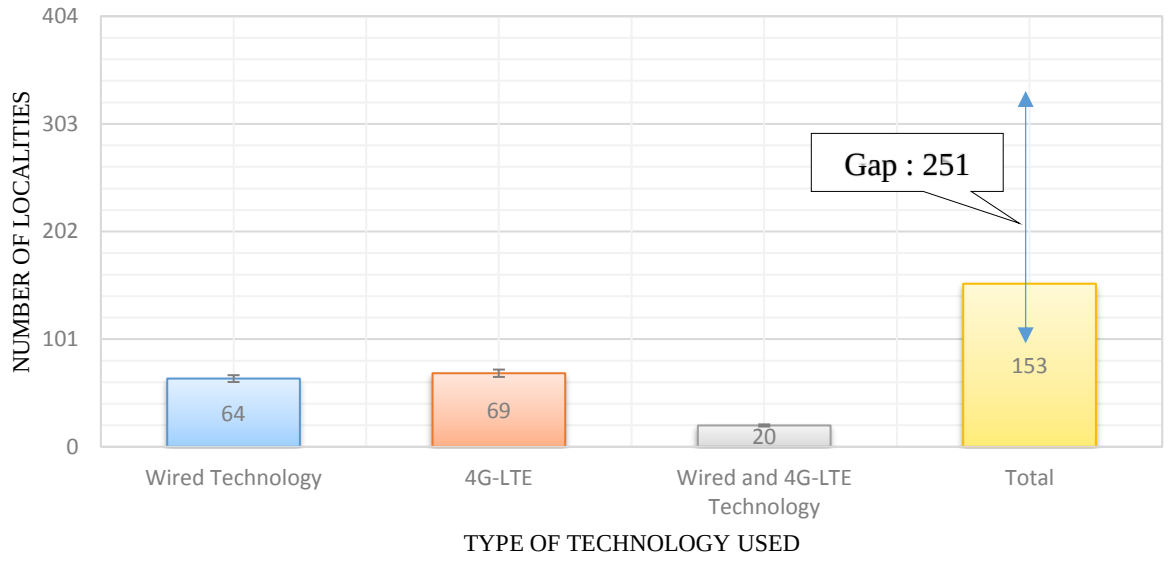
Table 5: Number of localities uncovered by ICTs before SUP

	Wired telephony and internet	4G-LTE	4G-LTE and wired telephony and internet	**Total uncovered localities**
Number of localities uncovered by ICTs	320	315	249	**251**

Source: The directorate of Post and Telecommunications of Bordj Bou Arreridj province (ICT Department)

The bar graph below shows the gap between localities covered by ICTs and those they are not before adopting the Universal Service Program.

Figure 22. Number of localities covered by ICTs before SUP



Source: Elaborated by the researcher

- After adopting the Universal Service Program (SUP) in the province:

Table 6: Number of localities covered by ICTs after SUP

	Wired telephony and internet	4G-LTE	4G-LTE and wired telephony and internet	**Total covered localities**
Number of localities covered by ICTs	64 + 7	69 + 65	20 + 1	**226**

Source: The directorate of Post and Telecommunications of Bordj Bou Arreridj province (ICT Department)

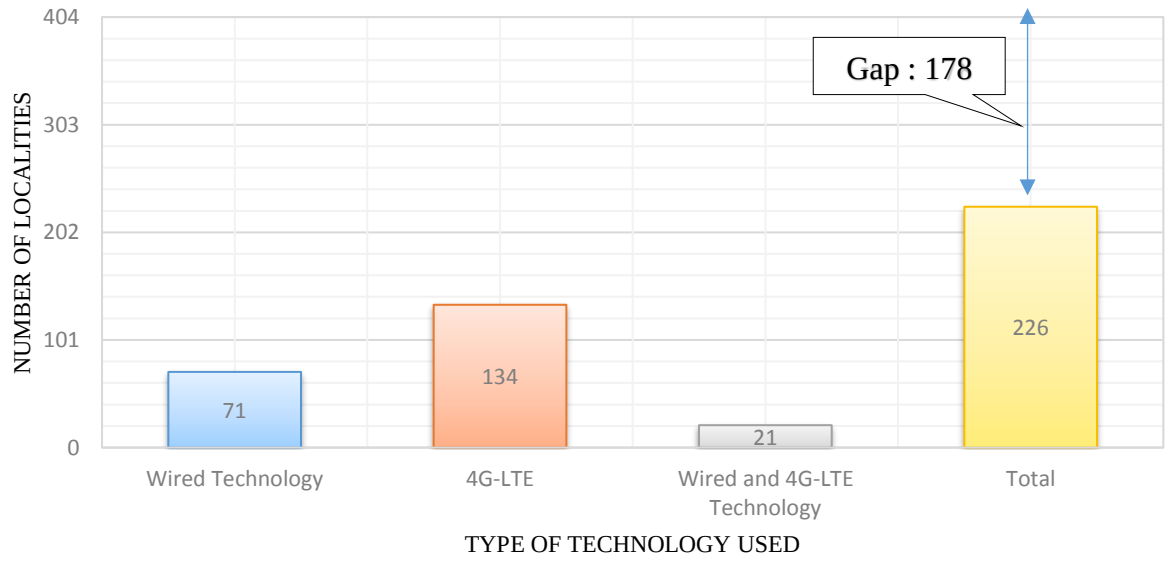
Table 7: Number of localities uncovered by ICTs after SUP

	Wired telephony and internet	4G-LTE	4G-LTE and wired telephony and internet	**Total uncovered localities**
Number of localities uncovered by ICTs	**320 - 7**	**315 -65**	**199**	**178**

Source: The directorate of Post and Telecommunications of Bordj Bou Arreridj province (ICT Department)

The bar graph below shows the gap between localities covered by ICTs and those they are not before adopting the Universal Service Program.

Figure 23. Number of localities covered by ICTs after SUP



Source: Elaborated by the researcher

The table below shows the results gained from documentary sources about the number of telephone/internet subscribers in Bordj Bou Arreridj province between 2017 and 2021 (before and after implementing the Universal Service Program):

Table 8: Number of modern ICTs infrastructure 2017-2021

Number of subscibers	Telephone	Internet
2017	**62 511**	**49 207**
2021	**76 033**	**61 281**

Source: The directorate of Post and Telecommunications of Bordj Bou Arreridj province (ICT Department)

- *Algeria's experience in bridging the digital divide "access and usage":*

Responding to this question I2 mentioned the investments of Algerie Telecom (WLL, MSAN, Fibre optics, 4G LTE), I3 stated the Oracle agreements between Sonatrach and the post, where two agreements were signed by the American Oracle Group; the first was with the National School of Post and Communication, and the second was with Sonatrach Centre that has become qualified to provide training services accredited by Oracle in the field of technological products related to information systems and design tools. I4 mentioned MICL program agreement between the Ministry of Post and Telecommunications and the Ministry of Interior and Local Authorities which aims to link municipalities administrations and Dairas with fibre optics network in order to digitise services. I5 talked about the implementation of the Universal Service Program to generalise the interconnection of all regions to achieve justice and equality in the use of telephone network and internet at the level of all the national territory as one of Algeria's experiences in bridging the Digital Divide.

- *Government future trends in bridging the digital divide:*

The only interviewee who answered the question of this section was the director I1 due to its strategic position, I1 mentioned that the government aims to develop and install modern infrastructures of Information and communication technologies to offer high speed internet access and rely on wireless techniques (4G LTE, Satellite) to cover isolated areas, as well as the inclusion of means of communication and promoting digitisation in the sectors of economy, trading, industry, education, health, and support technological innovation.

The second section: Discussion of the results

In this part, constant comparison method is used for discussion. The findings from the theoretical and empirical aspects of the research are analysed and compared with each other. Similarities and differences are then stated.

- *Sub-questions:*

- *What is the Current situation of ICTs infrastructures in the province?*

In the empirical studies, we found that the current situation of ICT infrastructures are in the phase of modernisation by replacing traditional infrastructures by modern ones, via changing copper networks by fibre optics (MSAN) and installing wireless technology of

communications (4G LTE) in the aim of benefit from a very high flow of internet and cover rural zones with ICTs.

On the other side, we found from documentary sources that the number of new technologies infrastructures are increased between 2017 and 2021 where the number of MSAN increased from 239 to .... and the number of 4G LTE raised from 25 to 85.

Comparison between the two sides confirmed clear similarities regarding the current situation of ICTs infrastructures in the province.

- *What is the Digital Divide?*

In the empirical study, the Digital Divide were defined as the inability in the use of Information and Communication Technologies between members of society, and between the inequality between regions that have access to modern ICT and those that don't have access, due to the lack of ICT infrastructures, to political-economic problems, the absence of scientific culture, due to low-income and education, geographical issues and disinterested people.

In the theoretical study, we reported many definitions about the Digital Divide from several researchers as Roger (2001) and Ali and Hejazi (2005).

Comparison between the theoretical and the empirical showed similarities between the two aspects regarding the concept of the Digital Divide.

- *What are the solutions to bridge the Digital Divide?*

In the empirical study, in order to bridge the Digital Divide in Algeria, government should rely on the development of new ICT infrastructures, rely on public economic operator of communications (Algerie-Telecom) and Mobile phone operators "Djezzy, Mobilis, Ooredoo", extend the fibre optics network even in rugged areas, should also support technological innovations and ensure educational pathways to use the Internet and other digital technologies, increase the number of telephone/internet subscribers by offering good quality of services at affordable prices, encourage scientific research in the field of information technology (IT), stimulating people to use computers and digital devices and provide them electronic services.

In the theoretical study, we mentioned that OECD countries' policies and programmes aimed at reducing the digital divide range from general approaches aimed at strengthening and extending the infrastructure, diffuse access and information more widely and to improve the

skills of individuals and workers. Also, we stated in the literature review that Hamadouch and Amani (2021) concluded in their research that Algeria concerned with digital transformation and the transition to government and private digital transactions to contribute to reducing the Digital Divide .They recommend that it is necessary to ensure safe, affordable and highest-quality access to Internet services.

Comparing the theoretical and empirical parts showed similarities regarding solutions that reduce the digital divide

- *What is the Universal Service Program?*

In the empirical study, all the interviewees declared that the concept of the Universal Service Program concerns the rural regions that are not served with ICTs, and the program adopted by the government to fund the public economic operators of communications to cover those areas in order to ensure equality and social cohesion.

In the theoretical study, the concept was defined by Hamadoun (2000) as "Universal Service is intended to serve as a reference tool to assist countries of the Americas region in forming the best policies and practices with the goal of making universal service/access available to all of the regions inhabitants". Also, James and Paul (2003) consider the universal service as the provision of exchange telephone access at prices which are below their costs. However, this definition embodies three notions: the goal, the instrument and the funding mechanism.

Comparison between the theoretical and experimental parts confirmed that the Universal Service Program seeks to achieve equality between individuals in providing telephone and internet services at all regions and at reasonable prices.

- *What are the obstacles and problems facing this program?*

In the empirical study, the absence of electrical energy and the unavailability of devices, equipment due to many reasons, especially during the epidemic (Covid-19), are one the major problems facing the implementation of the program, and there are some obstacles related to the owners of private areas which take much time to deal with them legally.

According to the documentary sources, there were no rural areas covered by ICT under the Universal Service Program 2020 due to the impact of the coronavirus pandemic.

Comparison between these two sources of information confirmed that the main problem was Covid-19.

- The main question of the research:

♦ *What is the role of the Universal Service Program in bridging the Digital Divide in Algeria?*

In the empirical study, all the interviewees mentioned that the Universal Service Program contributes significantly in bridging the Digital Divide in the province.

From the documentary sources, we explained how the Universal Service Program considers as one of the factors that bridge the Digital Divide in the province.

Comparison between these two aspects confirmed that the Universal Service Program contributes in bridging the Digital Divide in Algeria.

CONCLUSION

In conclusion, the objective of our study is to examine the implementation of the Universal Service Program in Algeria by taking the case of Bordj Bou Arreridj province to determine the role of this program in bridging the Digital Divide in the country.

The few studies that have addressed the Digital Divide in Algeria have explored this topic from a general perspective and have not addressed the Universal Service Program adopted by the Government and treated by the Ministry of Post and Telecommunications which aims to cover rural zones with ICT. This research will fill this gap in the literature by attempting for the first time to explain the role of the Universal Service Program in bridging the Digital Divide. A qualitative approach is adopted in order to answer the research purpose and research questions, then to explain how this program works in the province.

The analysis of the data collected through semi-structured interviews with the direc-tor of the Directorate of Post and Telecommunications of Bordj Bou Arreridj province as the representative of the ministry and with 5 managers at the same organisation charged with implementing and monitoring this program in the province of study, aiming to clarify the process of the implementation of the Universal Service Program, the problems they encountered while carrying out this task and the purpose of this program, then we reinforced the data collected through interviews with the documentary sources exist at ICT department.

The outcomes of this research have provided insight about various concepts related to the research questions and its purpose by implying the meaning of the Digital Divide, the methods adopted to bridge it, then defining the Universal Service Program, knowing the implementation of this program in the province and finally deducing the role of this program in bridging the Digital Divide in Algeria.

The main-question:

- **What is the role of the Universal Service Program in bridging the Digital Divide in Algeria?**

The Universal Service Program contributes significantly to bridging the Digital Divide in Algeria, especially as it supports and finances public operators of telecommunications with an economic nature to link remote areas with Information and Communication Technologies and enable citizens living in remote places to accessing the digital world and not distinguishing them from citizens living in urban cities by providing the same telephone services, the same speed of internet flow, and at similar prices.

Sub-questions:

- **What is the Current situation of ICTs infrastructures in the province?**

The ICT infrastructures in the province are in the process of modernisation and replacement of old technologies with new ones, replacing copper network by modern technologies related to the optical fibre (MSAN) and wireless stations of communications (4G-LTE).

- **What is the Digital Divide?**

The concept of Digital Divide refers to the difference and inequality between two elements in the provision and in the use of Information and Communication Technologies, between illiterate and educated people, between the rich and the poor, between the old and the young, either between the existence of ICT infrastructure in urban and remote areas due to political, cultural, economic, social, ethnic and geographic reasons.

- **What are the solutions to bridge the Digital Divide?**

The Algerian state seeks to reduce this Digital gap and find solutions that help citizens to access the digital world by relying on the investments of public economic operators of telecommunications (Algerie-Telecom, Mobile phone operators "Djezzy, Mobilis, Ooredoo") that contribute to the provision of ICT services in various regions, as well as by adopting the Universal Service Program, developing modern ICT infrastructures, supporting technological innovations and ensure educational pathways to use the Internet and other digital technologies, offering good quality of services at affordable prices, encourage scientific research in the field of information technology (IT), motivating people to use digital devices and provide them electronic services to facilitate their life.

- **What is the Universal Service Program?**

This program works at financing telecommunications companies to connect isolated areas that are not profitable, aiming to cover those rural areas that have less than 2000 inhabitants with communications, either with optical fibres technology (MSAN) or wireless technology (4G LTE) to allow people living in there to access internet at reasonable price and same service quality as citizens living in urban areas.

- **What are the obstacles and problems facing this program?**

- Delay in providing devices and equipment on time to time.
- Coronavirus pandemic where the importation of devices and equipment were stopped.
- Unavailability of electrical energy in rural zones concerns by the program.
- The difficulty of dealing with private land ownership to deliver optical fibres.

Through the empirical study, we found new aspects of information that were not in the theoretical study. Results from documentary sources indicated that the 72 rural localities concerned by the Universal Service Program were covered by the telephone network and the Internet between 2019 and 2021. We discovered that the main problem that can face the execution of a program as the Universal Service Program can be a pandemic like Coronavirus pandemic where ICT devices and equipment couldn't be imported from other countries from china in our case. We also discovered during the study that there is an agreement between the Ministry of Post and Telecommunications and the Ministry of Interior and Local Authorities which aims to link the municipalities administrations with fibre optics network, this allows people of the region to benefit from electronic services. Algeria state also seeks to improve ICT services by increasing internet speed and relying on satellites in the future.

As a final result, to reduce the digital divide rapidly in the country, the government should intensify the issuance of decisions related to the isolated places that it supports and include them within the Universal Service Program. On the other hand, public economic sectors of communications should speed up the process of acquiring and installing communication devices and equipment. Through these measures, we reach good results in linking rural zones and satisfying every Algerian citizen by integrating him into the digital world.

Our empirical research was limited to deal with the Digital Access Divide in Algeria, Further research should be targeted towards the Digital Usage Divide in the same country, this would provide additional ideas for understanding and development of internet usage in Algeria state.

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APPENDIX A INTERVIEW QUESTIONS FOR THE DIRECTOR OF THE ORGANISATION

THE NATIONAL HIGHER SCHOOL OF MANAGEMENT

ENSM, KOLEA

Student: Houssem OUNOUGHI

Bridging the Digital Divide in Algeria: What's the Role of Universal Service?

This interview is for a master thesis at the National Higher School of Management (ENSM) that seeks to investigate the role of the Universal Service Program in bridging the Digital Divide in Algeria.

- The comments and responses will be treated with utmost confidence.

Interview Questions:

1- What's your name?
2- How old are you?
3- What's your field?
4- What's your position and how long have you been working here?
5- What's the current situation of ICT infrastructures in the province (rural and urban areas)?
6- What do you know about the Digital Divide?
7- What are the solutions to bridge the Digital Divide (access and usage) in the province?
8- What are the current conditions to connect a remote area with ICT in the province?
9- What's the Universal Service Program?
10- How's the Universal Service Program works in the province?
11- What are the problems and the obstacles facing the implementation of the Universal Service Program in the province?
12- How do you view Internet access and usage in remote areas before and after implementing the Universal Service Program?
13- What's the role of the Universal Service Program in bridging the Digital Divide?
14- What lessons can the state learn from developed countries in bridging the Digital Divide?
15- What are the Government future trends in bridging the Digital Divide "access and usage"?

THE NATIONAL HIGHER SCHOOL OF MANAGEMENT
ENSM, KOLEA

الطالب: حسام ونوغي

تقليص الفجوة الرقمية في الجزائر:

ما هو دور الخدمة الشاملة؟

الغاية من هذه المقابلة هو جمع المعلومات من أجل معالجتها واستعمالها في أطروحة لنيل شهادة ماستر تخصص حكومة الكترونية بالمدرسة الوطنية العليا للمناجمنت، والدراسة تهدف إلى معرفة دور برنامج الخدمة الشاملة في تجسير الفجوة الرقمية في الجزائر.

- سيتم التعامل مع التعليقات والأجوبة بمنتهى الثقة.

أسئلة المقابلة:

1- ما اسمك؟
2- كم عمرك؟
3- ما هو تخصصك الدراسي؟
4- ماهي وظيفتك في المديرية الولائية للبريد والمواصلات السلكية واللاسلكية ومنذ متى وأنت تعمل هنا؟
5- ماهو الوضع الحالي للبنى التحتية الخاصة بتكنولوجيات الإعلام والاتصال؟
6- ماذا تعرف عن الفجوة الرقمية؟
7- ماهي الحلول لتقليص الفجوة الرقمية (الربط والاستعمال) في الولاية؟
8- ماهي الشروط الحالية لربط المناطق النائية بتكنولوجيات الإعلام والاتصال؟
9- ماهو برنامج الخدمة الشاملة؟
10- كيف يعمل برنامج الخدمة الشاملة في الولاية؟
11- ما هي المشاكل والعراقيل التي تواجه تطبيق برنامج الخدمة الشاملة في الولاية؟
12- ما هي نظرتكم بخصوص الربط بشبكة الأنترنيت واستعمالها في المناطق النائية قبل وبعد تنفيذ برنامج الخدمة الشاملة؟
13- ماهو دور برنامج الخدمة الشاملة في تجسير الفجوة الرقمية؟
14- ما هي الدروس التي يمكن أن تستفيد منها الدولة الجزائرية من خبرات الدول المتقدمة في سد الفجوة الرقمية؟
15- ما هي التوجهات الحكومية المستقبلية في سد الفجوة الرقمية "الربط والاستعمال"؟

APPENDIX B LIST OF LOCALITIES OF BORDJ BOU ARRERIDJ PROVINCE APPROVED BY MINISTRY OF POST AND TELECOMMUNICATIONS TO BENEFIT FROM SUP

Municipality	Locality	Number of inhabitants
DJAAFRA	OULED RACHED	1921
EL EUCH	LAMDJAZ	1791
RABTA	OULED AISSA	1600
BORDJ GHEDIR	OULED LAAYADI	1519
KHELIL	OULED BELHADJ	1500
SIDI MBAREK	OULED SIDI AAMAR	1500
OULED BRAHEM	AIN BOUKHEDACH	1254
EL ACHIR	VILLAGE LACHBOR	1200
SIDI MBAREK	BOULHAF	1200
DJAAFRA	CHAKBOU	1158
DJAAFRA	OUCHANEN KBIRA	1152
EL MAIN	ELMADJEN	1141
EL MEHIR	OULED BELMEZITI	1100
TENIET ENASR	HECHACHNA-KHEBATNA	1080
TAGALEIT	BITAM	1070
DJAAFRA	OULED AAMAR	1021
BORDJ ZEMOURA	HAY EL MOURABITIN	1020
BENDAOUAD	ELSSAMA	980
KHELIL	FHIMAT	950
KHELIL	OULED HAMZA	950
DJAAFRA	LAAZIB	941
TENIET ENASR	AIN KAHLA	913
BORDJ GHEDIR	OULED EL SILINI	904
BORDJ GHEDIR	OULED SIDI MOUSSA	900
MANSOURAH	BOUKABA	891
BENDAOUAD	LOUBACHICHE	868
BORDJ GHEDIR	OULED HAMDAN	819
RAS EL OUED	BOUGBIS	804
BENDAOUAD	OULED CHBIL	785
BORDJ ZEMOURA	OULED DJELAL	715
DJAAFRA	SIDI SALEH	702
RABTA	CHRAKAT	700
RABTA	LEFRAHTIA	700
BORDJ GHEDIR	ZEBIR	700
BORDJ ZEMOURA	TALAWAZRO	685
EL ACHIR	VILLAGE MAKHAMRA	680

OULED BRA-HEM	BOUBTIKH	653
KHELIL	OULED BAITHI	600
MANSOURAH	OULED ABBES	577
DJAAFRA	OURIR DJAAFRA	572
RAS EL OUED	BOUTAMAR-HAROUN-YESSAAD	571
TAFREG	OULED ZAID	569
MANSOURAH	ELHAMRA	563
EL EUCH	ELFADJ	561
DJAAFRA	OUCHANEN SGHIRA	551
BORDJ ZE-MOURA	HAY OULED HAMOUCH	550
DJAAFRA	OULED ABDELLAH	540
KHELIL	FAIDH SACI	520
DJAAFRA	BOUFANZAR	502
RAS EL OUED	LAOUMER-TLEDINA-OU-LED AMMARA	482
MANSOURAH	ZITOUN	459
RAS EL OUED	CHELLENA-EL GHIRENE	453
RABTA	OULED BENAISSA	450
EL HAMMA-DIA	OULED ARMILA	448
DJAAFRA	BOUNDA SGHIRA	426

EL HAMMA-DIA	LAGHWAL	416
TENIET ENASR	BOUHAMZA	409
EL HAMMA-DIA	ELRBIAIYAT	409
DJAAFRA	TAOUARMIT	401
RABTA	LAGHOUAZA+LAA-RAYES	350
TENIET ENASR	OULED MENI 01	337
KHELIL	AIN ELMOKH	325
TAFREG	ACHABOU	262
RABTA	OULED MHAMED SUD	250
HARAZA	BEN OUAGUEG	250
MANSOURAH	ELMZIRAA	235
HARAZA	ABIAR	231
MEDJANA	SOUNAF	228
MEDJANA	OUM ARIF	227
TENIET ENASR	AFABGO-EL MOUTEN	208
KHELIL	OULED RABEH	200
KHELIL	LAHOUISSI	200