Digital Divide: How to connect those who are not connected? The case of the Arab region

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DIGITAL DIVIDE: HOW TO CONNECT THOSE WHO ARE NOT CONNECTED? THE CASE OF THE ARAB REGION

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Abbreviations

A4AI: Alliance for Affordable Internet
ARO: Arab Regional Office
BDT: Telecommunication Development Bureau
CSO: Civil-Society Organization
DDD: Digital Development Dashboard
ICT: Information and Communication Technologies
IGO: Inter-Governmental Organization
ITU: International Telecommunication Union
LDC: Least Developed Countries
LLDC: Landlocked Developing Countries
NGO: Non-Governmental Organization
OECD: Organisation for Economic Co-operation and Development
PPP: Purchasing Power Parity
RM: Resource Mobilization
SIDS: Small Island Developing States
UIS: UNESCO Institute for Statistics
WFP: World Food Program

Abstract

Over the past years, connectivity has not ceased to charm the policy agendas of countries, global development agencies, and financial institutions (OECD, 2019). More and more money has and is intended to be invested and numerous resources are anticipated to reinforce and strengthen connectivity. Apart from the manifest advantages for those who enjoy access to the internet, the question remains: why is connectivity so fundamental? And if it is so essential, why are there areas that are still struggling to get connected?

In an increasingly interconnected world, digital connectivity plays a pivotal role in shaping economies, societies, and the overall development trajectory of nations. The Arab region, spanning across the Middle East and North Africa, has witnessed significant advancements in digital technology and connectivity in recent years. The transformative power of digital connectivity has the potential to revolutionize industries, empower individuals, bridge socio-economic gaps, and forward inclusive growth across the region. However, it is crucial to assess the current landscape of digital connectivity in the Arab region in order to identify existing challenges, gaps, and opportunities for further enhancement.

This paper explores the factors influencing connectivity and the barriers faced by individuals in accessing digital networks. The research employs a mixed-methods approach, combining qualitative and quantitative analysis, to examine the implications of affordability, digital literacy, and social barriers on connectivity. The study identifies the least connected countries based on these indicators and highlights their specific needs in addressing low connectivity. Furthermore, it reveals gaps in data pertaining to gender, age, and geographical disparities in digital connectivity across Arab countries. The findings presented in this paper serve as a valuable resource for developing effective strategies to bridge the digital divide. Through concrete examples and recommendations, this study contributes to the understanding of approaches aimed at promoting universal access to information and communication technologies (ICTs). Ultimately, this research underscores the significance of connectivity and proposes actionable interventions to enhance ICT access for socio-economic development. Policymakers and practitioners can utilize these insights to address connectivity challenges in the Arab region and beyond, fostering inclusive and sustainable progress.

1. Introduction

In the effort to make the world a better place, it is crucial to understand the importance of ICTs as enablers of socio-economic development, and embrace their usage for everyone, everywhere in the world. According to the International Telecommunication Union (ITU, 2016), connecting people to the internet implies a series of benefits in *healthcare* (i.e.: providing patients with access to the requisite medicare, connecting remote clinics to major hospitals, collecting, storing and protecting sensitive information and important medical data for more efficient usage, etc.), *education* (i.e.: providing the most relevant and useful knowledge to date for students of all ages/genders/origins, connecting schools and universities for better transmission of information, etc.) and *governance* (i.e.: governments providing adequate services to their citizens). This is particularly of relevance in the case of the Arab region. According to the latest estimates, in 2021, no more than 66% of the total population in the Arab region were using the internet, a number that got significantly impacted by the COVID-19 pandemic marking a detrimental impact on digital exclusion and socioeconomic development in general, emphasizing the urgent need for universal connectivity (ITU, 2021a).

Having been allocated a considerable amount of funding in its development, connectivity has often been the center of attention for many public policies, development programs and sustainable projects both at a national and global level. Tackling low (or non-existent) connectivity often results in improving public services or rendering the public good of the internet more accessible for everyone. At the same time, akin to other policy/programme/project proposals, there are a variety of interventions that may be suitable for each case. Determining the most suitable approach for the problem at hand necessitates a careful examination, evaluation, and assessment of its appropriateness.

This paper will exhibit the reasons why tackling low connectivity can benefit not only the people directly affected by the phenomenon, but also governments and other stakeholders indirectly linked to the local communities, as well as address the general impediment it causes in the global development. Focusing on the Arab region, the paper will then evaluate the different levels of connectivity found among developed to least developed or developing countries and will identify the key reasons behind this development or the lack of it. It will then proceed in looking into specific examples of countries or regions that draw particular attention to the matter, and it will examine possible solutions that could tackle the existing problem of connectivity. To conclude, based on the affiliated research, the paper will present the final results of the analysis carried out within the scope of the internship, as well as the main proposals made for the purpose of the project.

2. Background

2.1 Thematic

Before delving into the specificities surrounding the concept of connectivity, it is necessary to first elucidate what is meant by connectivity and more precisely *digital connectivity*, as well as the key features of its contemporary application within the framework of development. According to the Cambridge dictionary, digital connectivity denotes "the ability of a computer, program, device, or system to connect to the internet, with another computer etc." (Cambridge Business English Dictionary 2011). It is also defined by the quality, state, or capability of someone or something to get connected (Merriam-Webster).

Connectivity is often seen as a key driver for change and for the evolution of various industries. Sectors like education, banking, healthcare, and governance, that were formerly independent, disconnected, or fragmented, now are heavily dependent and intertwined, and are benefiting from the extended accessibility provided by connectivity. Typical example within the educational sphere is the liberal availability of academic documents which are not bound to the geographical location or the economic and infrastructural ability of academic institutions, but instead are universally accessible mainly through the medium of internet (OECD report, 2019). Moreover, connectivity is also recognized as an enabler of digital transition and transformation, and essential for communication, collaboration, access to information, economic growth, and innovation. Once online, one can access a vast number of resources and information available on the internet, learn new things, and stay updated on current events, trends, and developments. In addition, connectivity fosters innovation by providing relevant platforms where individuals or entities can share their ideas, collaborate, and grow. Overall, connectivity has a vital role in today's life for both tackling socio-economic challenges, promoting political stability, and guiding digital transformation and development of several sectors towards new horizons (Stromquist, 2002).

According to a report by the ITU on Digital inclusion of all (2022), over the past 5 years, the global population of internet users has increased by 1 billion new users, among which 466 million were only a product of the year 2020 and beginning of the COVID-19 pandemic. As of mid-2022, over 5.3 billion individuals were online, which accounts for over 63% of the global population. In spite of that, 2.7 billion people, slightly over one-third of the world's population, still remain offline, many of which are found in least developed countries (LDCs), landlocked developing countries (LLDCs), and small island developing states (SIDS).

Following the dramatic changes due to the COVID-19 pandemic that affected the whole world in several ways, going online was an inevitable consequence when physical presence was no longer an option. To achieve that, not only adequate infrastructures providing sufficient internet access were required, but also the capacity to procure them and the capability to use them. Due to these – in some cases constraining – factors, millions of people were left behind, not able to be connected, and thus receded from educational, health or work-related support and opportunities, particularly when governmental assistance was only given for those online. Consequently, having the means to follow up the digitalization of the majority of everyday tasks appeared to be a privilege for some, exacerbating inequalities, especially in the case of connectivity.

Among the objectives of the Common Agenda 2030[1] connectivity is to be advocated and fostered as a basic human right for all. Connecting all people to the Internet is amongst the crucial elements to make tangible advancements to people's lives, as well as to strengthening and accelerating multilateral agreements that foster quicker change and greater development.

2.2 The ITU

"Equitable access to digital technologies isn't just a moral responsibility, it's essential for global prosperity and sustainability. We need to create the right conditions, including promoting environments conducive to investment, to break cycles of exclusion and bring digital transformation to all."

- ITU Secretary-General Houlin Zhao, World Telecommunication Development Conference in 2022 at Kigali, Rwanda (ITU report, 2022)

The International Telecommunication Union (ITU) is the oldest of all intergovernmental organizations (IGO) and one of the United Nations specialized agencies concentrating on information and communication technologies – ICTs. Its establishment dates to 1865 and its purpose resides in promoting international connectivity in communications networks. ITU was from the first IGOs encouraging private sector membership and building a global community that currently amounts for 193 Member States and over 900 companies, universities, research institutes and international organizations from around the world (ITU, 2023).

Today, ITU is responsible for distributing global radio spectrum and satellite orbits, devising technical standards that guarantee flawless interconnectivity between networks and technologies, and reinforcing access to ICTs in underprivileged communities around the world. One of ITU's key objectives is to ensure connectivity for all people globally, regardless of their location and financial means, and to safeguard and ratify everyone's right to communication (ITU, n.d.1).

To achieve its mission, ITU comprises of the General Secretariat and three main sectors of activities: *Radiocommunications* (mainly focusing on the technical aspect of radiocommunication services and the international management of the radio-frequency spectrum and satellite orbits, among others), *Standardization* (responsible for the development and harmonization of standards related to core network functionalities, next-generation services, etc. both locally and globally) and *Development* sector (overseeing any growth-related activity, including emerging markets, corporate social responsibility, or any other internationally-accorded mandates and initiatives, as well as publishing the most recent, accurate and exhaustive ICT statistics) (ITU, n.d.2). Each sector operates through conferences, meetings and study groups between governments and industry players of diverse expertise. Their aim is to define frameworks, establish technical standards, guidelines, or recommendations, ensure the best functioning of all services, represent and coordinate competing commercial interests, share best practices and develop systems that can

[1] The 2030 Agenda for Sustainable Development is a global framework adopted by the United Nations in 2015. This report contains several suggestions in four overarching domains, aligning with the 12 commitments of the UN75 Declaration. The primary objective of the 2030 Agenda is to promote sustainable development, which involves balancing economic growth, social inclusion, and environmental protection. It calls for collaboration among governments, businesses, civil society, and individuals to work towards achieving these goals by the year 2030. (United Nations, 2021)

respond to existing problems or formulate future proposals. In addition, ITU organizes focus groups, global and regional workshops, and events, as well as non-member meetings addressing urgent, market-oriented industry issues that go beyond the realm of existing study groups. Finally, to support all this, the General Secretariat is responsible for managing the administrative and financial aspects of the Union's activities, while ensuring the seamless functioning of its three service sectors.

These areas of expertise and activities have led ITU to become a neutral platform of global consensus that opts to provide essential and structured services to an industry that is a leading medium for social and economic growth (ITU, n.d.2).

2.3 Connect 2030 Agenda

ITU and its members are committed to connecting the world, and in doing so, they have developed a common strategy and accountability framework called "Connect 2030". Under the initiative "Connect 2030 Agenda for Global Telecommunication/ICT Development", ITU pledges to support the UN's Sustainable Development Goals (SDGs) in fostering and accelerating the technological advances globally by 2030, facilitating the progress of implementation through the World Summit on the Information Society (WSIS) Action Lines, as well as forming a strategic plan composed of different initiatives that focus on creating both social and environmental impact (ITU, 2020b). The 2030 Agenda is based on five ambitious axes: growth, inclusiveness, sustainability, innovation, and partnerships, each one composed of specific and measurable targets.

***Image 1**: Connect 2030 Agenda (Source: ITU, 2020a)*

2.4 The internship

Within the scope of this report, I will focus more on ITU's Development sector. To a greater extent, the Telecommunication Development Bureau (BDT) of ITU focuses on development

projects linked to connectivity and access to the internet for everyone around the world. The Arab Regional Office of the ITU-BDT, based on the given circumstances, has decided to launch a regional initiative for connecting those who are not already connected by providing them with computer devices and/or training. More precisely, this project seeks to reinforce capacity building, digital inclusion, technology and network development for the least developed countries and the SIDS in the Arab region.

The aim of the internship focusing on the aforementioned initiative was to determine those who are still not connected among the Arab countries and to provide accordingly the necessary means (ex. devices, training tools etc.) in order to bring them closer to the information society and digital world by offering an adequate solution to the existing socio-economic hindrances. Based on the Common Agenda's goals for 2030, this project proposal attempts to bridge the connectivity gap by bringing different stakeholders together to reach those that are in most need.

2.5 Context & Project rationale

Executive agencies and international organizations, like the ITU, are encountering significant competition in obtaining funds from donors that will then help them to realize project proposals, develop programs or policies and implement initiatives that aim such social changes. As a result, having a comprehensive, precise, and concentrated strategy for mobilizing resources and promoting policies is essential for enticing and persuading donors to support various projects and initiatives. Working within this environment and based on the framework of this research internship, ITU was seeking to put together a study that will reply to fundamental questions as well as present a proposal that will bring the desired change to the world.

The approach that was followed throughout this research internship was to first define the rationale; collecting the relevant background information to define the context, the problem and main focus, its relevance, and the key beneficiaries. Having provided the right information that would frame the project's research, the following step was to describe the project, and more precisely, its objectives, expected results, future considerations, and next steps. The next phase included the formation of the project proposal which was based on the research and analysis of the data, the choice of implementation strategy and the methodology selected based on the given circumstances. Finally, a budget estimation was also included for the final proposal, involving an evaluation of the relevant costs per stakeholder, as well as the duration and sustainability of the project intervention. The final output of the research internship was a Concept Note[2] incorporating the above elements, data and findings, as well as an overview of the next steps and the ideal evolution of such project intervention. This deliverable was intended to be the vehicle of communication towards the interested parties and was designed to attract potential donors and expose a project proposal and initiative in a coherent, structured and systematic way.

[2] A Concept Note (CN) is a synopsis or a (brief) preliminary description of a project or an initiative that aims at engaging potential donors deeper into a partnership/collaboration conversation. CNs are used as an initial outline for potential partners' consideration/review and as a guide for discussion, prior to the development and submission of a more complete proposal (as required according to donors' mechanisms) or as part of formal submission processes. CNs are therefore considered a critical tool during the initial stage of resource mobilization.

Forming an extensive CN helps not only to disseminate the correct information but also contributes to an effective communication and awareness with respect to the aims, purpose and impact of the intervention in question, comprising all pertinent information that will persuade donors to get involved in resource mobilization (RM) and ergo the implementation of the project.

The purpose of a Concept Note is to capture the interest of the donor and demonstrate that the project or initiative is worth further consideration. It helps donors to determine if the described project or initiative fits with their goals and strategy and is likely to be accepted for fund allocation.

Before commencing with any research, it was crucial to define the problem at stake, and more precisely, all the elements influencing and guiding the definition and creation of a project proposal that will aid people in the Arab world to get connected in the most sustainable way, while making an impact to the local and regional communities. In a schematic way, the project was based on the following rationale:

What is the problem we need to respond to?	- Lack of dedicated equipment - Need for awareness and general support - Cultural barriers
What are the barriers contributing to the problem?	- Affordability issues - Social barriers - Other
What is the desired outcome?	- Benefit communities by connecting people - Engage policymakers, CSOs, NGOs, among others - Efficiently & effectively fund projects on connectivity
What can the ITU bring to the table?	- Know-how & expertise in ICT growth initiatives - Experience & involvement in similar nation-based interventions - Ownership of curated data from which actionable insights can be formed
How will the ITU be involved? (role)	- As a facilitator in a multi-stakeholder engagement - As a development project creator, promoter, and enabler

***Table 1**: Project Rationale (Source: Author's illustration)*

3. Literature review

The internet is a global network of interconnected parties (such as governments, industries, academia or other private parties) that communicate with each other using standardized communication protocols. Initially, it was created to link government research laboratories, but since 1994, it has expanded to serve numerous purposes and millions of users worldwide. Using a wide range of technologies, including wired and wireless connections, servers, routers, and various applications such as email, social media, streaming services etc., it allows for the exchange of information and communication across the world, enabling people to connect with each other and access vast amounts of data, resources, and services, regardless of their physical location (*Internet Growth Statistics 1995 to 2023 - the Global Village Online*, 2023). Due to its beeline development, the internet has rapidly emerged as a dominant platform that has transformed how we conduct business and communicate. It has given the world a globalized dimension that no other communication medium can match. It has become the primary source of information for millions of people at home, school, and work, and it continues to constantly improve in functionality, usability, accessibility and performance.

The most common purposes for people to go online are to communicate with family and friends, educate themselves, access work-related platforms and opportunities, seek health care services, share personal views, seek entertainment, and make purchases online. Recent forms of communication, such as web chats, newsletters, e-commerce and online advertisements, distance learning and teleworking etc., are unlocking new opportunities from the comfort of one's home. In conjunction with this, novel technologies specializing in optico-acoustic interactions, such as (live) streaming, audio and video conferences, live web cams, podcasts etc., are unlocking new avenues of communication rendering it more organic for the user. To obtain this, these mediums are opening new horizons to what *time* and *space* mean, reestablishing the "when", "where" and what one's *presence* means, shaping the conditions under which communication occurs and offering new flows of information. With the help of the internet, physical barriers are removed, and time and place are inconsequential to the transmission of data. (Stromquist 2002, p.64)

More precisely, it is estimated that as of 2022 there were over 5.3 billion internet users worldwide, almost half a billion more than 2021, amounting to 66% of the global population (Petrosyan, 2023a). The facilitation of computer access and usage, the digital transformation and general increase of smartphone utilization has incentivized many people around the world to use the internet with higher frequency and ease. For example, in January of 2022, China had roughly 1.02 billion internet users (72% of the country's population) whereas the United States 307 million (92% of the country's population). Typically, the BRIC countries ranked highly in absolute numbers, representing four of the top six countries with over 100 million internet users, with Egypt being the only Arab country arriving at eleventh place with 80.75% of its population being digitalized (Petrosyan, 2023b).

Ergo, connectivity is tightly linked to communication technologies, and the internet as a tool has been the vehicle to the impressive communication levels we are observing globally over the last two decades. Since the 9 million users in 1995, within five years the number of users reached 350

million, and within the first decade of the 21st century it attained over 2 billion users, which can be translated to over one-third of the world's population at the time (Castells, 2000).

However, the rate at which people get connected depends on the relevant conditions of development of each state. In fact, the web and its plethora of pages may, on some occasions, be constrained by factors that go beyond one's will to get connected. Indeed, internet access could be often undermined if for computers with limited processing capacity, or digital services and mobile broadband baskets that go beyond the financial means of users, or even when country-specific requirements restrict its use -particularly in the case of developing nations. In fact, this internet and web evolution is heavily contained among technologically advanced countries, leaving some room for its democratization. It is in reference to the great possibilities that it discloses in a wide range of issues that the United Nations Developing Program (1999) underlines the imperativeness of the democratization of technology and access to the internet for everyone.

Moreover, an element that is heavily linked to the ability someone has to get connected is digital literacy, otherwise known as "computer literacy" or "information literacy". These notions are not only becoming more and more relevant, but are being utilized to a greater extent in both academic and lay discussions and settings demonstrating the essence of our everyday literacy practices, as well as the structure of our economic, political, cultural and social systems as influenced by them. It is frequently emphasized that those who are lacking *basic* computer skills will be worse off than their "computer literate" peers in the modern work environment, and this assertion appears to have merit. Indeed, OECD reports indicate that individuals who lack the abilities required by the "new knowledge economies", i.e., those with insufficient or no skills are less likely to secure well-paid positions, and for whom un(der)employment is a prevailing concern. These are some examples amongst the most apparent and forthcoming ways in which computerization can affect daily life and personal/workplace relations (Roberts, 2000).

In summary, the Internet's impact on society and education is undeniable. Its value lies in its capacity to provide access to essential goods and services that cover domains such as healthcare, education and government services. It enables individuals, groups, and organizations from different locations to connect directly and quickly, providing them with new ways to get organized and grow (Prasad, 2016). However, even though the gap in device ownership between developed and developing regions is narrowing, there are still significant differences. While the focus is often on commonly used devices like computers, tablets, and mobile phones, there are numerous other digital devices that have become integral to daily life. This demonstrates that the digital divide extends beyond social media or mobile phone use and is deeply embedded in both advanced and emerging economies. It is influenced by macro barriers at the societal and institutional level, which are beyond individual consumers' control, as well as micro barriers related to consumer traits and circumstances (Papadopoulos & Cleveland, 2023). Both types of barriers act as gatekeepers to digital development and contribute to the complexity and context of digitalization and connectivity. Addressing the digital divide requires a focus on device accessibility and digital literacy and can benefit from ICT-based development projects.

4. Methodology

The present report addresses how to connect those who are still not connected by conducting qualitative and quantitative research on the availability and affordability of computer devices in the developing and least developing countries of the Arab Region. Specifically, this study sought answers to –including but not limited to– the following questions:

- Ø How do we define lack of digital connectivity?
- Ø What are the barriers attributed to the problem of connectivity?
- Ø How these barriers are affecting different parts of the population?
- Ø How do we understand the dynamics between the relevant stakeholders?
- Ø How do we understand social change in the context of digital connectivity?
- Ø What is the most suitable intervention with respect to the present problem/need?
- Ø What would be the prospected scale for the formation of a project proposal?
- Ø What is the best funding mechanism for the purpose of this project?
- Ø What kind of stakeholders should be involved in the process?

To do so, I utilized concepts and empirical findings drawn from the literature such as the digital divide and social practice theory vs. equality, as well as raw data on digitalization in context of the Arab world[3] (regional perspective), among others. Additionally, a desktop research on the efforts done by stakeholders to bridge the gap of connectivity and a mapping of the potential donor organizations active in funding such projects, are two elements contributed to the shaping of the project proposal. Lastly, an evaluation of the power relationships among relevant stakeholders and of the different resource mobilization platforms and mechanisms was performed to define the best-fit funding proposal for the realization of the project as well as depict the various parties to be involved in such an initiative.

For the collection, exploitation and analysis of the data employed in the internship research, I accessed ITU's ICT-Eye and DDD database provided by the ARO-BDT, as well as publicly available information from the ITU member-states, the World Bank, the Broadband Commission (for digital literacy statistics), the UNESCO Institute for Statistics (UIS), and other online sources on PPP[4] and other macroeconomic analysis metrics. Composite variables for each of the three main indicators (affordability, digital literacy, and social factors) were chosen from the above sources and utilized to define the lack of connectivity in the Arab region. Moreover, standard benchmarks for the aspects of affordability, digital literacy and social barriers were rigorously examined and used to analyze and understand the current state of the problem at hand, as well as to produce meaningful and actionable insights for the research's project proposal. Overall, the scope of this desktop analysis was to use quantitative data, interpret and transform them into

[3] The Arab world, under the ITU, includes all countries including Arabic as their official language. This group is composed of 22 member-states including: Algeria, Bahrain, Comoros, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, United Arab Emirates, Yemen.

[4] PPP (Purchasing Power Parity): a macroeconomic mechanism that allows cross-country/spatial comparisons that reflect on the differences in the volume of national outputs. It converts economies' GDP expenditures into common currency and helps compare economic productivity and standards of living between nations (The Investopedia Team, 2023).

meaningful qualitative data that will underpin where the problem lies with respect to affordability in the region of our interest, as well as what is the nature that is causing it.

> *The data used in the analysis of this project were derived mainly from the ITU database as well as other reliable sources based on the most recent estimations. They were oftentimes limited with respect to some country-specific data which were either not available or not up to date. Nonetheless, the analysis and conclusions reached to the rationale that this project is believed to constitute a sound hypothesis that can be validated more thoroughly through direct sources collected within the work of this project proposal.*

Framework

In the effort to reply to the question on *how to connect those who are not connected within the Arab region,* the following analysis incorporates three main parts to define the background and the context of this problem statement: 1) a landscape analysis which delves into the different indicators affecting the problem of digital connectivity within the Arab region, 2) an assessment of other similar existing initiatives linked to the topic of connectivity and the Arab countries, and lastly, 3) an assessment of the different funding mechanisms that this research internship could employ for the realization of its proposal.

5. Analysis

5.1 Landscape analysis

Prior to the design of a program or any project intervention, it is crucial to consider a landscape assessment which will delineate the context and the overall topology of the project. The community landscape assessment helps to define the strengths, resources, and needs of a particular community (National Student Support Accelerator, n.d.). The purpose of this landscape assessment is to delve into the state of digital connectivity within the Arab region, examining key indicators such as broadband penetration, mobile connectivity, digital literacy, and the readiness or adoption levels of emerging technologies. By conducting an in-depth analysis, this assessment aims to provide a comprehensive overview of the Arab region's digital connectivity landscape, offering valuable insights for policymakers, businesses, investors and stakeholders to make informed decisions and formulate effective strategies.

Indicators defining the lack of digital connectivity

Within this framework and to reply to the question as to who is still left disconnected, there are three pillars which will be addressed in the present analysis: affordability, digital literacy, and social factors. In addition, based on the assumption that not being connected is often due to exogenous factors and rarely a personal choice, this report also considers three main indicators that stipulate which are the reasons behind the underdevelopment of some areas in this domain: economic,

social and digital literacy related. These were used for selecting a target group of countries among the Arab region that "best" represent the problem of digital connectivity. For the purpose of this internship research, the indicator of infrastructure —although important— will not be dealt with within the scope of this project proposal firstly because it is considered multidimensional and fairly complex and should be targeted separately, and secondly, because it has been already tackled through many initiatives within the ITU.

Although a national level examination is required to evaluate the general connectivity of each country in the Arab region, a more granular approach is necessary to comprehend the impact of factors such as geography, economic growth, and socio-cultural elements (ex. age, gender, religion, education, beliefs, values, etc.) on specific regions or parts of the population. One common method for investigating these effects is to conduct a thorough examination of the composite sub-variables, as well as analyze any other moderating variable that could alter the relationship between connectivity and the three main categories of barriers examined in this paper.

5.1.1 Affordability

A major factor among the economically motivated hindrances to connectivity is the affordability of having an internet connection, acquiring and maintaining a device, or sustaining an active broadband submission. Affordability constitutes one of the vital elements based on which households or individuals can afford the broadband they need for work, school, healthcare and more. Every income is allocated accordingly to cover several human needs; both individual and common, both vital and subordinate.

Based on Maslow's hierarchy of needs, there are specific levels one must consider for fulfilling all possible needs; from the most basic and primary for survival (i.e., deficiency needs) to the least tangible, more personal/psychological ones (i.e., growth needs) (Mcleod, 2023). Although internet connection is not directly included in any of Maslow's human necessities, it heavily influences –to a different degree– many (if not all) of these intrinsic needs. Under the category of safety for example, personal security, employment, basic resources, health, and property are included and are heavily dependent nowadays on internet-based services. Additionally, if forging deep and strong connections with people means communicating with them through social media or the web in general, as we observed during the COVID-19 pandemic, internet access reinforces or weakens the desired sense of love, belonging and self-esteem, and therefore yield Maslow's third level of needs. Likewise, having the ability to access a solid internet connection may influence considerably the desire one may have for self-actualization. Therefore, even though we often refer to this hierarchy of needs, and our decisions heavily lie on our relative economic power to afford it (considering a finite amount of financial resources), the importance of internet access constitutes a high opportunity cost. Depending on the conditions we live in, this opportunity cost may vary but it surely is considerable for establishing an average standard of living, and therefore its affordability should not be exclusive to some.

Within the context of this internship aiming to deliver social impact to the digital connectivity discrepancies of the Arab world, in particular to economic underpinning, it is important to define

what it is considered an affordable broadband connection. This research is based on the "1 for 2" affordability target set by the Alliance for Affordable Internet (A4AI) for 2026. According to the A4AI, having 1GB of broadband connection to either a mobile or a computer should not exceed 2% of the average monthly national income (A4AI, 2023). This goal sets a threshold below which income is not a barrier to digital connectivity and has a bearing on a bigger initiative to redefine affordability and achieve universal internet access. Initially set to 5% of the GNI p.c. for a 500MB monthly data plan, the affordability target for internet access was aiming to set an income-based benchmark for basic data needs that would allow everyone to successfully access online content. However, research conducted by A4AI has revealed that this measure can be misleading as it fails to consider poverty, income inequality and other factors, such as gender, that may further skew inequalities in earnings, leaving still many unaddressed economic discrepancies for the lower 20% of the population. Moreover, this predefined data allowance plan is considered insufficient to cover a regular use of health, education, and other valuable online tools and information sources stipulated under the (current) needs of the digital era (*Affordable Internet Is "1 for 2",* n.d.). That being so, this affordability target was brought down by the UN Broadband Commission to 2% for 1GB of broadband connection as its predecessor was deemed in many cases discriminatory and insufficient for provisioning solid internet access to everyone regardless of their social status. Even though currently a 2% threshold is a rather ambitious goal for many developing countries around the world, it however allows all levels of income earners, including the bottom 20%, to afford basic broadband connection (see Appendix 1).

Following this principle, and within the effort and ongoing dedication to assessing ICTs for better decision and policymaking, ITU considers an internet access to be affordable when it costs less than the 2% of the average GNI p.c. for the developed countries and 4% for the developing and least developing countries of the Arab region, and therefore calibrates its initiatives to match this sustainability standard. Ergo, the present paper uses this benchmark to compare data on ICT affordability, classify the results produced by the analysis and pinpoint any national or regional shortcomings with respect to internet affordability, ultimately to arrive at meaningful conclusions and pertinent policy and regulatory recommendations that enhance affordability and ensure optimal value for money for the nominated group of countries (ITU, 2022b).

In order to fully grasp the economic implications contributing to digital connectivity deprivation, it was recommended to analyze different indicators drawn from the ITU's Digital Development Dashboard (DDD). More precisely, for the purpose of this research internship, the composite variables that were considered for the definition and formation of affordability barriers were the following:

Indicator	Purpose
Population covered by at least a 3G mobile network (%)	This is to exclude the possibility that a major discrepancy lies on the indicator of infrastructure.
Mobile broadband basket as a % of GNI p.c.	The average cost for mobile broadband as part of the GNI per capita should not exceed 2% for developed countries and 4% for developing countries.

Fixed broadband basket as a % of GNI p.c.	The average cost for fixed broadband as part of the GNI per capita should not exceed 2% for developed countries and 4% for developing countries.
Households with a computer at home (%)	This is to pinpoint if there is a lack of digital devices that can connect to the internet and in combination with the indicator below, to deduce if this is due to affordability issues.
Average price of computers	To define how much in % of GNI p.c. it costs to have the equipment in order to connect to the internet.
Average price of smartphone	To define how much in % of GNI p.c. it costs to have the equipment in order to connect to the internet.
Individuals using the Internet, total (%)	This index is used to establish the internet usage levels given the existing infrastructure
Households with internet access at home (%)	This metric (in conjunction with the previous one on individual usage) serves for estimating the reach/penetration of broadband network into households
Monthly mobile broadband Internet traffic per mobile broadband subscription (MB)	This is to understand the usage and consumption levels of internet connectivity with respect to mobile broadband connection

***Table 2**: Indicators used to define affordability (Source: Author's illustration)*

The aforementioned indicators were investigated individually or in conjunction with each other, to produce useful and meaningful results suited for the purpose of our research, and therefore reply to the question of affordability. Each index was used to measure each economy based on the same metrics so as to ensure international comparability. More precisely, the data collected from these indicators were imported and analyzed in an excel format where tables and graphs were produced. For example, combining the indicator of availability for a 3G/4G broadband connection, given that proper infrastructures allow it on a national level (accessibility), with the indicator accounting for the number of individuals using the internet (usage), will give us an understanding of how many people cannot use the internet. In addition to that, if we take into consideration the two indicators for broadband connection baskets for mobile and fixed devices as % of GNI p.c., we may also define populations not connected to the internet due to economic reasons (i.e.: exceeding the price ceiling set by the A4AI which leads to affordability issues).

According to the Consumer and Governmental Affaires Bureau of the US Federal Communications Commission (2023), internet users that face economic impediments which force them to remain disconnected, often encounter other indirect difficulties that hamper their ability to find attainable and solvent solutions. They may struggle, for example, to find broadband service plans which meet their needs irrespective of their social status. Additionally, they may find

themselves stranded in more expensive or lower quality plans that lead to either financial and technical hardships or even legal entanglements. Furthermore, falling into imbalanced/inequitable contracts with impossible termination fees or convoluted terms that often favor the private internet provider rather than the client. These issues go beyond the affordability barriers as they include social or other elements attached to the ability of someone to receive fair and solid broadband connection.

For this reason, this research internship goes on to consider other aspects, such as digital literacy and social attributes, contributing to the phenomenon of digital divide within the Arab region.

5.1.2 Digital literacy

The second equally important element, when tackling the problems affecting digital connectivity, is digital literacy; the ability someone has to employ a series of basic ICT skills and utilize them for the purpose of the essential computer-based activities (ITU, 2010). Otherwise known as "information literacy" or "computer literacy" is a connected notion that involves equipping individuals with the necessary skills and knowledge to effectively process data and convert it into meaningful information, knowledge, and informed decisions (UNESCO, 2008). With the help of technology, it encompasses techniques for researching and assessing information, aspects of information culture and ethical considerations, as well as the methodologies and ethical practices for communication in the digital realm (ITU, 2010).

However, for ICTs, a basic level of literacy is necessary to utilize the Internet effectively. According to ITU World Telecommunication/ICT Development Report (2010), a significant portion of the global population is unable to access and utilize the Internet and its associated applications in areas like healthcare, education, and government due to illiteracy. This issue is closely tied to education, and in order to further expand ICT usage, universal access to learning opportunities is essential. For those reasons, the ITU is committed to offering equal opportunities to people around the world to acquire the necessary tools and skills and ultimately get connected. To evaluate this market need for specialized training on digital literacy, it was deemed crucial to analyze the current situation with respect to ICT skills and understand its shortcomings.

In this regard, for the purpose of this research internship, the composite variables that I considered for the definition and formation of barriers affiliated to digital literacy were the following:

Indicator	Purpose
Households with a computer at home (%)	This metric was used for comparison of those in possession of a device and its usage
Households with internet access at home (%)	This indicator is helpful for understanding the potential presence of ICT skills

Active mobile-broadband subscriptions per 100 inhabitants (2020)	This indicator serves to understand the actual usage of mobile devices to access internet
Individuals with basic ICT skills (%)	Percentage of the population that are able to perform simple tasks like moving a file or folders, sending an email with an attachment
Individuals with standard ICT skills (%)	Percentage of the population that are at ease working with spreadsheets, creating electronic presentations or installing/configuring a software
Individuals with advanced ICT skills (%)	Percentage of the population that are able to program or code

***Table 3**: Indicators used to define Digital literacy (Source: Author's illustration)*

For an intervention to be meaningful and impactful, ITU suggests that a minimum of basic ICT skills is required. In consideration of that, all three categories of computer skills (basic, standard and advanced) were examined under this research in order to determine which part of the population is found outside of these parameters, i.e., with zero ICT skills, and therefore require aid (ex. training and educational programs). Moreover, I selected to analyze the presence of a device (ex. computer) and broadband connection per household as a proxy for basic ICT skills. There are other variables that could directly or indirectly apply to the indicator of digital literacy, however, the previously mentioned data collected from DDD were deemed to be sufficient for the scope of this research internship.

5.1.3 Other social elements (extraneous variables)

Lastly, there are certain social aspects which can incorporate all the elements that are inapplicable to issues related to affordability and digital literacy. These elements include gender and geographical disparities, cultural beliefs, and other ideologies.

Indicator	Purpose
Female/Male Internet users as a % of total female/male population	This metric was used for comparison of gender-related internet usage
Female/Male mobile phone ownership as a % of total female/male population	This indicator serves to understand the ownership mobile devices to access internet with respect to the general population
Internet users: N years as a % of all N years	This indicator was used to analyze the internet usage based on the different age groups (N: <15 years, 15-24 years, 25-74 years, 75+ years)

Percentage of individuals using the Internet by location (urban vs. rural)	These metrics were gathered to estimate any discrepancies with respect to geographical location
Households with a computer at home (%)	This metric is used for estimating the availability of devices per household (and therefore speculate on a potential training need)

***Table 4**: Indicators used to define other social barriers (Source: Author's illustration)*

Since connectivity policymaking must be gender responsive as well, it was important for this research to focus as well on addressing the digital gender divide. For this reason, I selected to evaluate indicators linked to internet usage and ownership of digital devices under the lens of gender and compare for each country the two numbers corresponding to female and male population.

Moreover, another aspect that reflects discrepancies due to sociocultural factors is the age metric. It is common that people between 15-24 years old are surpassing any other age group in terms of internet usage (ITU, 2021c), however, it is interesting to see how the 25-74 years old group is performing – a demographic that predominantly represents a nation's workforce. According to statistics issued by the ITU, in 2020, the internet usage rate among individuals aged 15 to 24 was estimated 71% globally, while the usage rate for all other older people stood at 57%, meaning 1.24 less likely to be connected to the Internet compared to their younger countrymen. Having access to ICTs earlier in their lives, younger generations present a natural disposition towards their usage and a deeper understanding of technology and its innovation. This positive trend of higher adoption among young individuals offers a fertile surface for digital connectivity to be developed, particularly in regions with a youth-dominated demographic profile like the LDCs, where approximately half of the population is under 20 years old. This implies that connectivity will increase among a country's workforce which will be more technology-adept as the younger generation becomes part of it. Consequently, this has the potential to enhance the development prospects of these areas.

Lastly, the indicator affecting as well in multiple ways the readiness of an individual to get connected is their geographical location. On a global scale, individuals residing in urban regions have double the likelihood of using the Internet compared to those living in rural areas. More specifically, in the LDCs, city residents are nearly four times as likely to use the Internet compared to rural inhabitants, with a usage rate of 47% versus 13%, respectively. Particularly in the Arab region, this gap is indeed pronounced, where less than half of the rural residents are online (42%) compared to their urban counterparts that reach 72% of the overall population – and this is just where data is available (ITU, 2021b) (see Appendix 2). This is not only due to infrastructural discrepancies but due to other cultural and societal reasons affecting people's decisions, and therefore are included under this part of the analysis.

The above elements, together and independently, affect directly or indirectly the flexibility someone has towards adopting new technologies, and actually being able to integrate them in their lives as core elements for their development.

When data on a national level were insufficient or non-existent, I tried to seek information from the primary source – i.e., experts and government representatives of the countries in question. Having already performed a preliminary, desktop research on ITU's available data, this helped me delve into specific national information such as local practices and potential existing initiatives from a selection of countries that showed potential for an intervention. These qualitative interviews were aiming to reply to questions linked to the local consumption practices with respect to Internet connection. (See Appendix 3)

5.2 Assessment of other similar existing initiatives

As digital connectivity continues to evolve and shape the world we live in, numerous initiatives have emerged worldwide with the aim of enhancing broadband penetration, bridging the digital divide, and fostering inclusive access to digital technologies. In the context of the Arab region, it is essential to explore and understand the existing initiatives that have been undertaken to promote digital connectivity, either by local organizations or international agents. These initiatives could vary from purely digital connectivity efforts to generic educational interventions or programs that incorporate ICTs, capacity building programs on women, children, or other potentially underprivileged communities or simply donation and other charitable actions, among others. By examining similar efforts, we can identify replicable models, innovative approaches, and effective policies that can be adapted and implemented within the Arab region. Moreover, the assessment of existing initiatives will help this research gain a comprehensive understanding of the strategies, the potential pitfalls or shortcomings of the existing programs and interventions that have been implemented around the world to enhance the deployment of emerging technologies and their smooth integration for the underdeveloped or least developed countries and regions.

It is important to acknowledge the diverse nature of the initiatives being examined. They may vary in terms of scale, scope, and target populations. Some initiatives may focus on rural connectivity, while others prioritize urban areas or specific demographic groups, such as women, kids or some illiterate parts of the population. Some may address more technical aspects of connectivity (ex. giving away or repurposing old computers to low income populations that cannot afford to buy new ones), whereas others emphasize more on the social aspect of connectivity (ex. targeting schools or collaborating with local organizations that empower women to enter the workforce by giving them the right tools - digital skills) Recognizing the diversity of such social-impact efforts, this research aims to provide a comprehensive overview of a range of initiatives, drawing attention to their unique characteristics, outcomes, and potential applicability within the Arab region.

Due to time constraints with respect to the internship duration, this assessment only replied to a certain degree to the question of evaluating existing efforts on digital connectivity by external (to the ITU) stakeholders. This is because of two reasons: limited amount of data and low impact on the project proposal. Research showed that there is limited to no action systematically targeting the Arab region in terms of digital connectivity (see Appendix 4). This information, albeit scanty, is yet valuable as it underlines a market need for development and a potential for a project proposal such as the one this research is aiming to give.

Ultimately, this brief desktop research contributed to gaining valuable insights that help identify best practices (in other areas of capacity building and social change), learn from the experiences of other regions or countries, as well as identify key players and potential stakeholders for which the CN will be meaningful. Moreover, it gave us an idea of what kind of funding mechanisms already exist, and what potentially could be a suitable option for ITU-ARO's initiative.

5.3 Assessment of different funding options

For the assessment of the funding mechanisms, I have looked into two main approaches: the big donor campaign approach, and the public financing through crowdfunding. Both mechanisms could reflect the nature in which ITU pursues its projects and initiatives, as well as represent the two major categories of investment apparatus international organizations usually adopt.

On one hand, the big donor campaign is mainly a platform that matches supply with demand while tackling particular thematics (ex. Funding for the cholera vaccine). Typical example that I chose to study under this category is the one Gavi, the Vaccine Alliance adopts. Gavi employs a resource mobilization process that includes donor relationships, country ownership, market shaping, and collaboration with various stakeholders. It involves building strong relationships and partnerships with both public and private donors, empowering countries' implementation process, influencing vaccine markets, while collaborating with civil society and other stakeholders (Gavi, 2020a). To accomplish that, Gavi draws a variety of partners that contribute with either technical expertise from the development community, or business know-how from the private sector (Gavi, 2020b). More precisely, for countries seeking support, there is an application-based process, including a predetermined kit, with the analysis, the aims and the purpose for a particular investment. Similarly for investors, there is a resource mobilization process, including detailed supply and procurement roadmaps, short and long-term ambitions for each intervention (ex. for the malaria vaccine, Gavi 2023), as well as the long-term view of how they would like the market to evolve. Similar to the CN ITU uses, Gavi provides a Product Portfolio Management guiding principle to which every project should abide to.

On the other hand, the second funding approach that was assessed in this research was the World Food Program's (WFP) "Share The Meal" mobile crowdfunding application. In their effort to end hunger, The WFP has created a mobile application where they ask for a minimum of CHF 0.80 contribution to end global hunger with the help of everyone. A very user-friendly and intuitive platform aiming to inform people about the existing problems due to lack of sufficient food around the world and incentivize them to make a change. It is mostly based on continuous, incremental donations towards a particular target-based problem (ShareTheMeal, n.d.).

Based on these two models, I have compiled the main elements representing each funding mechanism and how they would translate in the case of our research internship for ITU's ARO.

Big donors' campaign (*Gavi's resource mobilization platform*)	Crowdfunding campaign (*WFP's mobile application*)
Addresses more the complexity of stakeholders and partnerships involved into delivery social impact	Efficient and quick way of funding
Organization and delivery of the project will be spreaded among different partners and collaborating experts	Organization and delivery of the project will heavily be based on ITU
Engages stakeholders directly involved with the problem	Incentivizes and engages more people in a social cause (global "crowd" campaign)
Receives aid from any relevant agent around the world (including the Arab region)	Receives aid mainly from people in developed countries (already accessing mobile broadband internet and with more advanced ICT skills)
Approaches the general problem from a more holistic point of view (touching the politico-economic system/scene)	Ensures continuous support but spread/dispersed in small, segmented amounts (individual contributions via "microdonations" such as monthly charge)
Gathers aid for a targeted intervention (subject-based funding)	Divides aid into a regional-based interventions (destination-based funding)

***Table 5**: Comparison of the two funding options (Source: Author's illustration)*

After thorough consideration, the CN, and therefore the project proposal, will be based on Gavi's model of big donors' campaign which combines a variety of partners to support a specific project via resource mobilization. In essence, it proposes a platform that draws both technical expertise of the development community and market knowledge from the local community, and creates a network of communication between the different parties, bridging the demand (individuals, schools, civil societies etc.) with the supply (governments, NGOs, companies etc.).

6. Key findings

Having analyzed the three main variables affecting digital connectivity, I was able to define the problem (size, location, relevance, key factors, etc.), as well as the needs (main beneficiaries, type of ideal intervention). More precisely, the landscape assessment allowed me to exclude Arab countries that were already outperforming the minimum connectivity requirements in most, if not all, three levels: affordability, digital literacy and social barriers. These countries were often among the most developed within the Arab region, with solid economies and stable political scenes. However, there were several cases of countries which were varying in the performance indicators, showing partial need in some of the three levels, without being entirely disconnected. For the benefit of this research internship, and in favor of clarity and intelligibility, the following findings

and data appearing in the graphs are ranked according to importance or magnitude of each indicator (and not necessarily in alphabetical order), so that results are meaningful towards the question we are seeking to reply to; who are the least connected among the Arab region, why and how we can tackle this.

Overall, countries that are part of the LDCs are usually underperforming in many of the indicators or have insignificant data with either outdated information or no information at all. Although outdated or no information was not helpful to make conclusions, it was however a significant indicator for lack of dedicated equipment (i.e., computers) and/or weak monitoring system, both of which impede the development of the digital scene and require adequate intervention.

6.1 Affordability

With respect to the question of economic viability for someone to get, and remain connected, various indicators were examined and used in conjunction to conclude which countries predominantly/consistently are falling behind in the race of connectivity. Overall, the results showed that only half of the Arab countries are actually below the A4AI threshold for affordable broadband connection (i.e., less than 2% of the GNI p.c.), with four countries (Sudan, Djibouti, Comoros, Yemen) exceeding the 4% allotted for the developing countries, and another two not providing any results for that matter (Syria and Somalia) (Figure 1).

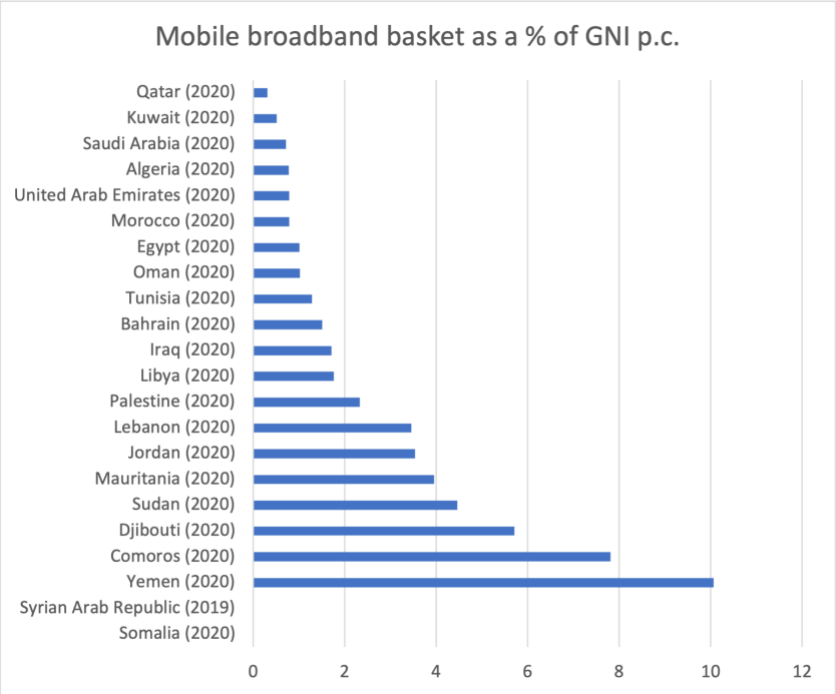

***Figure 1**: Results of the indicator for mobile broadband basket as a % of the GNI p.c. (Source: Author's illustration)*

Although internet access is relatively well distributed among the Arab region, with more than half (15/22) of the Arab countries providing at least a 3G mobile connection to the majority of their population (more than the 80% of people have well-equipped networks and adequate

infrastructures to accommodate and cover the needs for connectivity), there are still countries left struggling to cover even half of their population with sufficient internet connection (Figure 2). Intuitively, for countries like Mauritania or Palestine, making Internet access more affordable will not solve the problem for everyone, if they do not have the right infrastructures.

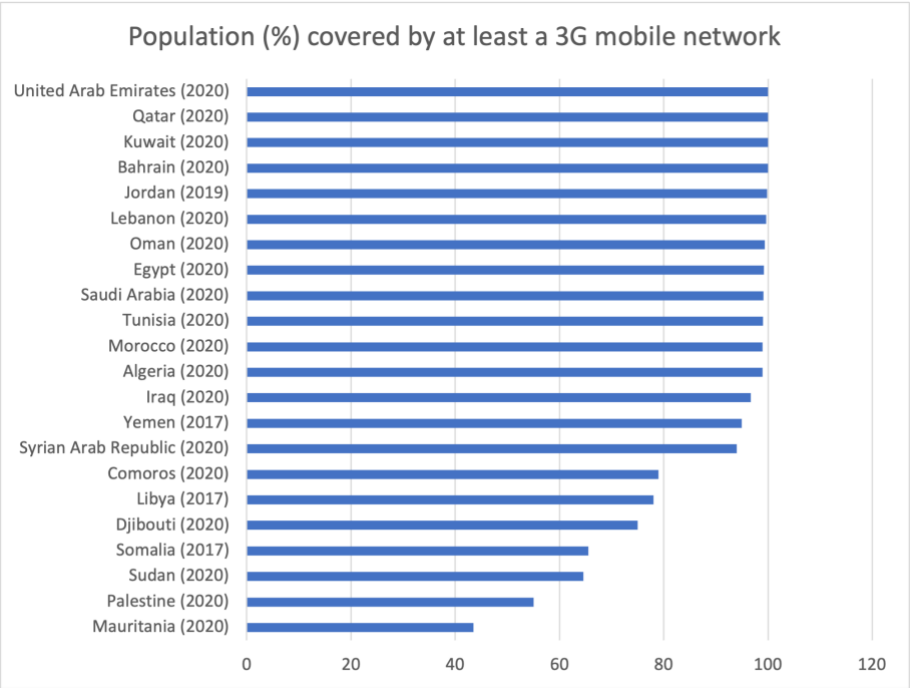

***Figure 2**: Percentage of the national population connected to a 3G mobile network: Results and Findings (Source: Author's illustration)*

On this basis, if we combine the above indicator with how many of the individuals are using the internet per country (Figure 3), we could estimate the connectivity levels of each country (Figure 4).

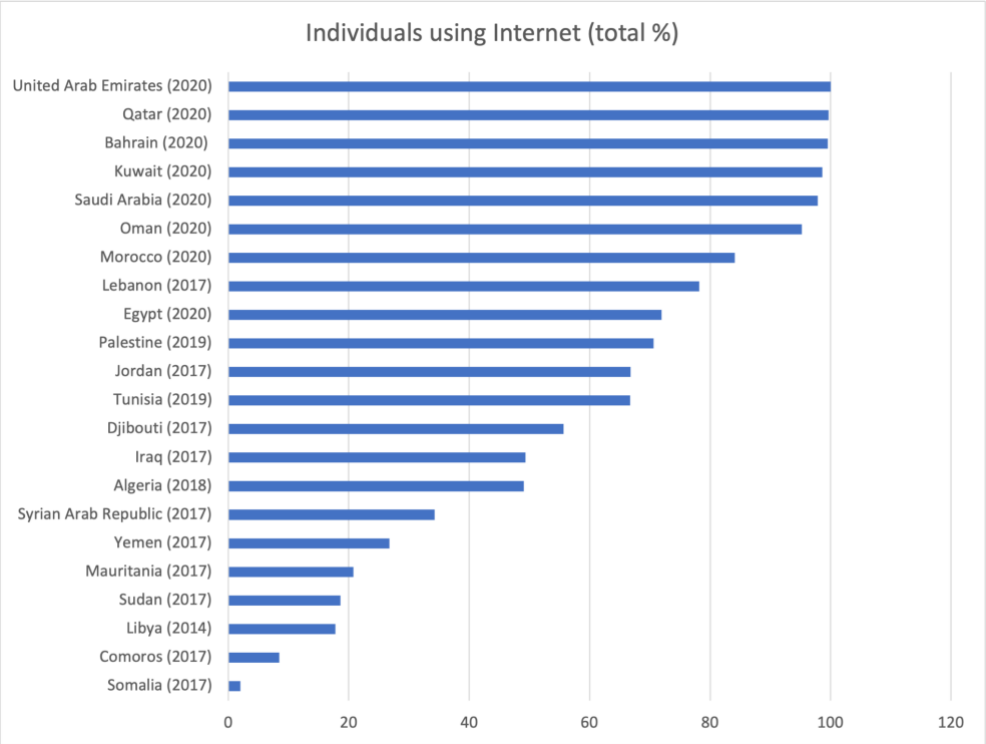

***Figure 3**: Total percentage of individuals using Internet per country (Source: Author's illustration)*

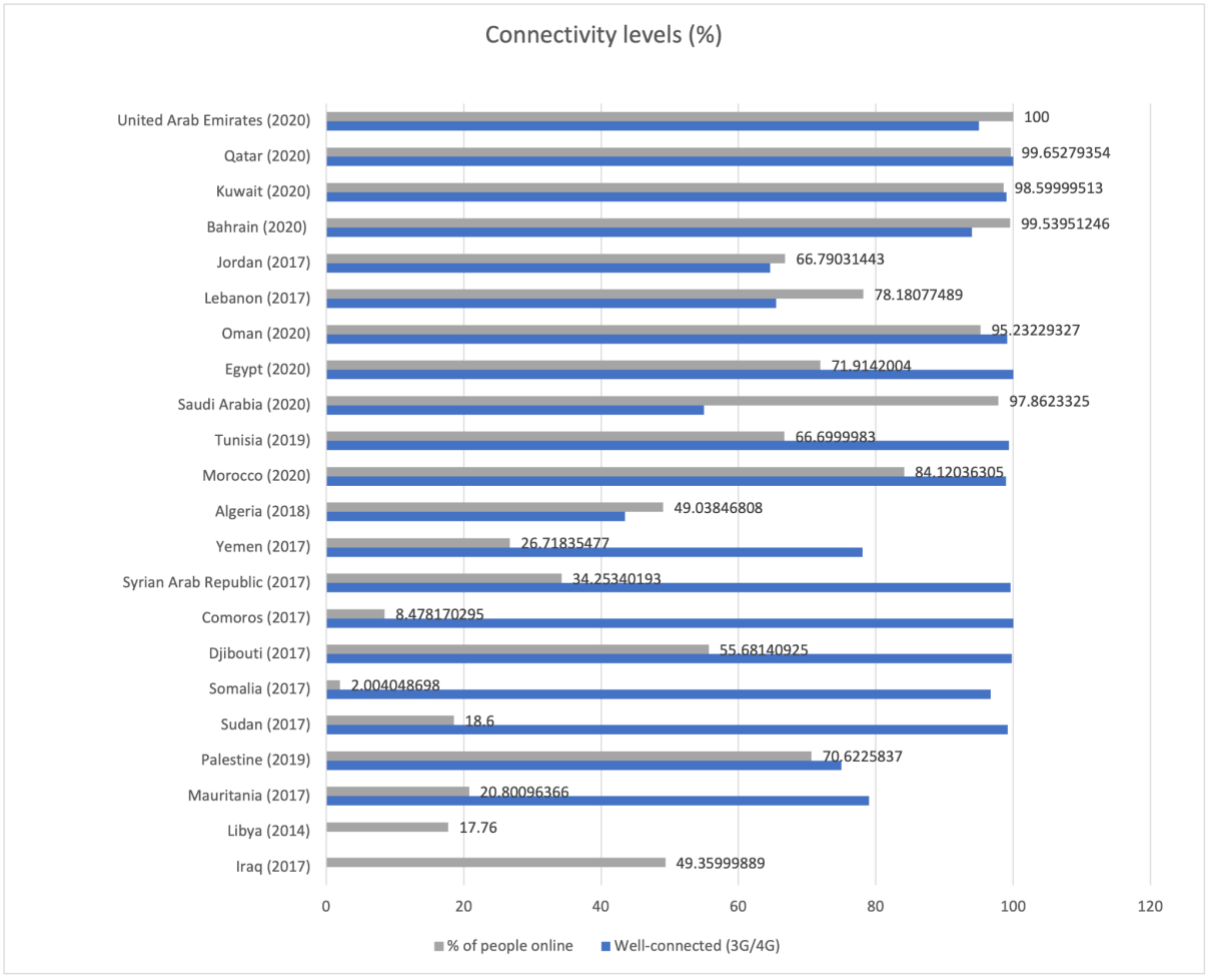

***Figure 4**: Total national connectivity levels (Source: Author's illustration)*

In fact, the majority of developed Arab countries exhibit excellent performance in terms of the availability and utilization of broadband connections. However, for most developing countries, the existence of 3G or 4G connection is not the only ticket for people to go online. Countries like Somalia and Comoros seem to have significant barriers to connectivity that are irrelevant to infrastructure – and most probably linked to affordability (as data has shown previously). Similar potential for intervention showed as well countries like Sudan and Mauritania, that provide generally a sufficient level of Internet connection; yet the majority of their population remains disconnected.

6.2 Digital literacy

Based on the provided data, there are big variations among the Arab countries with respect to ICT skills both on an individual level, as well as within the context of a household. More precisely, countries like Sudan, Palestine, and Djibouti have relatively lower percentages, while countries like Saudi Arabia, United Arab Emirates, and Bahrain steadily outperform in all of the sub-categories. When comparing the percentage of individuals with basic ICT skills, there is a similar pattern. Sudan, Palestine, and Djibouti have lower percentages, while countries like Saudi Arabia, United Arab Emirates, and Bahrain have higher percentages. The percentage of individuals with standard ICT skills also follows a similar trend. The overall percentage of individuals with ICT skills varies across countries. Some countries have null or missing values for this indicator, such as Libya, Lebanon, Jordan, Mauritania, Yemen, and the Syrian Arab Republic. As far as the percentage of households with a computer at home is concerned, numbers are again very low for countries like Yemen (8%), Comoros (approx. 9%), Sudan (12%), and Mauritania (15%). Equally low for those countries is the percentage of households with internet access at home with Yemen reaching only 9% of its households, Sudan with 15%, and Mauritania 20%. Comoros also faces challenges in terms of internet access at home, with an estimated percentage of households having internet access at around 13%. In terms of active mobile-broadband subscriptions, among some of the least performing countries in the Arab region we observed Yemen (15%), Sudan (25%), and Mauritania (30%). Comoros has a relatively low percentage, with an estimated value of around 17%, suggesting as well limited access to mobile internet services.

Based on these statistics, we may conclude that countries like Yemen, Comoros, Sudan and Mauritania face significant challenges in terms of computer access at home, with only a small percentage of households having access to computers. To further support this, the low percentages of internet penetration in households further exacerbate the digital divide among those countries indicating limited opportunities for online connectivity and information access. Last but not least, these countries in the Arab region have relatively low percentages of active mobile-broadband subscriptions, supporting once more the hypothesis of critical levels of digital illiteracy. Therefore, bridging this gap can be crucial in promoting digital inclusion and expanding digital opportunities for the population.

The availability of enablers (such as computer ownership, internet access on a household level, basic ICT skills, etc.) and the affordability of ICT prices can influence the development and accessibility of ICT skills in a country. Some countries have higher levels of ICT skills and better

enablers, while others lag behind. This indicates the need for efforts to bridge the digital divide and promote ICT skill development in less advanced countries.

It is also important to note that these conclusions are based on the provided data and may not capture the full complexity of the situation. Further analysis and contextual information would be needed for a comprehensive understanding of the ICT skills landscape in the Arab States region.

6.3 Other social aspects

Under this part of the analysis, there was a lot of missing data. Most of the indicators available from ITU's DDD, were only partially giving useful information that could reply to questions of gender, age and geographical predisposition with respect to digital connectivity. In many cases, the available information was coming from countries that already rank pretty high in all the other indicators and do not present challenges with respect to digital divide.

First, data focusing on different age groups suggest that most of the listed Arab countries have relatively high internet usage rates, particularly among younger individuals (15-24 years). This indicates a positive trend in digital development and access to the internet. However, the data gaps for older age groups highlight the need for improved data collection efforts to gain a comprehensive understanding of digital inclusion and usage patterns across different demographics.
Secondly, with respect to information on female and mobile phone ownership, data from Comoros, Jordan, Lebanon, Libya, Mauritania, Somalia, Syrian Arab Republic and Yemen are not available, indicating a lack of information on both female and male mobile phone ownership in the country – five out of eight of those are countries with repeatedly low or no data. Among the countries with available data (Bahrain, Morocco, Oman, and Saudi Arabia), are mostly developed countries that consistently show relatively high rates of internet access and usage. However, one element worth mentioning with respect to gender is the clear disparity between female and male users (Figure 5). Indeed, data reveals that the former consistently attains lower rates of mobile ownership for national female population's, ratifying once again the imperative need to bridge the digital gender gap in order to comprehensively attain digital connectivity across people and across Arab countries.

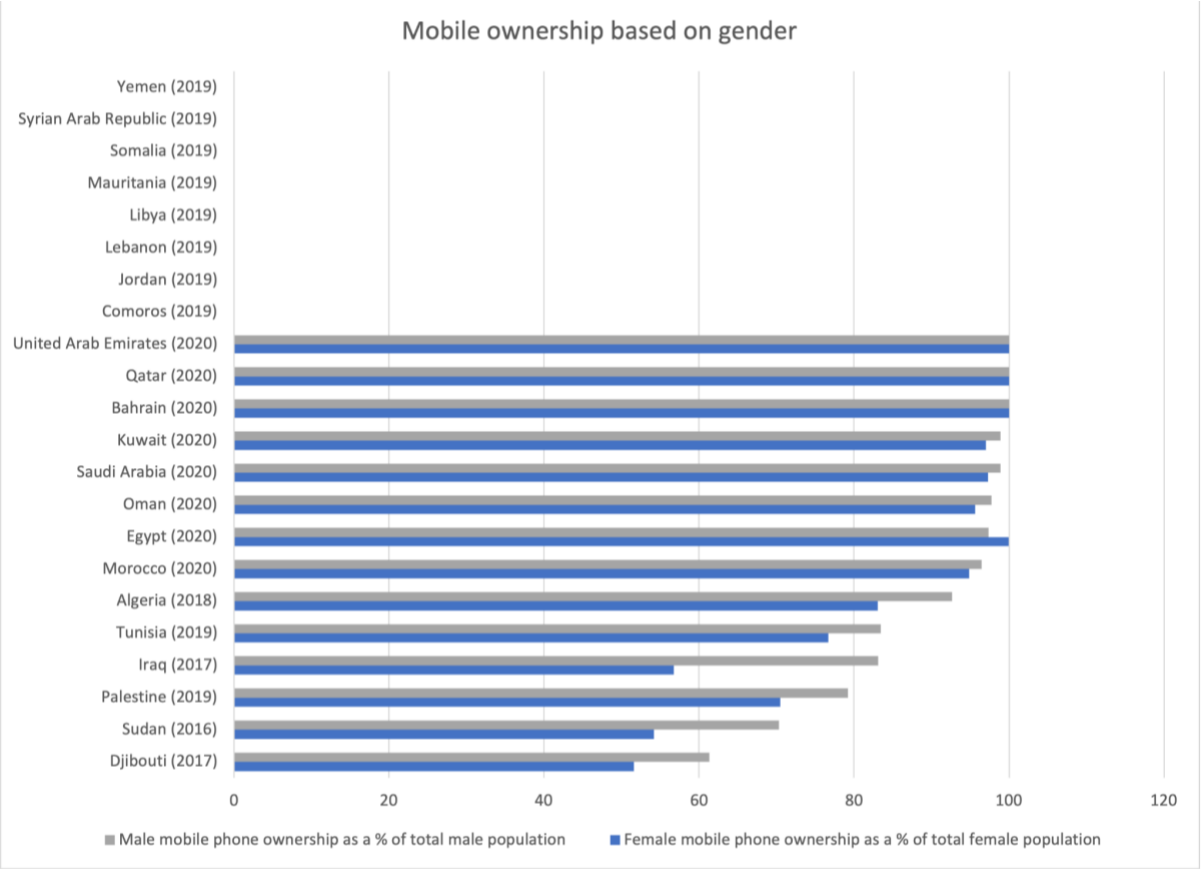

***Figure 5**: Percentage of mobile ownership by gender (Source: Author's illustration)*

Overall, these statistics highlight the existing digital disparities among Arab countries, with varying levels of mobile phone ownership between men and women, Internet usage between different age groups, and internet access based on geographical location. While some countries demonstrate higher ownership and usage rates, indicating improved access to mobile technology and communication for several members of their population, others exhibit lower rates, suggesting limited access and potential digital divides. Bridging these disparities requires targeted efforts to enhance digital infrastructure, affordability, and access to technology and mobile services, particularly focusing on countries with lower ownership rates.

6.4 Target group - Final beneficiaries

Based on the previous analysis of the results, and with reference to the aim of this research internship, I was able to form the target group that corresponds best to the purpose of the project proposal. More precisely, according to the latest data of ITU DDD, five are the countries that are found to least perform in all of the variable we have analyzed:

Country	Affordability		Digital Literacy		Social aspects	
KPIs based on 2020 estimates (out of 22 ITU members)	**Population covered by at least 3G mobile network (%)**	**Mobile broadband basket (% of GNI)**	**Individuals with basic ICT skills (%)**	**Active mobile-broadband submissions per 100 inhabitants**	**Gender disparity (%)**	**Geographical location (urban-rural areas)**
Comoros	79 (16/22)	7.81 (19/22)	No data	60	No data	No data
Djibouti	75 (18/22)	5.82 (18/22)	16.82	24	8	No data
Mauritania	43.5 (22/22)	3.95 (16/22)	No data	62	No data	No data
Somalia	65.5 (19/22)	No data (21/22)	No data	3	No data	No data
Sudan	64.6 (20/22)	4.46 (17/22)	3.32	42	6	No data

***Table 6**: Least connected countries based on the three indicators: Results and Findings (Source: Author's illustration)*

Although there are some other countries that meet the criteria of least connected populations, due to their political instability and reoccurring civil unrests, countries like Libya, Syria and Yemen are deemed unsuitable for the purpose of this project's realization and feasibility, and therefore are excluded from the project's intended focus group.

Based on the above findings, the five ITU members either emerged as the countries with the lowest performance in terms of achieving connectivity, or their lack of meaningful data implies the absence of such support or review mechanisms, and therefore display a need for adequate intervention.

To complete this information with more local data, the additional qualitative interviews that were executed with governmental agents and experts on the matter of ICTs and socioeconomic development, helped underpin any missing information and reveal nation-specific particularities and barriers to connectivity. Due to the scarcity of our resources (limited time to find, contact, arrange a meeting with the interviewees, to execute interviews with connections and finally draw meaningful conclusions) and the particularity of the existing situation, only these five countries were targeted for further examination and research, and thus, their representatives were contacted for an arranged meeting. Unfortunately, only two of the representatives (Comoros and Djibouti) reacted to our request and agreed to provide answers to our questions – to the extent possible. Given this, the process reaffirmed the complexity of the problem and the difficulties each country

faces to reply to those questions, and identify the barriers linked to connectivity. The outcome of these interviews was of high significance and weight, and not only revealed details of the consumption habits of the local populations, but also helped to make the final decision regarding the ideal pilot country for the project proposal (*Further details regarding the content are exhibited in the following Section 7.3*).

7. Proposed solution

7.1 Role of the ITU in the project proposal

Based on these findings, the five countries in question are underperforming in many of the indicators yet hold great potential for development. This project proposal chooses to tackle these reasons and to form the basis of a project intervention that will respond to those unfulfilled needs and turn these deficits into engines of digital growth.

More specifically, the project proposal this research internship proposes:

- Combines the role of ITU as a development-enabler organization in terms of global ICT growth with local authorities' experience and expertise in this domain.
- Takes advantage of ITU's involvement and experience in pre-existing nation-based interventions and training.
- Explores and analyzes the kind of intervention that is of most value, and ITU and other stakeholders (including policymakers, analysts, governmental authorities, businesses, organizations) can provide.
- Engages with potential users and civil society organizations to evaluate the development of specific indicators with respect to digital growth and their willingness to change.

Therewith, the combination of these elements forms a project proposal whose output is expected to help both country members and ITU to better define and estimate the groups of people that need ICT aid, and to develop a program that connects various stakeholders (public-private, national-international, CSO, governments, policymakers, ...) efficiently towards a common goal; tackling the digital divide.

7.2 Mode of intervention

Taking into consideration the above elements (strengths, weaknesses, opportunities), the best way to respond to the main problem is by tackling the lack of dedicated equipment, the lack of awareness and general support, and sociocultural barriers hindering the change. This project will address issues related to affordability (i.e.: buying and maintaining a computer, paying to acquire the specific skills to use the devices and access ICT-related activities) and social elements (i.e.: limited access due to gender/age/location etc.). As a result, this internship research suggests that the ARO of ITU should establish a platform to facilitate knowledge exchange and foster collaboration among stakeholders. This initiative aims to cultivate a spirit of cooperation and enable the acquisition of valuable insights from global experiences in the realm of digital connectivity.

This will directly benefit the people, who will have access to a device (ex. smartphone, tablet or computer) and basic individual ICT skills (to use the device and connect themselves), as well as, policymakers, data producers, relevant Civil Society and Non-Governmental Organizations by guiding them towards the precarious parts (i.e., specific groups, areas) of the country's population.

It will also provide recommendations on:

- Which and what kind of intervention (i.e.: donation of equipment or training programs) is more adequate with respect to the digital development country's profile,
- How and when this will be implemented,
- How it will measure its evolution and impact, and
- When it should be terminated.

Lastly, the CN also includes a budget estimation for the project team, ensuring adequate provisions for the resources required to undertake the project. This estimation is formulated in accordance with the relevant guidelines provided by the ITU (see Appendix 5).

7.3 Pilot country context

For the purpose of international comparisons, global indicators have been constructed by various institutions, notably the United Nations, the World Bank and the ITU, and by associations such as the GSMA or private companies that conduct benchmarks based on specific measurements. Ergo, the development of each member state depends on the nation's performance and adherence to these basic indicators, which form their basis and require regular review.

In the case of Comoros, some of these indicators have been deficient in recent years, absent, inaccurate, or not updated. As a result, some indices have not been calculated for Comoros. The others are often tainted by the uncertainty that characterizes certain basic indicators.

To begin with, and for the purpose of the research internship, this report conceptualizes a pilot project focused on the Comoros. More specifically, it explains the current geopolitical and socio-economic situation, how this influences the ICT development in the country and how it appoints Comoros as an ideal starting point for the pilot project.

Comoros is among the smallest countries in the world, and the smallest in the Arab region. However, due to its geographical formation, it entails some barriers with respect to connectivity and solid internet access. According to the expert interviewed from Comoros, Youssouf Soulé, Head of Administration and HRM - ANRTIC, before the era of competition between concentrated internet operators, the connection was almost everywhere. Now it is mainly focused on the most concentrated areas, i.e., the urban areas, where the great population lives in the agglomerations. This leaves a big part of the local population unconnected. Moreover, accessing electronic devices is another big obstacle. According to the Head of Department Development and Promotion of ICT in Comoros, the market is very restricted and reflects the resources of the population which are also very limited. There is no ICT registration service for the electronic devices and prices may vary among each trader (ex. 20-550€). (Soulé, 2022)

On the other hand, based on ITU's ICT Regulatory Tracker, this index improved significantly in 2016 for Comoros with the effective opening of the sector to competition, and the assumption of responsibility for this competition by the sector's regulatory authority. With an overall score of 82.3 in 2018 (sum of the scores of the four components) out of a maximum of 100, Comoros ranks very favorably as the country that has made the most progress in the world from 2007 to

2018, going from a score of 7.5 in 2007 to 82.3 in 2018. This shows great potential for development and impact creation if a project as this one gets to be realized in the country.

Therefore, Comoros constitutes an ideal case for a pilot project. However, once the project is established, this Concept Note suggests its extension and application as well to the rest of the countries listed in the table above.

7.4 Financing model

To better match the aims of this project, it was indicated by the research to choose a "big donor" campaign to support the needs of its implementation. This suggests the creation of a platform where all device and training related requests linked to connectivity will be shared and matched with donor agencies to form multi-stakeholder partnerships. This platform will include the following elements:

Elements included	Input	Output
Application process	Each country seeking digital support can formally declare it via the platform's "request for intervention" option	Available and relevant stakeholders that can respond to the demand for intervention
Method of intervention	This includes all elements needed/requested (ex. Number of devices, type of training, follow-up)	Provide support (financial or material) for the specific request (ex. RM)
Analysis	Under which conditions will the intervention take place	This will provide the background and context about how funding will translate into action
Scope	Describes the urgency and importance of such intervention	Future impact

***Table 7**: Elements included in the platform for cooperation based on the project proposal (Source: Author's illustration)*

This financial model will be similar to the one GAVI uses for its resource mobilization process. It easily identifies mechanisms that each sub-project will be in need of, and can match supply and demand in a shared platform.

The advantages of this approach are:

- It better addresses the complexity of stakeholders and partnerships involved in delivering connectivity
- It can tackle issues over the general politico-economic system
- It ensures direct major funding for the launch and maintenance of each project
- It maps and connects all contributors via a centralized platform that better facilitates communication and monitoring over the set objectives

Moreover, this consolidated platform will provide an overview of the specific project's aim, ongoing state, and evolution of the process (life cycle of the project). It will also ensure transparency and precision as to what is the status of its intervention and its impact so far.

7.5 Implementation strategy

To develop a project that fits the ITU Arab Regional Office's goal on connectivity, this report proposes the following activities developed phase by phase as follows:

Phase	Action
Phase 1: Pilot project in Comoros	Select a specific target group (ex. Schools in rural areas), find donors, and connect them with the relevant parties, NGOs and CSOs. Start small and then grow – easier to measure the result and create impact. Ex. Donate 1 device with training kit per family in a rural area to maximize the use and engage all family members.
Phase 2: Expand to other LDCs within the Arab region (pre-selected countries listed above)	Learn from experience of the pilot project and open the project to LDC countries with similar needs and situations with respect to connectivity. Expand the donors' pool and involve more CSOs and local actors. Increase the device and training capacities, and formalize pre-downloaded content for digital skills acquisition depending on the target group.
Phase 3: Expand in other LDCs around the world	Possibility to introduce a program to train the trainers. Expand the donors' platform to a more global one where project-requests on the topic of connectivity and device donation will come from around the world and be exhibited for funding.

***Table 8**: The different phases of the implementation strategy (Source: Author's illustration)*

Every pilot case should address existing agreements, and include essential elements as shown below:

***Figure 6**: Illustration of the project proposal (Source: Author's illustration)*

7.6 Sustainability

At each pilot phase, the yield country reports are expected to provide policymakers and relevant stakeholders with specific information on which are the segments of a population most in need, why and what are the concrete steps on how to implement a meaningful intervention based on key indicators. An overall project report (forthcoming) will summarize the main findings from the pilot projects and make recommendations on how countries and ITU could use the results of the pilot studies for their ICT development initiatives.

The goal is to create an ecosystem where stakeholders of various backgrounds can easily communicate, forge partnerships, and address connectivity problems systematically on the basis of pre-existing case studies.

8. Discussion

In the beginning, the internship was calibrated towards the idea of a computer donation (as means of social-impact intervention), with the idea of a complementary training kit as reinforcement to those in need. This was mainly to tackle the problem of accessibility and affordability to get connected, with additional ICT support. However, the question of digital dis-connectivity was deemed far more complex than a simple device with education package distribution. Research showed us that it is hard to predict and identify the parts of a population that are currently lacking in means for accessing ICTs and the kind of form of intervention that is best suited for their needs. In many cases, the incomplete database with a lot of missing and insufficient information only gave a partial image of the actual situation, and therefore led to inconclusive results/verdicts. Moreover, it is often resource-intensive to review and continuously assess the evolution and progress of any kind of intervention, especially on such a large national and regional scale. Consequently, adopting a more collaborative approach, involving different stakeholders, both local and global, public and private, was thought to best target the beneficiaries in question, with the most suited kind of intervention, and for the rightful amount of time.

An element that was not sufficiently developed under this research, is the evaluation of readiness and willingness of the local communities to adopt new practices (i.e., their incentives to acquire a device, their motivation to learn how to put it into use both for their personal and professional benefit etc.). The lack of certain data with respect to social and consumption practices, digital literacy and other barriers with respect to culture, could be investigated further with the help of targeted surveys and structured focus group interviews. In the case study, by proxy linked to this, we got to reply to some of these questions through our targeted qualitative interviews with governmental agents from Comoros and Djibouti. This was a particularly rich experience that provided us with crucial information for our decision making and the formation of an adequate pilot project.

Moreover, the construction of a concept note, as the key outcome of my internship mission, helped me better understand the receiving end and "helping hand" of such a project proposal. As with every social-impact intervention, funding is crucial for moving forward to the realization of a project, program or policy. Therefore, forming a correct guide, that will "speak the language" of the funding agency, and yet underline all the essential elements and important rationales that are required for convincing the relevant stakeholders to be involved and commit to participate, was an equally important dimension (and lesson) from this research internship. In fact, one of the most reformatory learning experiences was the exercise of approaching a research question, constructing the main problem and key elements from scratch, and then working on building the core essence of our goal: a project proposal that helps connect those who are still not connected. In this journey, I was glad to be joined and accompanied by my supervisor Karim Abdelghani, who not only guided me through the process, but also opened the dialogue for brainstorming, reviewing certain trajectories, and exploring other approaches that could compensate the lack of certain data and ultimately benefit the research (such as the qualitative interviews). In general, this maieutic method was very insightful, and helped me experience first-hand the full process of a project proposal (in the form of Concept Note) and public policy intervention.

Finally, another element that is worth mentioning, and heavily linked to the previous key takeaway, was establishing a clear scope of work, acknowledging the limitations of an internship, and understanding what's feasible and what is not. Within the timeframe of a semester, it was improbable to perfectly respond to all questions and collect the complete information required to make a well-rounded, in-depth proposal. Understanding what kind of information to look for and identifying where to collect such information, was one element. Prioritizing and relativizing was another, equally important for moving forward with the available data and resources that were accessible in the moment. However, if more time and resources were available, it would have been beneficial to conduct further research and analysis on the readiness and willingness of selected countries or regions to take part in this project proposal, as well as on tracking and monitoring the improvement of connectivity in the Arab region. This would enable a more detailed understanding of the specific challenges and opportunities and inform the development of effective strategies for bridging the digital divide. Future studies with expanded timeframes and resources could delve deeper into these areas, leading to more robust recommendations and solutions for promoting universal access to ICTs and fostering socio-economic development.

9. Conclusion

This research focused on two aspects for tackling the digital divide and the ability someone has to get connected: being able to acquire and maintain a device that can connect to the internet and knowing how to use it. There are several variables affecting the level of Internet connectivity one can attain within the Arab region, and these may include affordability, digital literacy and other social factors. Affordability, for instance, is critical as the cost of devices, internet services, and data plans can pose significant barriers, particularly in low-income communities and developing countries. Digital literacy on the other hand directly affects the capacity someone has to employ the available technology, making it futile to access certain goods and services that benefit both personal and professional aspects when lacking basic ICT skills. Additionally, geographical location can impact access to reliable internet infrastructure, with rural and remote areas often facing challenges in connectivity. Social factors also contribute to the digital divide. Age, gender, education level, and socio-economic status can influence individuals' access to and proficiency with digital technologies. Marginalized groups, including elderly populations, women, people with disabilities, and those from disadvantaged backgrounds, may face additional barriers to digital inclusion.

Indeed, research has revealed significant disparities in digital connectivity among Arab countries due to these factors, highlighting the presence of a digital divide. Bridging the digital divide is therefore crucial for promoting equity, social inclusion, and economic development within the Arab region, and in general around the world. By advancing these aspects, countries can address any digital disparities that may face, facilitate equitable access to technology, enhance digital inclusion, and ultimately, lead their populations in the digital era.

The lack of meaningful data and the scarcity of resources from certain countries, however, limited the effort to determine the exact size or degree of the population suffering from the problem of connectivity, emphasizing the complexity and difficulties faced in addressing the digital divide.

To reply to the question of "how to connect those who are not connected in the Arab region", this research supports the development of a project proposal addressing the underperformance of five countries (Comoros, Djibouti, Mauritania, Somalia and Sudan) in several digital growth indicators by tackling the lack of dedicated equipment, awareness, general support, and sociocultural barriers contributing to the digital divide. Efforts such as Public Private Partnerships (PPPs) and collaboration between governments, NGOs, IGOs (like the ITU), and the private sector are often necessary to achieve comprehensive solutions. Ergo, the project intends to leverage the role of the ITU as a development-enabler organization and the expertise of local authorities in the field of ICT. It seeks to foster knowledge exchange, partnership and collaboration among stakeholders, guiding policymakers and relevant organizations in implementing interventions that bridge the digital divide. The aim is to create a sustainable ecosystem that promotes effective interventions based on identified needs and enhances connectivity on a broader scale.

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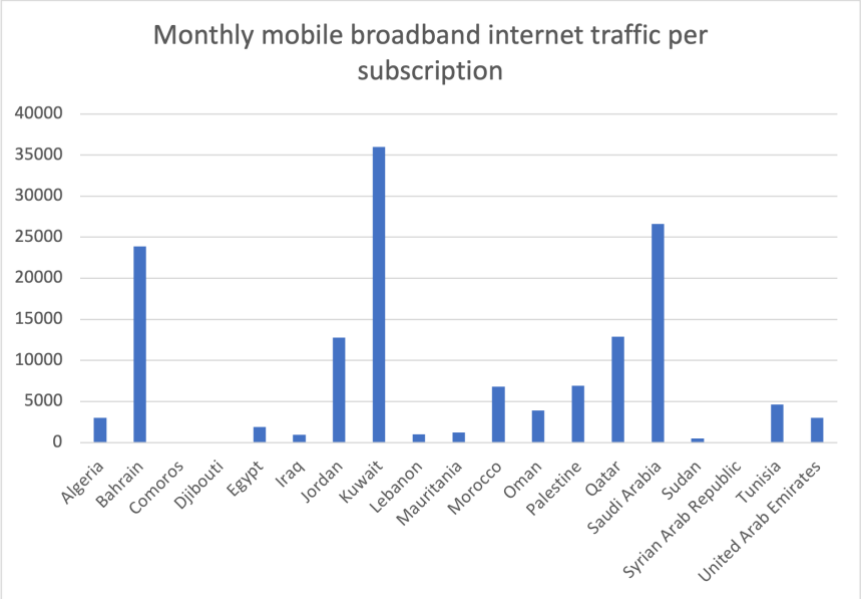
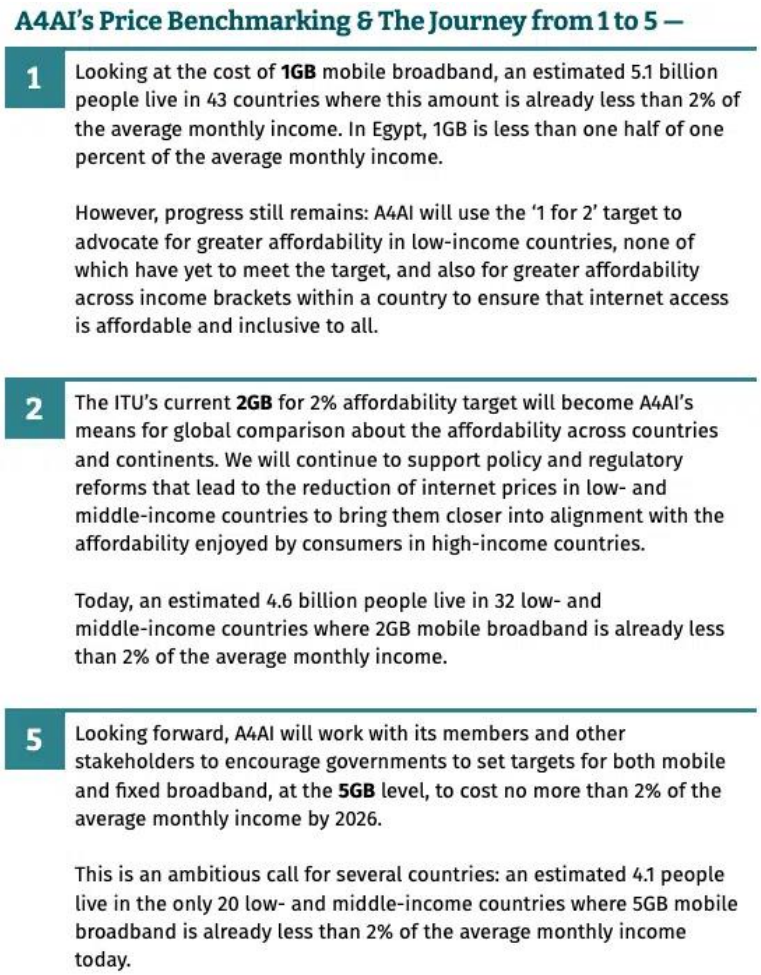
Appendices

Appendix 1. Remarks to Affordability

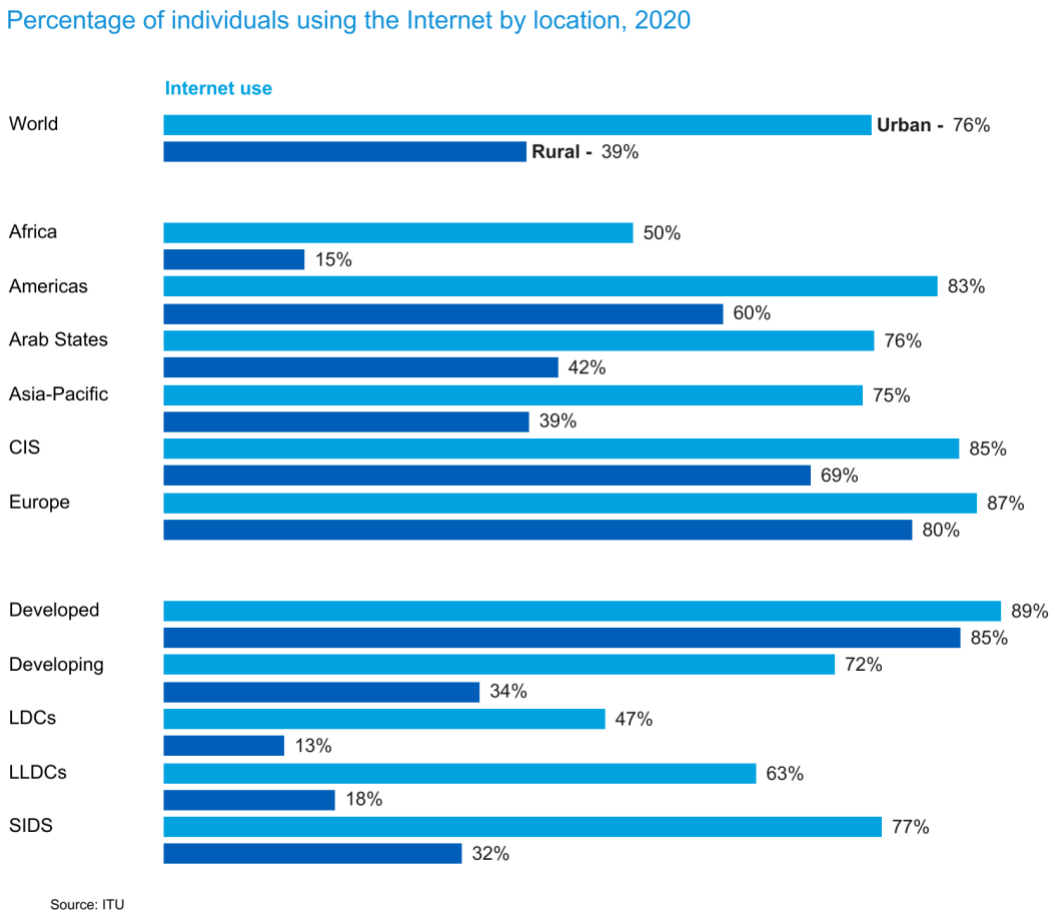
In the context of social sciences, a widely used benchmark for affordability measurements is the GNI per capita index. With reference to broadband affordability, this index translates to an "entry-level" data plan (i.e., 500MB) for a price inferior to 5% of the average monthly income (GNI per capita). However, research conducted by A4AI has revealed that this measure can be misleading as it fails to consider poverty, income inequality and other factors such as gender that may further skew inequalities in earnings. To illustrate this point, the A4AI takes the example of South Africa. The average income in 2014, measured by GNI per capita, was $6,790. However, a significant 60% of the population actually earned less than half of that amount. Consequently, what may appear to be an affordable mobile internet connection (accounting for 1.48% of the "average" monthly income) could actually cost the majority of South Africans anywhere between 6% to 19% of their income. The concept of a national "average" income is further distorted by gender disparities in earnings, with women globally earning 30% to 50% less than their male counterparts. Consequently, a country may meet the 5% affordability target, yet still have a substantial portion of its population unable to afford internet access (*Affordable Internet Is "1 for 2",* n.d.).





Undernote to the picture:
The progression "from 1 to 5" centers around the affordability of data across three different tiers - 1GB, 2GB, and 5GB. This approach facilitates governments' strategic planning to lower connectivity expenses and ensure widespread availability of affordable broadband prices worldwide (*Affordable internet - journey from 1 to 5*, 2022).

Appendix 2. Comparison between urban and rural internet use



Appendix 3. Qualitative interviews with experts

For the purpose of completing the missing data and consequently being able to reply to the question of socio-economic barriers that influence nation-based Internet consumption, I prepared interviews with governmental representatives, experts on the matter of ICTs, connectivity and socioeconomic development, from the countries of Comoros, Djibouti, Mauritania, Somalia and Sudan.

Here is the set of questions asked:

1. *What is the current status of digital development in [country name]? Could you help us specify the local demand for digital needs (i.e., specific regions within urban/rural areas, focus groups with particular social background, etc.)?*

2. *Do you happen to have statistics with respect to those who are not connected to the internet: where they are located and why they are found in this position (i.e., economic, social, or other reasons)?*

3. *In your view, what constitutes the biggest challenge for people to get connected in your country (affordability, digital literacy, infrastructure, etc.)?*

4. *What would be the average cost of a smartphone and a tablet in your country? Based on the World Bank's database, the GNI p.c. in [country name] for the year 2020 is XXX USD and people are already paying Y% of GNI p.c. for mobile broadband subscriptions. According to Alliance for Affordable Internet (A4AI), this is significantly above the 2% of the GNI p.c. average cost for affordable internet as it has been established as a global target.*

5. *If we are to launch a project that helps people to get connected by donating devices and/or relevant educational material, who are the national stakeholders that could contribute to this initiative? Are there any specific NGOs or CSOs that focus on closing the digital gap and are active in the local area?*

6. *In your country according to ITU statistics, Z% of people are still not online. Do you think that an initiative aiming to bridge the gap between the demand for connectivity and the offer of devices and suitable/adequate digital training, might resolve the problem of lack of connectivity?*

Appendix 4. Assessment of other existing initiatives

In an effort to bridge the digital divide and enhance access to education, several organizations and initiatives have emerged worldwide. The following initiatives are the most representative for the purposes of this research as they strive to provide technology resources and educational opportunities to underserved communities, few of which account for the Arab region as well (albeit insignificantly).

Initiative	Nature	Purpose	Focus group
Labdoo (https://www.labdoo.org/en/)	Non-Profit NGO	Takes donations of used laptops, sanitizes, erases data & installs the education software (edubuntu - open educational resources) Recycles laptops when don't work anymore Intervention based on request/demand	Children and schools around the world (no intervention so far in the Arab region)
Close the gap (https://www.close-the-gap.org/)	International social enterprise	Offers high-quality, pre-owned devices donated by European companies Focus on educational, medical and social projects in developing & emerging countries. Active in different sectors/needs (ex. Education, microfinance, employment, gender, youth) Demand-driven projects, impact-driven initiatives	All around the world, but not a lot in Arab region: - Iraq (University of Dohuk – to support Iraqi Dutch education association), - Lebanon (Thaki – refugee & vulnerable children with electronic educational tools), - Sudan (Ahfad University of Women – women of families in rural areas with computers/better opportunities & academic teaching)
Computer Aid International (https://www.computeraid.org/)	Non-profit organization Donors: UK & EU private	Mediator for providing low-cost computers (around 55£) & software to NGOs, ICT skills training	All around the world. Arab region includes: Algeria, Lebanon, Mauritania, Morocco,

	telecommunication enterprises (ex. Siemens, Sony pictures, 02 Telefonica company) and centers (ex. AstraZeneca, Oxford University Press)	to teachers (Solar Learning Labs) Sells to NGOs in need	Sudan, Tunisia
Computers for schools (https://www.c4smb.ca/)	Canadian-based organization Contributors: Canadian government & innovation, science and economic development center	Provides trainings, job opportunities, low-cost computers ($0-100) & electronic equipment, recycling	Public schools, libraries, NPOs, literacy centers, etc. in Manitoba, Canada
World Computer Exchange (https://worldcomputerexchange.org/)	American non-profit organization (larger non-profit supplier of tested used computers to schools and community organizations, according to UNESCO)	Provides computers with educational content and training to schools, NGOs and programs around the world that focus on technology access in developing countries Collects donations of used computers, heavily based on volunteering Aims to bridge the digital divide	Mainly in Africa: Nigeria, Ethiopia, Liberia, Mali, Zimbabwe, Zambia, Sierra Leone, South Africa, Tanzania, Kenya

Based on the information provided, it can be concluded that while some initiatives have some presence in the Arab region, there are still gaps in their interventions, leaving room/accommodating for potential growth/opportunity for development.

Appendix 5. Budget Estimates

Categories	Purpose	Quantity	Cost	Totals
Project Manager (1x)	P4 staff	Whole duration of the project	$280 per day	$ 67'200
Expert (2x)	P5 staff for research on connectivity & devices	40 man-days	$340 per day, based on deliverables	$ 13'600
	P5 stuff for Comoros–related research	40 man-days	$340 per day, based on deliverables	$ 13'600
Procurement costs	Devices (purchase & repair) + training	1'000 devices	Per entity	$ 100'000
Travel expenses	Experts on the field	5 missions	$2'000 per mission	$ 10'000
Miscellaneous costs	Workshops on the ground etc.	Implementation period	(Rough estimate)	$ 50'000
Total Fixed Price USD (net of any direct taxes or customs duties and other taxes)				$ 254'400