



CHALLENGES OF ICT INDUSTRY IN DEVELOPING COUNTRIES BASED ON A CASE STUDY OF THE BARRIERS AND THE POTENTIAL SOLUTIONS FOR ICT DEPLOYMENT IN DEMOCRATIC REPUBLIC OF CONGO

1. NGWABA BIMBALA Joseph, KINKETE MFUMABI Hervé
Institut Supérieur de Commerce, Kinshasa

Abstract: Many developing countries have initiated significant information communication Technologies (ICT) projects including e-Government, e-commerce, e-Health, and other schemes that are to thrust ICT uptake within public and private sectors as well as paving the way toward achieving a knowledge society. Unlike developed countries, the penetration and deployment of ICT however, has not been as fast and effective in developing countries (Pujan, 2013). Reportedly, most e-initiatives that have been implemented have either not met their intended objectives or lapsed halfway. The aim of this research is to assess e-Government development in Democratic Republic of Congo including its performance in global e-Government surveys, review some detrimental causes behind the poor e-service delivery ranking, and recommend solutions to improving future rankings. Interviews were conducted with a number of IT experts and government authorities in the sector. Besides, the literature to this topic is generalized and extended the scope of the findings insofar as it might also be insightful for other developing countries undergoing similar challenges.

[Keywords: ICT, developing countries, Democratic Republic of Congo, IT services, e-Government]

I. INTRODUCTION

Unlike traditional government services, e-Government services enable access to information, documents, forms, accessible through Internet palliating bureaucracy procedures demanding physical contact and loads of paper-based forms (Giorgos et al., 2007). It emphasizes on features such as 24x7 access to government services, services from the comfort of the home, lower services costs, reduced burden on government employees, and

automated procedures (Maja & Dečman, 2014). Thus, citizens can access a wide range of social services such as public expenditures, patient follow-up, crop prices, distant learning, tax returns via interactive web-based application using the required infrastructure (i.e., a computer, telephone including a web browser and an internet connection). Internet has induced e-Government to swiftly expand as a widespread approach of public services delivery impacting daily lives of both personals and professionals either at home, schools, library, urban settings, hospitals, or public places in general (Nikag, 2017). ICT is instrumental to form the basis for the fourth industrial revolution and has the potential to provide opportunities for innovation, techno-entrepreneurship, job creation which could allow developing countries to make a quantum leap and pave the way toward achieving SDG goals. The economic development model based on cheap labor has been failed to lift up developing countries from poverty or to build their capacities in this digital information era. If effectively implemented, ICT can enable developing countries alleviate poverty, create a new business model and more importantly provide better governance. While Latin American and many European and Asian countries have made considerable advancements in this field, some African countries are still lagging behind and have not yet decided whether to go or not in this digital arena. The Democratic Republic of Congo is cited among the late adopters in the sub-Saharan region. Nearly all governments services from national to local agencies are still delivered traditionally. Besides, the country has not implemented a clear and comprehensive ICT policy yet. If the status quo were to prevail, the gap will only widen between Democratic Republic of Congo and other countries in the region that have made significant advances in the sector like Uganda, Rwanda and Kenya.

Zaie & Pujan (2013) reported the majority of e-Government projects that were initiated in developing countries have failed due to reasons such as gaps between the deployed technology and the realities of local contexts. As a matter of fact, this study focuses on challenges that hold back ICT penetration as well as e-Government deployment in Democratic Republic of Congo and suggest practical enabling solutions. The challenges were broadly sorted into Social, Legal, Economical, Political and Technological approach also known as SLEPT analysis. Understanding ICT challenges from these perspectives is enough for effective e-Government implementation as local context is mostly about these five key factors. The results are then extended to current theoretical framework to generalize the relevant findings in the broader context of developing countries as they almost face similar challenges despite their specific local contexts.

The paper supplies the shortages of research that focus on examining setbacks behind ICT adoption particularly in Democratic Republic of Congo. It is obvious that providing a holistic explanation and a single theoretical perspective for the challenges and intricacies in this wide context is rather unlikely. That is why this study is far from being an exhaustive list, it's rather intend to shed light on challenges and intricacies of this matter. The results shall provide some awareness and insight for the central government, scholars and researchers to give further interest to multilevel interdependent issues and factors.

1.1. Definition of e-Government

E-Government is defined by the OECD as “the use of information and communications technologies (ICT), and particularly the Internet, to achieve better government OECD(2010).“e-” stands for “electronic” – Online. The prefix has been commonly used to imply the technology application in a given domain of life (e.g., e-commerce, e-business, e-learning, e-health, e-banking, etc.). E-Government goes hand in hand with e-Governance. While e-Government refers to ICT infrastructure that underlay electronic service delivery including electronic workflow and electronic productivity, e-governance refers to the “ruling” as a result of “effects produced” by the interaction between government, the public service, and citizens throughout the political process leveraging ICT potential (Hinnant & Moon, 2004). Thus, e-Government is perceived as being a sub-set of e-governance. According to Maja & Dečman (2014), it includes preparing and implementing policies, using ICT to provide a wide range of administrative functions, offering services, putting democracy into practice and including citizens in various processes of the state.

1.2. E-Government categories

The objective of e-Government is to establish interaction between government and citizens who are the key government customers (Layne & Lee, 2001). Chen (2002), categorized Government's customer interaction into four key groups namely: , Government to Citizens (G2C), Government to Government (G2G), Government to Business (G2B) and Government to Employee(G2E). The following are the various categories of the services to be identified:

A. Government to Citizen

The G2C refers to the government services that are accessed by citizen via internet (Tuğba, 2004). A citizen can have access to the government

information and services anytime from anywhere such as electronical payment of bills, tax returns, renewing licenses and so forth.

B. Government to Government

The G2G is to enable government, department and local governments collaborate by mutually sharing information (Hinnant & Moon, 2004). This will help decrease response times between government agencies and reduce the cumbersome processes and procedures on government services delivery.

C. Government to Business

The G2B is about making interactions, transactions, and communication faster, clearer, and easier between government agencies and businesses. This can be realized by providing information through a one stop access (web portal).

D. Government to Employees

The Government-to-Employee can be understood like an internal G2G sector which aims to bring employees together and improvise knowledge sharing. Similarly, G2E provides online facilities to the employees such as applying for leave, reviewing salary payment record. It is also the relationship between employees, government institutions, and their management (Layne & Lee, 2001).

1.3. E-Government e-service identification

Dibakar (2011) defines an e-service as a piece of software that is part of e-Government system that automate or partly automate one particular administrative process. This process can be triggered by a user (citizen, business, NGOs etc.). Chen (2002), summarized continuum four stages of the development model on how e-Government delivers its content and services:

A. Informational Services

These enable information search by citizens via internet. They include general information supplied to the user in the form of instructions or information enquired by the user in which communication is made one way.

E.g. user may look up exchange rate, public expenditures, relevant statistics, etc.

B. Interactive Services

These services can be understood as formal interactions between government and citizens in which communication is made two ways through online feedback, email, and so forth (Moon & M. , 2002). According to Hanna (2017), interactive services also include the ability to search for records, to download forms and applications, or to submit them via internet. E.g. Tax returns, online registrations, etc.

C. Transactional Services

At this stage, e-Government is said to become functionally responsive and therefore convenient to the public insofar as the government can provide services through online transactions, such as enabling users to pay tax, traffic fines, apply for National ID cards (Pujan, 2013).

D. Integrated Services

With integration, government jointly collaborate with citizens as well as business on projects or processes etc. (OECD, 2010). E.g. e-voting or opinion poll. In this phase, services become client-focused and seamless as they are clustered and linked for ease of use.

1.4. Benefits of e-Government

Some benefits of implementing e-Government were pointed out from the literature review:

- A transparent government;
- Foster democracy;
- Can help build trust between governments and citizens;
- Improved and streamlined services with speed and convenience;
- Service accessibility expanded at any time, at anywhere enabled to run 24x7 (twenty-four hours a day / seven days a week);
- Realized efficiency gains, reduced human related errors;
- Timesaving and more useful and useable information;
- Cost savings;
- Increased satisfaction;
- Better public decision-making;
- More responsive;
- Improved life standards, happy and informed citizenship.

II. METHODOLOGY

In this research, qualitative in-depth interviews were used to glean facts and speculations. The interviewees were individuals who are either expert on the topic, administrative worker or decision maker in the political system in ICT-related fields. Among the 13 interviewees were members of the Ministry of Digital, the Regulatory Authority for Telecommunication and Post (ARPTC), university professors, private sector leaders. Interviews were open-ended and semi-structured in order collect plausible answers or insight to the following questions:

- What factors hinder ICT implementation and the deployment of e-Government in developing nations; particularly in the Democratic Republic of Congo?
- What are the prominent aspects of the problems in implementing ICT?
- What are enabling solutions to overcome the existing challenges?

The outcome of the interviews were analyzed and clustered using SLEPT (Social, Legal, Economical, Political and Technological) analysis to conduct a macro analysis of the e-Government system in general. To ensure that the data is consistent and reliable throughout the analysis process, related data were gleaned from official reports from international organizations such as the World Bank, the Organization for Economic Co-operation and Development (OECD), International Telecommunication Union (ITU), United Nations (UN), UNESCO, Global System for Mobile Communications (GSMA), Collaboration on International ICT Policy in East and Southern Africa (CIPESA) were used. Additionally, the Ministry of Digital and the Regulatory Authority for Telecommunication and Post (ARPTC) reports were used to acquire more specific data and information related to Congo. To further enrich the data, technical magazines were used as well.

III. CURRENT SITUATION OF ICT AND RELATED ASPECTS

3.1. Main ICT initiatives

The ICT sector in the Democratic Republic of Congo has made a significant development in the last couple decades. The former regulations applicable to technological convergence come under Ordinance No. 87-243 of July 22, 1987 regulating computer activity in the Republic of Zaire.

In 1996, the legislator sanctioned the liberalization of the audio-visual sub-sector and in 2002, of the telecommunication sector, formerly public monopoly (PNN, 2019).

The government seriously begun considering the development of a National Information and Communication Infrastructure (NICI) plan since 2002. Law No. 013/2002 of October 16, 2002 and Law No. 20/017 of November 25, 2020 relating to telecommunications and information technologies paved the way for the legal framework with more emphasis on telecommunications as well as audiovisual except the digital sector (PNN, 2020).

In 2004, The government teamed up with the United Nations Economic Commission for Africa (UNECA) to develop the National Information and Communication Infrastructure (NICI) plan. So far, this plan did not achieve significant results in terms of national backbone infrastructure and e-Government.

In 2006, the Regulatory Authority for Telecommunication and Post (ARPTC in French), created in 2003, signed the broadband protocol with New Partnership for the Development of Africa (NEPAD in French), thereby including the Democratic Republic of Congo in the East African Submarine System project (EASSy project).

In 2009, Congo adopted its National ICT Policy (NICT) with specific objectives related to (a) broadband infrastructure; (b) accessibility to telecommunication service; (c) increasing the participation of ICT in economic and social development (Elias et al., 2020).

In 2011, it connected to the submarine fiber optic cables (WACS Project) at Muanda coastal city.

In the 2015-2016 financial year, the Congolese government proposed the new National Strategic Development Plan (PNSD) for all public sectors. The PNSD had translated the will of the government consisting in (a) improving the governance of the digital economy; (b) investing in national broadband infrastructure; (c) improving access for the population to ICT; and (d) the reduction of the digital divide with a view to foster an inclusive society (PNN, 2019). It had set itself some disruptive objectives by 2021, such as the launching into orbit of the first Congolese satellite, the completion of 5,000 km of national fiber optic backbone and the connection of 30,000,000 fixed and mobile lines in metropolitan network. Unfortunately, at this stage ninety

percent of these plans lapsed due to the 5-year expiry of unperformed review period.

In 2019, the ministry of digital was created, dissociated from the ministry of Post Telecommunications and Communication, with the clear objective of revolutionizing the digital sector in the Democratic Republic of Congo long ignored. In the same vein, the government took the initiative to draw up the “National Digital Plan”. This plan is based on 4 strategic pillars (a) infrastructure, (b) content, (c) application uses, (d) governance and Regulation. The plan supports the digital development strategy for 2025. Seemingly, at the time this paper is being written, it is reported that the plan is likely to lapse as there is no incentive from government. The minister in charge of digital, Mister Eberande KOLONGELE stated: “we have several projects for the future that are still pending and that require resources”.

3.2. The E-Government Development Index

The United Nations Department of Economic and Social Affairs (UNDESA) surveys on the adoption of ICT in governments for the delivery of essential public services (Elias et al., 2020). The survey delivers the comparative e-Government development rankings of all United Nations member states which is called E-Government Development Index(EGDI). Mathematically the e-Government index (EGDI) is based on the weighted sum of three different indices, namely the online service index (OSI), the telecommunications infrastructure index (TII) and the human capital index (HCI). Decision makers can now assess the acceptance and performance of the telecommunication in their respective countries based on EGDI survey according to the three elements.

3.2.1. Online Services Index (OSI)

The Online Services Index component of the e-Government Development Index is a composite indicator measuring the use of ICTs by governments in delivering public services at the national level (UNDP, 2014). Table 1 shows Democratic Republic of Congo’s Online Service Index (OSI) according to the U.N. e-Government Survey Report (2018).

Table 1. Democratic Republic of Congo’s Online Service Index (OSI)

(Source: UN E-Government Survey (2018))

COUNTRY NAME	WORLD RANKING IN 2018	OSI REGION AVERAGE
Democratic Republic of Congo	0.2083	0.3633

3.2.2. Telecommunication Infrastructure Index (TII)

The Telecommunication Infrastructure Index is an arithmetic average which is used to measure five indicators: number of main fixed telephone lines per 100 inhabitants; estimated Internet users per 100 inhabitants; number of wireless broadband subscriptions per 100 inhabitants; number of fixed broadband subscriptions per 100 inhabitants; and number of mobile subscribers per 100 inhabitants (UNDP, 2019). The TII measures the connectivity of Infrastructure to distribute e-service between G2C, G2B, G2G and G2E. Democratic Republic of Congo's Telecommunication Index (TII) at 0.0645. Mobile cellular subscription per 100 inhabitants is at 43.3 percent in 2018 and Internet subscription is 5.9 percent (Internet World, 2018) while household with a computer is at 3.1 percent with a household using internet access at home of 3.2 percent as a result of low coverage of mobile phone lines. Though progress has been made in terms telecommunication infrastructures, more still needs to be done to bridge the digital divide especially in rural areas.

3.2.3. Human Capital Index (HCI)

The HCI is one of the critical indicators of e-Government acceptance. It consists of four components: the combined primary, secondary and tertiary gross enrolment ratio; adult literacy rate; expected years of schooling; and average years of schooling (UNDP, 2019). In 2018, DR's human capital index is at 0.5108 little above the regional averaged index of 0.4602 (UNDP, 2019).

3.3. Developed vs developing countries

While developed countries have made significant advancements exploiting the potential of the Internet to successfully enable public services and build knowledge economy, the development of successful e-Government strategies has been comparatively slow in the majority of developing countries (world Bank, 2020). Dibakar (2011), pointed out some difference between both as follow:

Table 2: difference between Developed and developing countries
(Source: Dibakar (2011))

	Developed Countries	Developing countries
Politics and economy	- Government and economy developed early, immediately after independent - Economy growing constant rate, productivity increasing,	Government usually not specifically defined; economy not increasing in productivity Low standard of living

	- high standard of living - Relatively long history of democracy and more transparent government policy and rule	Relatively short history of democracy and less transparent government policy and rule.
Technical staff	- Has a current staff, needs to increase technical abilities and hire younger professionals - Has outsourcing abilities and financial resources to outsource; - Current staff would be able to define requirements for development	- Does not have as staff or has a very limited in-house staff - Does not have local outsourcing abilities and rarely has the financial ability to outsource; current staff may be unable to define specific requirements
Infrastructure	- Good current infrastructure - High internet access to citizens and employees	- Bad current infrastructure - Low internet access to citizens and employees
Citizens	- High internet access and computer literacy; still has digital divide and privacy issues - Relatively more experienced in democratic system and more actively participate in governmental policy-making	- Low internet access, and citizens are reluctant to trust online services; few citizens know how to operate computers - Relatively less experienced in democratic system and less actively participate in governmental policy-making
Government officers	Decent computer literacy and dedication of resources; many don't place-Government at high priority	Low computer literacy and dedication of resources; many don't place-Government at high priority due to lack of skill

IV. SLEPT ANALYSIS

The SLEPT analysis is an extended version of the PEST (Political, Economical, Socio-economical, Technical and political) analysis with the additional Legal factor. According to Nesterenko (2014), the SLEPT analysis describes a framework of macro-environmental factors that use in the environmental scanning component of the strategic management components. Besides, he advocates that this analysis model is a powerful tool, which helps

to create a wide and coherent picture in the implementation of e-Government systems. This research used this analysis model to cluster information from the comprehensive interviews and the existing body of literature to point out impediments and intricacies in developing countries in general and in the Democratic Republic of Congo in particular.

4.1. Social factors

The Democratic Republic of Congo is the largest country according to the territory in sub-Saharan Africa and the second-largest in all of Africa (after Algeria) with a population estimated at over 80 million (UNDP, 2020). Paradoxically, it is also one of the poorest countries in the world recording poor socio-economic rankings. In 2017 the country's gross national income per capita was estimated to 870 dollars (World Bank, 2019). According to BAfD (2020), in 2018, it was estimated 72 percent of the Congolese population, equaling 60 million people, lived on less than 1.90 dollars a day (the international poverty rate). At the start of 2022, 46.8 percent of the Democratic Republic of Congo's population lived in urban centers, while 53.2 percent lived in rural areas (GSMA, 2022). The country's Human development index (HDI) value for 2019 was estimated to 0.480 (below the average of 0.513 for countries in the low human development group and below the average of 0.547 for countries in Sub-Saharan Africa) – which put the country in the low human development category ranking it at 175 out of 189 countries and territories (World Bank, 2020). The country's GNI per capita decreased by about 37.3 percent between 1990 and 2019 (AfDB, 2020). The world bank (2020) reported unemployment and underemployment are significant concerns, particularly for urban youth (ages 15-24). The highest unemployment rates (32 percent) are for youth ages 15-35, with underemployment rates for the same group around 75 percent. Entrepreneurship is generally limited to earning sufficient funds for daily survival rather than the development of a formal business, yet it is significantly stifled by taxation, harassment, and lack of access to credit. In this perspective, ICT adoption must be tailored to benefit the end user heeding the socio-economic context insofar as ICT infrastructure alone is not sufficient to reap the benefits of ICT, otherwise the deployment of the acquired technologies is likely to fail or else ineffective. Users are citizens from all walks of life range from individuals, businesses, government entities. They need to have access to devices, applications and the requisite skills to utilize ICT effectively. In a country where most population's purchase power is restricted to afford basic needs for survival, ICT cost is deemed luxury for both devices and data plan. For example, internet package in Democratic Republic of Congo varies according to one telecommunication provider to another. Out of eight data plans measured in the country by ITU (2020), the

average price observed was 1 dollar per 1 GB a day and 10 GB for 10 dollars a Month. This is still deemed costly as it is prohibitive to many Congolese compared to GNI of the population. Despite low life standards and telecommunication companies coverage in many localities, ICT penetration in Congo is growing fast. Analysis from GSMA (2022) indicates that internet users increased by 3.3million (+25.4 percent) between 2021 and 2022. In addition, there were 43.95 million cellular mobile connections at the start of 2022. Yet, the quality knowledge remains questionable as well as access to education for most internet users (World bank, 2020). Internet users would need to master different skills such as technical, structural and strategic skills to be able to fully benefit from internet access. According to Torero and Von Braun (2006), technical skills refers to the ability to manipulate a technology, such as using a keyboard. Structural skills are linked to the capacity to understand contents and formats, while strategic skills imply ability to select and prioritize the large volume of information available through the internet. Unlike the constitution statement, Congo is one the in the 21st century where access to primary education is not free (UNESCO, 2015). This has deprived millions of children from their fundamental right to basic education. Mokonzzi (2008) reported the percent of adult who lack basic literacy skills is as high as 70 percent. Low literacy skill is also increasing in both rural and urban areas among young people whose education has been thwarted by political instability, inter-community violence and economic hardship resulting in high school drop-out rate. Furthermore, the scarce resources allocated to education sector and shortages of qualified graduates in science, technology, engineering and mathematics programs at tertiary level (estimated to 14 percent in 2019) are critical challenges for the adoption and deployment of ICT (World bank, 2020). According to UNESCO (2015) from 1969 to 1975, the national government of Congo spent on average 21.9 percent of its budget on education. The government's spending on education went down drastically from 21.9 percent in 1975 to only 0.1 percent in 2000. The world bank (2020) reported only 0.4 percent of GDP was spent on education in 2019, while the average spending in sub-Saharan African countries is 4.6 percent. Along with other issues, this low spending results in low educational performance across all sub-sectors of education in the country. Consequently, adopting ICT for government services or processes without qualified experts in the field may expose at various risks (cyber-attacks). For instance, an incomplete or ineffective implementation of ICT systems as a result of lack of know-how or expertise may raise deficiencies such as loss of data (e.g. poor backup systems) or information theft which may have severe security consequences especially for government related information deemed confidential. According to an interviewee, most governments in developing countries are aware of low quality education of local labor in various domain of sciences such as architecture, health, engineering etc. The majority of software present in

public or private administrations are imported and maintained by foreigners while the local competence is simply user. Furthermore, the IT industry is overwhelmed by foreigners who hold a considerable market share. Local entrepreneurs in IT sector complain about this mistrust as there is no incentive from government. Without government commitment, the digital divide will only widen across the country and the IT industry will be prevailed by a plethora of foreigners.

4.2. Legal factors

When e-Government is implemented, new communication channels appear, thus the adoption of ICT, electronic public service provision and delivery including its underlying infrastructures can raise bunches of challenges ranged from the property laws, rights protection, data privacy, interoperability framework and other related issues. The Democratic Republic of Congo is slowly embracing the use of ICT, although most laws and regulations governing digital communications and internet are in draft form. Worryingly, the country also continues to register increasing violations of internet freedom such as internet shutdowns, website blockage, censorship, retrogressive law-making, court cases against internet users, and surveillance refraining citizens' access to ICT (CIPESA, 2014). Articles 23-25 of the Congo Constitution (Democratic Republic of Congo's Constitution, 2005) guarantee citizens the right to freedom of expression, information and association. The Framework Law 013/2002 on Telecommunications and Law 014/2002 establishing the Regulatory Authority are the main legislation impacting internet use in the Democratic Republic of Congo as they contain various provisions on online privacy, data protection, and surveillance. For instance, Article 52 of the Framework Law 013/2002 on Telecommunications states: "the privacy of every piece of mail sent through Telecommunications services as guaranteed by the law". Yet, this privacy can be infringed only by the public authority, when needed for public interest unless the Attorney general grant approbation as described in the law in cases such as the aim to protect essential elements of country's scientific, economic and cultural potential, prevention of criminality and organized hooliganism "in exceptional circumstances", or when the national security is cited. Consequently, all mobile operators and ISPs are obliged to abide by this law. However, there is no explicit definition of "public interest" by the constitution. As result, it is open to misinterpretation and abuse (CIPESA, 2014).

The Democratic Republic of Congo neither have a specific law on interception of communications beside the Framework Law 013/2002. In addition, it does not have a specific data protection law apart from Article 21 (b) of Framework Law 013/2002, which only mentions that telecom operators

are subject to some confidentiality and neutrality with regard to the content of messages exchanged by their clients.

Article 7 of a 2015 ministerial order entrusts telecommunication companies to protect their subscribers' privacy, but the wording is vague and too permissive for state actors (CIPESA, 2014). For example, if national security or a judicial case is cited, this article allows "authorities," namely ministries and other agencies, to violate subscribers' privacy without any documentation or consent from the attorney general. In the same vein, it requires Telecommunication companies to send data collected about subscribers' identity to government services before deleting it from their database. This provides for easy state surveillance. The ministerial order was issued to enforce mandatory SIM card registration, a move which drew criticism from rights activists, but government did not back down.

Article 31 of the Congo's constitution 17 and Articles 52 and 53 of the Framework Law 013/2002 guarantee the right to privacy to every Congolese citizen. Evidence suggests that the Congo government conducts surveillance with the assistance of telecom service providers and ISPs, who comply with government information requests as their licensing obligations require them to do so. Orange, one of the leading telecom operators in the country, in their 2015 transparency report revealed that it received up to 385 requests for customers' data from the Congolese government – the requests included details on calls (duration, the person called, etc.), caller identification data (name, address, birth date, etc.), the customer's (among which opposition leaders, civil society activists, journalists etc.) GPS data, billing information, and more (CIPESA, 2020). This poses a threat to the true realization of the potential of internet use as users come online with pre-established negative perceptions that could contribute to self-censorship, and ultimately limit their use of the internet for free expression and civic participation.

The report from CIPESA (2014) concludes that, the Framework Law 013/2002 do not comply with international best practice related to ICT and internet policy. Besides, it primarily favour government interests, rather than what is mutually beneficial for the government, citizens, and Telecommunication companies. Mistrust of justice and elasticity of trial are also instrumental to restrict the access to technologies and slow down the deployment (USAID, 2010). Citizens and business have limited legal recourse to seek redress. The World Press Freedom index of 2016, ranked Congo 152 out of 180 countries due to the media repression and crackdown. For instance, www.descwondo.org and www.vacradio.com, which are critical of government and are owned by individuals sympathetic to the

opposition, were reportedly blocked in March 2016. Congolese ISPs on orders of the government, block access to the websites. Telecommunications operators complained of the negative impact that blockages would have on their income. Some feared that clients would seek legal recourse by suing the telecom companies for going against the agreements they had with clients for internet services provision. Furthermore patenting and aggressive intellectual property rights (IPR) are other concern refraining ICT uptake in Congo. The process to get license for private businesses often requires bribes. Companies that refuse to pay bribes face retaliatory measures such as deliberate delays in licensing and permitting (GSMA, 2011). Besides, while laws protecting investors and Intellectual property rights (IPR) are in effect, the court system is often very slow to make decisions or follow the law, allowing numerous investment disputes to last for years. IPR are legally protected in the Congo, but enforcement of IPR regulations is limited and IPR theft is common. The country is a signatory to a number of relevant agreements with international organizations such as the World Intellectual Property Organization (WIPO) and is subject to the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS).

4.3. Economical factors

The Democratic Republic of Congo's endowment of mineral resources—including copper, gold, tin, tungsten, and cobalt located largely in eastern Congo and estimated to be worth over \$24 trillion—could undoubtedly drive the economic development of the entire country (World Bank, 2012). Yet, despite all its incommensurate resources, its development progress remains questionable and paradoxical. The country has failed to capitalize its wealth due to poor democratic traditions, institutions, high corruption rate, political instability, illicit trade in natural resources, authoritarian rule that have allowed the country's national political elite to fraudulently use the country's wealth for personal enrichment rather than enabling broad-based development— implementing growth policies, or delivering even the most basic welfare to the population (USAID, 2010).

This governance failure in all sectors explains the country's low ranking as one of the world's poorest country (UNDP, 2020). Economic indicators in Congo are alarming as the country is tributary to exportation of natural resources. Yet, the revenues from mining sector are allocated without transparency, and/or are never deposited into government coffers (USAID,

2010). As a result, despite high prices for mining products, the current account deficit deteriorates and does not have positive incident in the country's GDP. This paradoxical reality calls into question the government's ability to be fiscally responsible and underpin much of the economy. According to an interviewee, when parliament passes a budget for a ministry, the budget execution is said to fall short of commitment. Poor budget management, understanding of budget processes, application procedures, inability to spend resources received are competencies lacking many of Congolese government officials in order to make realistic economic plan in short, medium or long term. In addition, the local budget is unable to contain public expenditures, so the country resort to external aid to respond to the needs of citizens as a result the donor projects equivalent to 12 percent of the overall economy (World Bank, 2020).

Private sector leaders complain of corruption and the multiplicity of taxes as a key impediment to their activities. The process to get license for private businesses often requires bribes. Companies that refuse to pay bribes face retaliatory measures such as deliberate delays in licensing and permitting (GSMA, 2011). High cost of tax compliance to business operations and the onerous requirement impedes businesses growth and create severe disincentives to investment. In other to resist to such a rough environment, companies set prices consequently to tax burdens they endure as a result of arbitrary price soaring of public goods and services as well as speculation in the market. These facts explain the country's poor ranking of 180 out of 190 in the World Bank's Doing Business paying taxes indicator (World Bank, 2019). Companies like SAMSUNG, Nestle, Chevron, and others closed their business as they deemed the economic environment unfriendly and unfair.

Financial cost remains a critical constraint to enable ICT deployment in most developing countries. Corruption and the country's poor management of public revenue and regulations make ICT usage becomes more costly as firms are burdened with excessive taxes and bribes. The government is unable to provide with support through complementary actions such as consequent public investments, subsidiary or setting special price (GSMA, 2011). Poor infrastructure, ineffective national regulatory frameworks for telecommunications and unfriendly economic environment do not encourage competition for companies to provide both cheaper and better quality telecommunication services (World Bank, 2012). Restrictions on infrastructure competition are reported to limit the development of high-capacity backbone networks and commercial risks hinder investment in wired infrastructure (ITU, 2013).

4.4. Political factors

The process of state creation and development is perceived as a largely technical exercise. Technical experts will formulate policies and governments will lead implementation process (OECD, 2012). Internal politics has a critical role to play as it can foster knowledge transfer and technology acquisitions, catalyze change, promoting trust and assisting the management of risks and disruptions associated with ICT-driven change. In addition, it can help stimulate demand for ICT in setting and leading public policies as well as dictating the depth of technology advancements. According to some government officials, the Democratic Republic of Congo's ICT policy implementation failure derives from shortages of policy planners in the sector; unclear definition of attributions between stakeholders; the tendency for plans to be overambitious and the difficulties of aligning plans with annual budgets; scarcities of data; bureaucratic weaknesses; unfamiliarity of authorities (including Members of Parliaments) with ICT background; internal resistance to change and skepticism that ICT can drive economic development. Besides, Heeks (2019) reported, most government authorities in developing countries have neither the capacity to properly plan, forecast nor manage budgets to meet project deadlines in a timely manner. This unawareness lead to unrealistic budget allocation, financing of ICT projects or deadlines. Consequently, projects either fail to be completed or the outcomes do not meet the intended objectives.

Furthermore, some interviewees advocated Congolese authorities deem ICT projects counterproductive, as a result implementation of projects appears to be strongly donor driven. The dependence on donor funding has resulted in poor leadership and coordination that impedes the development of large scale e-initiatives as it provides scant support in terms of improving harmonization amongst different stakeholders (OECD, 2006).

ICT goes along with democracy tradition as ICT fosters democracy, while democracy in return enables conditions to fully reap ICT potential by removing bottlenecks (World Bank, 2012). Though the country is said "democratic," in the terrain, facts can tell opposite story. Democratic Republic of Congo is one of the countries in Africa apart from Arabic countries, where the freedom of internet is infringed (World Bank, 2019). On January 19, 2015, the government ordered telecommunication companies to suspend all internet and short message service (SMS) amid protests over a proposed electoral bill (CIPESA, 2020). Users could not access social media platforms like Facebook, twitter, only basic service such as emails and websites which were not critical of government. In 2018, the same scenario was reiterated a week after Congolese voted on December 30, 2018 in general elections.

This explains that government in nations with low democracy traditions, may deem information transparency – a result of ICT introduction as a threat to their corrupted regime or use ICT potential to threat privacy. This psychosis makes such regimes reluctant to fully harness ICT potential for government-related systems and processes. Without the support of the highest authorities, the full capacity of ICT can never be achieved (Pujan, 2014).

4.5. Technology Infrastructure factors

While the number of broadband connections in Africa crossed the 400 million mark in 2018 (nearly twenty times 2010 levels), the regional average broadband penetration –including 3G and 4G connections– is only 25 percent in 2018 (World Bank, 2020). Mobile broadband coverage in Africa is still at 70 percent of the population (GSMA, 2022). Slow, unreliable and insufficient telecommunication services in most African countries prevents the region from better capitalizing on innovative applications and reap the full benefits of ICT potential. Additional challenges include lack of access to reliable and affordable electricity, communication networks, make Africa's digital transformation journey even more difficult. For instance, Basant et al. (2004) point out the primary reasons depressing returns to ICT expenditures and adoption in India is power disruption. Despite its substantial hydropower potential of the Congo River, only about 19 percent of the Congolese population are connected to electrical grids (ITU, 2019). The country has three major cities where the population and activities are concentrated namely: Kinshasa in the southwest, Lubumbashi in the southeast, and Kisangani in the north. Power and ICT infrastructure is mostly developed in Kinshasa and Lubumbashi while the rest of the country is almost entirely devoid of power and ICT coverage (Foster, Vivien & A, 2013). According to interviewees, mobile wireless networks cover about 40 percent of the population and a large share of that coverage includes 3G. 4G LTE services are now accessible to customers in Kinshasa, Lubumbashi, Kisangani and other major towns.

Poor communicational infrastructure such as internet bandwidth also hinders effective application of ICT in general and make access to web and online resources difficult. Data from ITU (2019) show that Internet Speed in Congo averaged 851.85 Kbps from 2007 until 2017, reaching an all time high of 3462.75 Kbps in the first quarter of 2016 and a record low of 154.98 Kbps in the first quarter of 2010. With an average download speed of 7.7 Mbit/second for fixed-network broadband internet, the Democratic Republic of the Congo ranked 159th in an international comparison. The upload rate of only 3.3 Mbit/second was significantly lower (161st place). The quality of the Internet, consisting of signal fluctuations (jitter) and latency, is very far ahead

at 44th place. In mobile internet, i.e. on tablets and smartphones, the Democratic Republic of Congo comes 118th with a download speed of 13.53 Mbit/second. The upload speed of around 8 Mbit was enough for 96th place.

The West Africa Cable System (WACS) is the only subsea cable connecting the Democratic Republic of Congo directly with the rest of the world which justifies the country's poor rankings (RTI, 2020). The WACS's landing station is located at the coastal city of Muanda and controlled by a state-owned company – the Société congolaise des postes et télécommunications (SCPT). According to Internet providers in the country, three-quarters of the electronic data transfer is lost between the landing station in the coastal city of Muanda and the capital Kinshasa for about 400 km inland (RTI, 2020). The government has acknowledged some technical shortcomings but says that these are being addressed. However, this is unlikely to reassure operators in the sector. Most companies operating in the sector set up their own infrastructure with international access or satellite links, which are considered more reliable but are considerably more expensive. Certainly, this impacts latency, cost, and network availability. The Democratic Republic of Congo has access to additional cables via neighboring Rwanda and Zambia to the coast, but all traffic goes to Muanda where WACS lands (RTI, 2020). There is no national fiber backbone as the project lapsed underway due to political and financial reason.

V. MEASURES TO INCREASE THE EFFECTIVITY AND SUCCESS OF ICT

Government policy takes various forms, such as acts of legislatures (including general law, and fiscal or budgetary measure including tax and expenditure etc.), regulations and rules made by ministers and/or regulators, and decisions taken by courts, fiscal and regulatory agencies, and state-owned enterprises (Pujan, 2013). Below are some policies to consider in order to enhance ICT penetration and enable and pave the ground for e-Government deployment:

5.1. Social policies

Government must recognize the role that ICT and internet play as enablers of the socio-economic development. The international community, including international human rights groups and development agencies should support initiatives that improve access to affordable and reliable ICT

services, support skills and knowledge building programs for youths, civil society, women including disabled people (GSMA, 2014). The following policies are critical:

5.1.1. User centricity

Digital government must be built for and benefit the end user. Users are citizens from all walks of life, businesses and government entities, among others. Design of public services should be thus based on rigorous user profiling in order to address different users' needs including the marginalized ones. World Bank (2014) suggests that services need to be adjusted based on extensive personalized user experience analysis. Besides, all services need to target specific segment of users and be tailored to specific needs or problems. In order to provide quick and user-friendly public services and customer-centric approaches, Sharafa (2017) advocates that prototyping shall be a cross-cutting technique embedded into all projects.

5.1.2. Affordability and inclusiveness

Even where connectivity exists, many people do not use digital technologies, to some extent because they cannot afford it (World Bank, 2018). Affordable ICT infrastructure, devices and services are essential building blocks for digital inclusion where businesses and citizens indiscriminately of their socio-economic standing, gender or geographic location are enabled to participate in and benefit from the digital economy and digital society (Heeks, 2019). Equipment such as telephones, servers, internet, computer must be commensurate to the GNI of the population ensuring that the most vulnerable are able to afford ICT devices. Private and public partnership is needed to incubate social enterprise models that provide financially-sustainable, low-cost, high-quality devices and services (GSMA, 2014).

5.1.3. Capacity building

Digital literacy and appropriate ICT skills, which imply at least a minimum level of

educational attainment are necessary for ICT to be productive (UNESCO, 2015). The problem of human resource shortages can be sorted out from different perspectives. The following policies need to be taken into account:

- There is an urgent need for primary education to be free of charge. To address this requirement, government and donors can form an effective partnership and support minimum attainment of schooling to all;

- Train and educate experts in engineering field and promote exchange programs partnership with developed countries universities. This will consist in sharing experiences as well as foster capacity building and raising mutual understanding among developed and developing countries;
- Restructuring the old curriculums of schools to address current issues is another important factor in preparing future generations to confront and keep up with ICT trends;
- Training domestic leaders problem-solving skills in ICT convergence field in a systematic and practical manner to create policies and attract capital investments (KOICA, 2019);
- Civil society organizations should seek to undertake advocacy activities with members of parliament and senators, educating them about the importance of creating clear and sustainable digital rights legislation;
- Civil Society should invest in expertise in training more citizens about rights and responsibilities in internet use and digital security safety, including how to better secure their online data and devices, utilize anonymity and safeguard against security breaches.

5.2. Legal policies

New technologies and systems demand new regulations. ICT adoption goes hand in hand with legal frameworks to address challenges inherent to ICT introduction. The following policies are worth considering:

5.2.1. Law enforcement and customization

Although internal constraints such as resistance to changes and corruption are heavily implicated in Democratic Republic of Congo's slow policy implementation, reinforcing the law will consist in banning impunity and promoting justice to be applicable equally to all. Given the adoption of ICT can raise bunches of challenges ranged from the property laws, rights protection, personal data privacy, interoperability framework and other related issues, legislators should provide enabling environment to address these challenges through a set of legal frameworks to make e-Government solutions legally binding. Wimmer (2002) suggests government activities to be strongly regulated and driven by legal frameworks including national constitutions.

5.2.2. Security of justice

To maintain credible commitment to the promotion of economic welfare and attract capital investment, the agency charged with enforcing the rules governing ICT will need to be independent of government (Contini & Cordella, 2015). Governments still have to overcome the lack of trust in justice and develop regulations for the security of investors in the sector and the protection of personal data. Two main options are critical themselves:

- Independent court-based administration: This requires at root, an independent judiciary. The enforcement of competition and consumer regulation may then be vested in an ordinary court system through civil actions to ensure the independence of the administration of justice (Contini & Cordella, 2015).
- Independent commission: The common alternative approach is the creation of an independent National Regulatory Authority (NRA) subject to court supervision (USAID, 2010).

Security of justice will be instrumental to enable stakeholders to have the minimal level of trust in the economy and society to make planning even worthwhile.

5.2.3. Data Privacy and Digital Identity

As more data (social security numbers, health and medical records, financial and banking data and even basic such as full names, gender, addresses and birthdates) becomes digitized and more information is shared online, data privacy is taking on greater importance (World Bank, 2006). It would require documents certification, electronic signatures, confidentiality and privacy. The government should strengthen the means of security authentication to citizens through the usage of Key Infrastructure (PKI) based digital signature (World Bank, 2006). The operational national PKI system should include legislation enabling the usage of digital signatures. National Registration Authority and Certification Authority (CA) should be issued for individuals and companies. Efforts should be made in the area of information security management to upgrade the security level of the digital identity of citizens and ensure that the overall governmental data processing is reliable, robust, secured and legally bound (GSMA, 2011). Once in place, ecommerce and e-banking activities will be promoted. Citizens should be assured that all their information will be stored and used in an extremely secure environment and government cannot make them the victims of reprisals.

5.2.4. ICT Standards

According to Reddick & Christopher(2010), specification of the standards to be adopted at each level of the architecture, if applicable, and definition of a life cycle for the standards, to accommodate evolving e-Government projects and innovation in technologies takes on greater importance. The ministry of digital and stakeholders should be responsible for adopting the standards that are applicable with regard to telecommunication equipment, either imported, locally assembled or manufactured, and setting rules and procedures regulating their import, sale and usage. ICT implementation can raise problems such as application of different levels of IT standards including security standards, incompatibility of systems, inter alia etc., within an organization, a well-functioning ICT governance committee, whose role also extend to cross-cutting ICT issues is required. The committee should also serve as a forum where the competing ICT demands of the various departments and programs could be discussed and considered at the corporate level, so as to allow for prioritization based on the government's key ICT priorities and needs (ITU, 2012).

5.3. Economic policies

Government should have the capacity to make credible technical contributions to policy decisions at both the macroeconomic and sectoral levels. The following suggestions are made to promote a long term poverty reduction and create a viable market to boost ICT adoption.

5.3.1. Promote Public and Private Partnership(PPP)

Partnership with private sector shall be fostered enabling them to take part in improving the existing infrastructures or building new ones. Strengthening a transparent and efficient business enabling environment will allow private enterprises to prosper and foster techno-entrepreneurship and innovation (Sharafa, 2017). Government intervention in most projects will consist in to safeguard the welfare of the population it represents and the national interest as well as risks that cannot be borne by the private sector (World Bank, 2012). These may include tariff-setting mechanisms, competition policy, promoting a friendly economic environment, safety standards etc. Besides, political stability and civil society security need to be promoted to increase trust and social capital (World Bank, 2009).

5.3.2. The use of international standards by Industries

Since small to medium enterprises and ICT start-ups are increasingly booming in Democratic Republic of Congo, the use of international standards can greatly increase their chances of survival in the global digital market (ITU, 2012). Industries realize benefits such as the

opening up of export markets as their products become compatible on a global scale and result in increased efficiency, credibility and confidence as customers from all over the world will recognize international standards (OECD, 2005).

5.3.3. Declaring Special Economic Zones

There's a need to implement long standing legal framework establishing the regime declaring Special Economic Zones (Torero & Von Braun, 2006). This will be likely to improve foreign direct investment. Special Economic Zones are designated areas in a country that possess special economic status enjoying tax incentives and exemption from duty on importation of raw materials among other things, to create an investor-friendly environment (USAID, 2010).

5.3.4. Liberalization and market competition

The development of ICT infrastructure and services shall be driven by increased liberalization and market competition, along with increasing private investments (Sharafa, 2017). A policy of encouraging competition in ICT markets appears more likely to lead to a high degree of availability, quality and affordability for the basic connection and services (World Bank, 2009). Liberalization consist in opening the market place to offer more opportunities to the development of the private sector that will in return accelerate economic growth; encourage new investments; improve competition, efficiency and increase productivity (Rodrik, Subramanian & Trebbi, 2004). This can be enabled through the creation of a regulatory framework for the market based on general comprehensive statement and the law of the industry, transparency, flexibility (Banza, 2015), as well as new market structures and new regime of authorization. Although the gains of liberalization may not be felt immediately, tangible benefits may be realized over time (Sharafa, 2017). Strategic support from government will consist into bridging the gap between skills, technologies, and scientific capabilities in order to harness liberalization benefits(OECD, 2011).

5.3.5. Funding

5.3.5.1. venture capital funds

In addition to private investors, the rapid growth in ICT-based start-ups in industrialized countries has been largely driven and supported by venture capital(World Bank, 2019). This in turn depends on stock markets which function well, and fiscal regimes which encourage such investments. In many developing countries, these are not totally in place. To address this requirement, developing countries need to set up or encourage venture capital

funds, dedicated to the ICT industry, for instance through public financial institutions.

5.3.5.2. Tax incentives

Financial cost is a critical challenge for many countries while implementing ICT projects (Sharafa, 2017). The tax is the domestic resources if effectively mobilized and managed, can help government fund public projects, beside donors supports. In the same vein, it enables economic policies and affects macro-economic variables such as inflation and unemployment (World Bank, 2012).

It worth mentioning, there is a pressing need to reinforce procedures in three key areas: the generation of development projects; the evaluation of expenditure requests by central government coordinating agencies (finance and planning ministries) and the formulation of economic policies (Nikag, 2017). Besides, it is paramount to accelerate the industry and mining sector for private investors so as to create greater economic opportunities. There is a need for governments to implement sustainable policies intending to absorb public consumption and inflation rates in order to prevent from their negative impact on economic growth (World Bank, 2020). While the extractives sector has supported a decent average gross domestic product growth rate of about 6 percent over the past ten years; well-developed extractive and agricultural sectors, with the purpose of building a diversified economy, achieving inclusive growth, and attaining middle income status, with a view to overcoming poverty is paramount (Feldman and Maryann, 2022).

5.4. Policies and strategies

The process of state creation and development was seen as a largely technical exercise. Good advisers and technical experts will formulate policies and governments will implement them (Nikag, 2017). Governments can help with policies enabling new technologies, new business models and investment. The right policies will, in turn, provide the business holders and capital investors with the incentives to support projects that will drive demand. The following policies take on greater importance:

5.4.1. Removing bottleneck

Government should focus upon removing policies that prevent competition and limit innovation (Pujan, 2013). ICT shall not be regarded as a threat to a political regime. Instead, they need to encourage and facilitate the introduction of innovative ICT-based products and solutions and

remove political barriers that constrain ICT freedom, competition and innovation (Sharafa, 2017). Parliamentarians should promote ICT and challenge any government policy that violates the citizens' ability to fully enjoy telecommunication services. For instance, censorship which concerns the possibility that a government can control information and web activity when this information or data did not agree with what the government wants.

5.4.2. Leadership

A brightened leadership at the national level is needed to systematically foster ICT integration and provide the appropriate inputs to the ICT industry (CIPESA, 2020). Narrow-minded leaders as it is the case in many developing countries either ignore ICT as they deem it a threat to their corrupted regime or misuse ICT to threat people's privacy. Leaders need to change their mind and broaden their ruling perspective. Without the incentives of the highest authorities, any policy implementation would be in vain (World Bank, 2014).

5.4.3. Building Strong institutions

According to some economists (Rodrik, Subramanian & Trebbi F, 2004), the major factor behind economic growth is the development of high quality institutions. Mr. Obama, the former US President in his speech in Ghana parliament, stated: "Africa does not need strongmen, it needs strong institutions" (Heeks, 2019). More effective execution of longstanding development programs and better policy formulation require stronger institutions where the law is enforced and applicable to all. Besides, the development programs should be carried out by institutions rather than political leaders whose reign is termed so that in case of government reshuffle or change in regime, the policy implementation keeps running.

5.4.4. Stakeholders synergy

Stakeholders synergy is one of the building blocks of successful policy implementation. Stakeholders include sectorial ministries— the ministry of digital, ministry of postes et telecommunications, ministry of finance, and ministry of planning as well as business managers, civil society, academics and other bureaus at the center of government that have special roles to play in ICT policy implementations. They shall be distinctly identified, gathered and clearly and mutually understand their attributions

and roles so that policies are implemented based on common consensus (GSMA, 2014).

5.5. Technical infrastructure

According to Zaie & Pujan (2013), new technologies and systems should be acquired **wisely** heeding the infrastructure in place in order to minimize the costs and refrain from fruitless investments.

5.5.1. Power

Technical infrastructures, especially electricity are essential prerequisites for ICT deployment and development (ITU, 2014). Democratic Republic of Congo counts many dams, only Inga I which is operational, yet it is not use at full potential. Appropriate solution is to use the full potentials of dams as well as powering off-grid cell towers with renewable energy (Heeks, 2019).

5.5.2. Backbone expansion

Completing the WACS submarine project along the Kinshasa-Kisangani-Lubumbashi axis, could increase the country's connectivity by providing faster Internet access, more reliable connections and access to more advanced services (RTI, 2020). Launching a satellite to orbit should help diversify and bring down Internet costs and thus have a positive effect on the business environment and job creation (UNCTAD, 2006).

5.5.3. Open source software(OSS)

According to Zaie & Pujan (2013), new technologies and systems should be acquired wisely heeding the infrastructure in place in order to minimize the costs and refrain from fruitless investments. One of the solution consist in adopting open source technologies (hardware, software or algorithms). Harnessing (extending or customizing) open source products will help developing countries sort out patent-related challenge as well as use existing algorithms to build their applications upon rather than developing them from scratch. OSS not only appears to be a genuine alternative to proprietary software, but to some extents it is deemed the most affordable in terms of total cost of ownership and access (World Bank, 2006). According to GSMA (2014), it allows countries to innovate in couple ways: firstly, by enabling a thriving ICT industry that foster OSS-based content and applications. Secondly, by developing customized contents and/or applications that can allow to meet local needs and requirements.

5.5.4. Technical interoperability

It is necessary to develop a general governmental technical interoperability framework to enable integration between IT systems ranged from ministerial departments, public agencies, and layers of government. This will define overall requirements for implementation of data sharing. Three interoperability aspects need to be considered:

- **Organizational interoperability:** This aspect of interoperability aims at addressing the requirements of the user community by making services available, easily identifiable, accessible and user-oriented (Whitman & Panetto, 2006).
- **Semantic interoperability:** this aspect interoperability ensures that the precise meaning of exchanged information is understandable between applications that were not originally developed for this purpose (Kiu,Yuen & Tsui, 2008). Therefore, it is a prerequisite for the front-end multilingual delivery of services to the user.
- **Technical interoperability:** this aspect of interoperability covers the technical issues of linking computer systems and services (Panetto, 2007). It includes open interfaces, interconnection services, data integration and middleware, data presentation and exchange, accessibility and security services (Guédria et al., 2015).

In addition, Interoperability Governance is needed to cover the ownership, definition, development, maintenance, monitoring of interoperability frameworks in the context of multiple organizations (Bernard & Bruno, 2017). It is a high-level function that fosters leadership as well as organizational structures and processes with the aim to ensure that the sustainability and extension of the interoperability frameworks between organizations' strategies and objectives.

5.5.5. E-Governance Portal

E-Governance Portal allows the citizens to access government information easily and to enjoy one-stop government services (GSMA, 2014). It is an interface between the government and the citizens, providing a web-based interface that enables interoperability between state portals, national portal integrating with departmental applications for services.

VI. CONCLUSION

Summing up, this paper is built on the existing body of literature and comprehensive interviews with decision makers and experts in the field of ICT in Democratic Republic of Congo. Common challenges and

deficiencies as well as potential solutions were pointed out and generalized for developing countries.

The notion of a “e-Government” was loosely defined to make the statements generalizable. Organizations are recommended to broaden their perspective. Instead of initiating efforts focusing on how to turn the exact current process into a digital version, they should assess and understand the SLEPT factors at play which may be markedly different from one country to another. Besides, they need to learn from best practices to designing and assessing appropriate solutions.

Based interviews conducted and the existing repository of literature, enabling solutions are proposed heeding different aspects of ICT related issues in the context of developing countries. Some prerequisites were pointed out that should be met, before any policies or solutions can prove effective. Firstly, regimes in place shall not deem ICT adoption a threat to their very existence. There is a need of mentality change from leaders and the highest authorities. Without the support their support and if the political system of a country do not appreciate transparency that ICT can bring, any initiative to facilitate the introduction of ICT is bound to failure and can complicate the vast deployment of ICT.

Secondly, an unbiased judiciary system is one of the building that fosters a safe and friendly environment for investors and business holders.

Thirdly, human and institutional capacity building and sustainably improving social and economic indicators are central to the entire strategy. In the same vein, restructuring the old curriculums of schools and university in order to align with the quality of graduates in terms of international standards to address current issues is another critical factor for the future generation to confront and respond to the realities of the new digital world. Otherwise, the adopted technologies will not meet the intended goals— either be used in a harmful or an inefficient manner or completely ignored.

Finally, for long-term, equitable development to occur, public, private, and civil society organizations at national, provincial, and local levels must be strengthened throughout the country. It appears safe to consider, however, that privatization and liberalization, or promotion of market competition are complementary rather than competing policies. While private firms tend to perform better than State Owned Enterprises(SOEs) given the same market structure, liberalization realizes its full potential when market competition is promoted.

Above all, we recognize however that there is no “one size fits all”-solution. The independent cases and the findings as well as experience reported in this paper are only generalizable to a limited scope. We rather advocate that as technology matures and business environment changes, the need to re-assess solutions and processes at a regular basis to make it flexible enough to change with future requirements takes on greater importance as none will last forever. In addition, further researches can examine the specific factors in depth (e.g: the citizen readiness etc.) to find new factors and get a more detailed view of specific issues.

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