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Analysing the importance of e-government in times of disruption: The case of public education in Rwanda during Covid-19 lockdown

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ABSTRACT

The world has been in the grip of the Covid-19 pandemic since 2019. The Rwandan Government failed to establish e-government infrastructure to provide e-education during the lockdown (a.k.a Guma mu Rugo or Stay home), resulting in all children having to repeat the academic level they were in when the lockdown started in March 2020. The problems in Rwanda’s education during Covid-19 are partly attributed to the government’s ICT platform which does not prioritise e-education services, government’s inability to provide infrastructures for e-government, and the lack of ICT equipment and skills. Research on the aspects of e-government and e-education in Rwanda is limited. Knowledge is scarce about what happened to public education in Rwanda during the lockdown. This study aimed to explore the effects of the lockdown on Rwanda’s public education and how e-education could have helped provide public education. A desktop research method, involving collecting data from existing sources on e-government and the state of public education in Rwanda during Covid-19, was conducted. The results show that the lockdown has negatively affected public education because the country failed to provide e-education services. To address the impact of the Covid-19 lockdown and possible future lockdowns, the government of Rwanda must establish an e-government infrastructure that provides e-education. It will also need to establish affordable infrastructure in rural areas where it does not exist.

1. Introduction

Since its spread across the world and subsequent declaration as a pandemic in early 2020, Covid-19 has had a severe impact on every aspect of human life in both developed and developing countries (Munzhedzi, 2021). One of the many measures instituted by governments across the globe to contain the virus was the lockdown. The lockdown has affected every aspect of life, including education in many countries, but its major impacts are mainly felt by poor people in developing countries such as Rwanda. This article uses the e-government discourse to explore the effects of the lockdown on Rwanda’s public education; and how e-education could have assisted in providing public education during Covid-19. This study is relevant because it is done at a time when many governments around the world are taking stock of their performance during the past two years of COVID-19. This study is the author’s contribution to the evaluation of the Rwandan government’s performance during the COVID-19 period. The analysis in this article has both theoretical and practical contributions. From a theoretical point of view, the author envisions filling the gap in the current literature on the use of e-government to provide public education in Rwanda. From a practical point of view, the author envisions providing practical recommendations to assist the Rwandan government, and any other government around the world, to provide e-government infrastructure and use it to provide e-service to their citizens in times of lockdown and other emergencies. The article begins with a discussion on the theoretical and conceptual analysis of e-government and Information Communication Technology (ICT) and e-government in a virtual state.

It follows with a discussion of the role of e-government in the Fourth Industrial Revolution (4IR) and a pandemic-prone future, and the nature of e-services currently provided by Rwanda’s IREMBO platform. IREMBO (i.e., gateway or door in Kinyarwanda), is Rwanda’s Government to Citizen (G2C) e-Service portal, which allows the citizen and businesses to submit the application for various services and make the payment online. The article proceeds with a review of the state of e-education in Rwanda and the effect of the One Laptop per Child programme during the Covid-19 pandemic lockdown. The article concludes with a discussion on how e-government could have saved Rwanda’s education from...
the impact of the Covid-19 lockdown and what the Government of Rwanda could do to provide e-education during Covid-19 and similar pandemic-related lockdowns.

2. Theoretical and conceptual analysis

According to an OECD (2008, p. 3), “Today it is widely accepted that the state has an irreducible role in the delivery of both basic social services and also justice and security”. The rise of the phenomenon of e-government (and e-governance), which was facilitated by the introduction of the Information and Communication Technologies (ICTs), especially the Internet in the late 1960s was meant to ensure efficient delivery of public services to citizens anywhere in the world, anytime of the day (Kayizali, 2005). Blom and Uwizeyimana (2020, p. 208), explain that “e-government refers to the usage of ICTs, especially the internet, and automated devices by the government to deliver services to the citizens and other stakeholders, within and outside the country’s boundaries effectively and efficiently”. Kayizali (2005, p. 1) argues that these ICTs can be grouped into three categories. First, ICTs that use computers to process data, which has become predominant in modern societies since the early 1980s; second, ICTs that include “telephones (with fax) and the broadcasting of radio and television, often through satellites” and third, “networking technologies, the best known being the internet, which has extended to mobile phone technology. Voice Over IP telephony (VOIP), satellite communications, and other forms of communication still in their infancy” (Kayizali, 2005, p. 4). These other forms of communication still in their infancy could include the 4IR, which is characterised by the fusion of sophisticated technological advances such as Artificial Intelligence (AI), advanced robotics, drones, the Internet of Things (IoT), cloud computing, wearables, blockchain technologies, additive manufacturing or three-dimensional (3D) printing, driverless cars, nanotechnologies, and biotechnologies, to mention but a few (Nalubega & Uwizeyimana, 2019, p. 2). The 4IR technologies are still evolving, but their impact on industrial, social, economic and governance patterns is undeniable.

Similarly, when referring to a particular service, the concept denotes that such service is available to the citizens via electronic means such as the internet (Bakunzbake, Klein, & Islam, 2019). Therefore, e-education, which is the focus of this article, suggests that education services are available to the country’s citizens through electronic means such as the internet and other electronic platforms.

When a country’s government decides to provide full or partial e-services, it must go through several organisational changes to re-engineer itself. The result of organisational re-engineering is often referred to as ‘networking and collaboration’ (Kayizali, 2005, p. 2). Networking and collaboration between the government and its socio-economic partners facilitate the integration of the delivery of services in the traditional ways and is also a vital ingredient for e-services (Kayizali, 2005, p. 2). As argued by Blom and Uwizeyimana (2020, p. 209), “The electronic networks that are needed to make e-government function and the interactions that result from these electronic networks are known as Government-to-Government (G2G), Government-to-Citizen (G2C), and Government-to-Business (G2B)”. However, networking and collaboration between the government and the citizens and business communities are not sufficient for e-government to function effectively and efficiently if the citizens do not have the necessary ICT infrastructure and tools to use e-government. To establish the G2G, G2C and G2B networks, the government must have the necessary technical infrastructure and the social and economic partners must have the necessary tools to feed the information into the e-government system. They also need the necessary electronic means to draw the information and services from the e-government systems. The availability of government infrastructure that provides e-services, and the availability of tools and technical equipment that citizens use to access e-services are two important elements that make e-government work (Bakunzbake et al., 2019). The provision of e-services to other government institutions, the citizens, and the private sector institutions anytime, anywhere is equally important. The uninterrupted provision of e-services 24 h a day, seven days per week, and 365 days per year is what makes e-government different. The aim of e-government (e-GOV) in Rwanda is to improve government operational efficiency and service delivery (MINICT, 2015b, p. 7).

However, while the prefix ‘e’ refers to the government’s use of electronic devices on both these concepts to execute its functions, government and governance are not the same things (Blom & Uwizeyimana, 2020, pp. 208–209). There is a difference between e-government and e-governance. For example, while the concept ‘e-governance’ is also a composite of concepts, electronic and governance, it refers to the different mechanisms used by government and its non-governmental social partners (private sectors, civil societies, and individuals) to “operate, engage with citizens, and provide services” (Blom & Uwizeyimana, 2020, p. 208). E-governance considers the fact that non-governmental institutions often act as agents of the state to provide public goods and services on behalf of the government (Blom and Uwizeyimana, 2020). While the government is a key stakeholder in the governance structure, and networks that are created between the government and non-governmental social partners in the private and civil society sectors, the government is first among equal partners (primum inter pares).

When a government decides to use ICT to provide public goods and services to everyone, it becomes a virtual state. Therefore, most (though not all) governance networks created between the government and its non-governmental social partners (i.e., e-governance) are also often virtual networks. A virtual state refers to “a government in which information and communication flow increasingly over the web rather than through bureaucratic and other formal channels” and structures (Kayizali, 2005, p. 4). However, countries must meet certain conditions before establishing virtual states. The first condition is that these states must deliberately and consciously decide to use ICTs to provide public goods and services. There is strong evidence to suggest that a virtual state is possible in countries that are advanced in the use of technology, like Singapore. E-government is possible in Singapore because “ICT has penetrated all corners of government operations” (Kayizali, 2005, p.4). In Singapore, the virtual state has “eliminated hierarchical barriers, increased speed, increased transparency, expanded information, facilitated direct feedback and enhanced responsiveness” (Kayizali, 2005, p. 4).

The second most important condition virtual states must meet is to embark on the digitisation deliberately and decisively that is facilitated by and through digitalisation. Digitisation means “the encoding of analogue information into binary data”, a combination of zeros and ones. It is digitisation that makes “the exchange of information between all digital devices possible, hence, the ‘network society’” (Moll, 2021, p. 15). Digitalisation means “how most domains of social life are transformed around the digital technology (i.e., 3IR) infrastructure that is now at the centre of society” (Moll, 2021, p. 21). Since governments work in partnership with many local and global public, private, and NGO institutions all government partners must also digitise and digitalise their way of doing things. For example, e-education in Rwanda could be achieved through digitisation of education practices and digitalisation to change the administration and delivery processes of education.

According to Manoharan, Ingrams, Kang, and Zhao (2021, p. 467) “as the tools of electronic communication have spread and digital information has become the norm, e-governance has rapidly established itself in the daily operations of government around the globe. These authors argue that “it would be difficult to identify an area of government that does not use digital technology at all” (Manoharan et al., 2021, p. 467). The world has reached a point of no return in terms of using ICTs to provide goods and services to its citizens (Schwab, 2017). With the emergence of the 4IR technologies and the major progress in 5G network development and expansion across the globe, it will be
difficult to stop technology from becoming a critical part of public service delivery (Kurzweil, 2005, p. 135). As “technological access, innovations and skills become a sine qua non-condition for various social and economic sectors, the manual approach to public service provision will soon become a thing of the past (The South African Association of Public Administration and Management (SAAPAM), 2021, p. 2). Technology will replace most of the traditional physical practices such as meeting procedures (via Zoom, MS Teams, Google Meet, etc.), teaching and learning activities (such as via Blackboard Collaborate, and other e-teaching and e-learning management systems). As demonstrated during the Covid-19 pandemic, it is now possible to access e-health facilities and services via multiple types of technologies via mobile phones etc (SAAPAM, 2021, p. 2). The advent of the Covid-19 pandemic and its devastating effects is arguably the most vivid example showing that one does not have to wait for the future to understand the necessity and importance of using ICTs to provide public services. Thus, the access and use of ICTs to provide public e-services is no longer a luxury but a necessity. If one were to evaluate whether the Government of Rwanda could have used electronic means to provide e-education during the Covid-19 disruption period, one must first find out whether the government of Rwanda can provide e-education in the first place.

3. E-services in Rwanda during times of disruption: the case of IREMBO platform during COVID-19

According to the Government of Rwanda, the use of ICT has become dominant in almost all public services, including education, health, and service delivery over the past 20 years (Twizeyimana, Larsson, & Grönlund, 2018). However, a close analysis of Rwanda’s IREMBO platform shows that it was only hosting 44 services online in early 2012 (Bakunzibake et al., 2019), and by the time of this research in 2022, it was hosting 67 services. The services provided through the IREMBO Platform in 2022 include 13 categories of services which comprise the services summarised in Table 1. Notably, the services provided through the IREMBO platform do not include education. They include two services related to the accreditation of foreign qualifications, namely the “Application for Equating Foreign Qualifications”, and the “Application for Equating Foreign Qualifications - General Education” (IREMBO, 2022, p. 1). The only thing that seems to have overtaken other e-services in Rwanda is mobile money. Only two mobile carriers are operating within Rwanda: MTN and Airtel-Tigo. As of June 2019, of the total number of active mobile subscriptions in Rwanda, 54% are with MTN and 46% are with Airtel-Tigo (Kamande, Kamanzi, Kituyi, & Qureshi, 2021, p. 11). Table 1 summarises the types of e-government services provided by IREMBO in 2022.

| Categories                  | Number of services per category |
|-----------------------------|---------------------------------|
| Family                      | 12                              |
| Identification              | 10                              |
| Immigration and Emigration  | 10                              |
| Land                        | 9                               |
| Police                      | 8                               |
| Notarisation and Gazette Service | 4                         |
| Health                      | 3                               |
| Governance                  | 3                               |
| Education                   | 2                               |
| Rwanda Museums              | 2                               |
| Transport                   | 2                               |
| Criminal Record             | 1                               |
| Media                       | 1                               |
| Total                       | 67                              |

Source: IREMBO (2022)

4. The current state of e-education infrastructure in Rwanda

The Government of Rwanda claims that the role and use of ICT in education were highlighted during the Covid-19 pandemic. The government states that schools with online teaching facilities continued to teach when students and teachers were at home, while those schools with no online facilities closed. The only explanation of the reasons why Covid-19 has had serious impacts on both Rwanda’s learners and teachers is that the country’s ICT infrastructure does not provide e-education and that most students and teachers lack the requisite ICT skills. This is the view held by the Laterite and the Research for Equitable Access and Learning (REAL) Centre (2020, p. 2), which argue that the preliminary data from a Laterite and REAL Centre phone survey of teachers during the pandemic has shown that most of Rwanda’s teachers have little or no experience with online teaching and remote learning platforms. These organisations argue that the lack of ICT infrastructure and lack of ICT skills among many learners and teachers make it impossible for teachers to support their students outside the classroom. They also made it impossible for students to access any freely available reading material on open access websites.

The above argument demonstrates that e-education could have minimised the impacts of a prolonged lockdown on access to education (Agence France-Presse AFP, 2020). Because of the lack of e-education, “many of Rwanda’s students will have gone months without formal education” (Laterite and REAL Centre, 2020, p. 2).

The Rwanda Education Board (REB) School Data Collection Report (2019) shows that there were 2195 (75.5%) schools with computers across the country in 2019 and the Ministry of Education (MINEDUC) aimed to add 712 laptops and 712 projectors delivered to primary schools in the Financial Year (FY) 2020/2021, which would amount to a total of 2907 at the end of the FY 2020/2021. In addition, the REB School Data Collection Report of 2019 shows that Rwanda had a total of 1456 (84.2%) schools with computers. MINEDUC aimed to add 915 laptops and 915 projectors delivered to secondary schools in the FY 2020/2021, which would amount to 2461 schools with computers and projectors. Furthermore, the REB School Data Collection Report of 2019 shows Rwanda had 60 Centres of Excellence (CoE) in ICT established. MINEDUC aimed to establish 60 GoE equipped with laptops and projectors. To do so MINEDUC was planning to issue a tender for 3120 laptops, 60 projectors, and furniture equipment. Finally, a review of MINEDUC’s Outcome 6 of its Imihigo 2020/2021 shows that the government of Rwanda has taken some steps to enhance the use of ICT to transform teaching and learning. It also shows that in 2021, MINEDUC aimed to renovate REB Multimedia Studio. However, it is not clear how many Multimedia Studios existed that need to be renovated and operationalized during this FY 2020/2021 (MINEDUC, 2019, pp. 11–12).

4.1. The One Laptop per Child program during the Covid-19 pandemic

The above analysis does not mean that technology is not used in Rwanda’s education system. It simply means that technology, if used during the lockdown, was limited to the few children from well-to-do families, mostly concentrated in the big cities, especially Rwanda’s capital, Kigali. If one looks at the MINEDUC report statistics in 2018, only 30% of schools had access to the internet, which suggests that 70% of schools do not have access to the internet (MINEDUC, 2019). The question then is how are these laptops used if only 30% of schools in Rwanda have access to the internet? Igihe.com reported on 14 March 2021 that the government has distributed 275,000 computers (laptops). But, according to MINEDUC (2019), only 250,000 were delivered. There is no doubt that 275,000 computers (or the 250,000 that were allegedly delivered) were not enough to have an effective impact on a much wider school population, even in a non-COVID-19 lockdown situation. Furthermore, even if every school child in Rwanda had a laptop, few of them would have been able to use them to access e-education because 52.4 per cent of Rwandans do not have electricity, and up to “84% of
Rwandan Basic Education (BE) sub-sector is composed of pre-primary, primary, and secondary education levels. In addition, there is non-formal education, or Adult Basic Education (ABE) (MINEDUC, 2019, p. 1). The Rwandan authorities “are known for imposing draconian measures whenever crises happen, and in this time of the coronavirus, it was not any different” (Deutsche Welle (DW), 2019, p. 1). On 21 March 2020, “Rwanda surprised everyone by becoming the first country in Sub-Saharan Africa to order a total shutdown to contain the spread of the coronavirus”. To ensure citizens’ compliance, the local defence forces, police, army, and intelligence services were immediately deployed to set up checkpoints and patrol residential and business areas.

The order to shut down all schools was immediately issued after the first case of Covid-19 was found in Kigali (AFP/Stringer, 2019, p. 1). The Rwandan Basic Education (BE) sub-sector is composed of pre-primary, primary, and secondary education levels. In addition, there is non-formal education, or Adult Basic Education (ABE) (MINEDUC, 2019, p. 1). “The government’s 12-year basic education programme and education through grade nine are compulsory” (U.S. Department of State, 2021, p. 28). According to MINEDUC (2019) there were 282,428 learners in 3401 pre-primary schools (2019) and 2,512,465 pupils in 2961 primary schools (2019). There were 648,947 learners in 1452 general secondary schools (2019) (MINEDUC, 2019, p. 1). There was a total of 3,244,569 learners which combines primary (2,512,465) and secondary (732,104) (MINEDUC, 2021, p. 1).

The school disruptions which were caused by the government measures to contain the COVID-19 pandemic could have been minimised if Rwanda had a functioning e-government system. An article in Igihe.com on 14 March 2021 published a story on “Ubudasa bw’irwanda” (“loosely translated as Uniqueness of Rwanda”) in which it claimed that the Rwandan Government continued, almost uninterrupted, to provide education services to all learners through technology. However, the government newspaper’s claims were contradicted by the Minister of Education (MINEDUC), Dr Valantine Uwamaria (cited in Kamuzinzi, 2021, p. 2), when she announced that “Every learner in both primary and secondary schools in public and private schools will repeat the year irrespectively of whether they have continued receiving an education while they were at home or not”. According to the Minister, the only children who could progress to the next school grade in 2021 are those approximately 500 000 children in nursery schools (abiga mu mashuri y’incare) known in French as gardienne), who will join those approximately 450 000 children who were in Primary 1 (known as Grade 1 or First year, in other education systems) when the lockdown started in 2020 (Uwamaria, cited in Kamuzinzi, 2021, p. 1). In early 2020, Khan and Stoelinga (2020, p. 1) predicted that the shutdown of schools in Rwanda had the potential to increase enrolment at Primary 1 “from an estimated 550,000 pupils in 2020 in a non-Covid scenario to 770,000 pupils in 2021 due to an increase in the number of learners who will become eligible to begin primary education”.

However, Khan and Stoelinga’s (2020) estimation of 770,000 pupils in 2021 was clearly underestimated because the Minister announced that the expected total number of pupils in primary one (P1) would be around 950,000 in 2021. According to Rwanda’s Minister of Education, “there were about 500,000 first-year children in 2020 who will be joined by about the same number of children who will be skipping the nursery school year to start the first year in 2021” (Uwamaria cited in Kamuzinzi, 2021, p. 2). This increase of pupils in P1 in 2021 became inevitable because of two reasons. The first is that the Rwandan Government cancelled the 2020 academic year. The second reason is the fact that the children in nursery schools who were turning seven years old were promoted to Primary 1 in 2021 to join those who were repeating Primary 1 from the 2020 classes. Understandably, the higher enrolment in P1 in the 2021 academic year “will have a long-term impact on the structure of the education system as this larger cohort will increase enrolment and the need for more resources in every subsequent grade they transition into” in the next nine or 12 years.

6. What could the government of Rwanda do to make the provision of e-education possible?

There are many things the Government of Rwanda could do to provide e-services and e-education, during, and after the Covid-19 lockdown.

6.1. Increase the internet penetration in both rural and urban areas of Rwanda

Among the hindrances listed by the United Nations’ Sustainable Development Goals (SDGs) are a lack of, or low internet penetration. According to Goal 9. C of the 17 SDGs, “internet penetration is a key metric in efforts to reduce poverty and encourage rational development” (UN, 2015, p. 2). When a country has a large coverage of internet penetration, it will be able to provide “Voice communication over the Internet (VoIP), blogging, internet radio, internet television, social networking sites, cloud computing, and internet-based user applications which all contribute immensely to the rise in popularity and acceptance of the internet as the primary communication method for many” (MINICT, 2015a, p. 10). Kemp’s (2020, p. 1) analysis of internet users in Rwanda shows that there were only about “3.31 million internet users in Rwanda in January 2020”. Kemp (2020, p. 1) also argues that “the number of internet users in Rwanda increased by 267,000 (+8.8%) between 2019 and 2020” and that “internet penetration in Rwanda stood at 26% in January 2020”. However, the biggest problem in Rwanda is that most ICT infrastructure which is needed for e-government, and e-services are heavily concentrated in the capital city of Kigali, with little infrastructure in rural areas where the majority (over 83%) of Rwandan people live. For example, it was estimated that over 300 Cybercafés were operational in Rwanda in 2008. However, over 65% of these Cybercafés were within Kigali City (The Communication Initiative Network, 2010). In addition, due to low computer affordability, low mobile phone penetration and lack of easy connectivity to the internet (Hotspots, 3 G modems), outside Kigali’s Business District, the number of Cybercafés in Kigali decreased to 131 in 2010. This explains the MINICT (2015a, pp. 10–11) report’s argument that only “38.9% of Rwanda’s public sector (ministries, agencies, provinces and districts) and 34.5% of the private sector had web presence” in 2010.

6.2. Currently mobile applications and government investment focus more on the market, business, and financial transactions than public service delivery

The biggest concern in the Rwandan Government’s ICT sector is how to make money from the ICT infrastructure. While this trend follows increased demand for linking mobile payment systems with online based e-commerce and trading platforms globally, it does not consider the socio-economic situation of most Rwandan citizens. It also does not consider public services like public education, which is generally provided to people who cannot afford private sector education. People with the means to take children to private schools in Rwanda do so because of the poor quality of education in public schools. From a business transaction and market-demand point of view, “Today, there were more than
3.4 million mobile subscribers who were able to purchase electricity and airtime anywhere at any time because of mobile payment systems in 2010, but there is a known number of people who were accessing online education during the same period” (MINICT, 2017, p. 2). Therefore, while e-government seems to be a high priority in Rwanda, e-education is not at the top of the government’s agenda because it is not a transactional activity and because public education is provided to people who are not financially capable of purchasing such service electronically.

6.3. Rwanda currently has a low digital literacy rate

Dias (2020, p. 381) argues that “the existence of formal e-government strategies and plans and the capacity to implement them” must be considered when comparing the success or failure of e-government and e-services delivery in developed and developing countries. Lack of digital literacy is one of the many reasons why the Rwandan Government was unable to provide e-education services during the Covid-19 lockdown. According to Mwai (2020, p. 1), only 8.4% of Rwandan citizens are computer literate. Thus about 91.60% of Rwandan citizens “lack skills to use smart devices to access digital services without depending on agents as intermediaries” (Mwai, 2020, p.1).

6.4. Increase government funding and allow the private sector to contribute to the budget allocated to ICT infrastructure

There is a direct link between the relative wealth and the quality of public policies for e-government development and implementation. Dias (2020, p. 381) argues that the “political commitment and high-level coordination” and the country’s willingness to allocate more funding on e-government development and implementation, explain why e-government is likely to deliver the expected results in developed countries and to fail in resource-constrained countries. This is no different in the case of Rwanda. According to Dias (2020, p. 391), the success in Rwanda “seems to be the result of the combination of three main factors: the development of focused plans such as the National Information Communication Infrastructure plans (2000–2015), the ICT Sector Strategic Plan (2013–2018), and the Smart Rwanda Master Plan (2016–2020)”. However, while Rwanda has a strong and lasting partnership with a private company, and a clear choice of a one-stop government model, most funding of e-government in the country seems to come from the national budget. For example, it is said that “the telecom sector in Rwanda has generated a total investment of 590.4 Billion Rwandan Franc (RWF) over the period 2001–2015” (MINICT, 2017). But most of this funding came from the government and little investment came from the private sector. If one considers that many ICT projects require considerable upfront investment which would be difficult to acquire from the government and the fact that the private sector’s investment is very minimal, one can understand why most Rwandan people still lack access to e-services and e-government, especially in rural areas.

6.5. Provide ICT infrastructure and equipment to both rural and urban areas

Urbanisation stood at 17.3% (2013/14) and is only expected to reach 35% by 2024 (MINICT, 2017, p. 8). If one considers the fact that about 83% of 13,194,480 Rwandan citizens are still living in rural areas (World Bank Data, 2022, p. 1), it means that most Rwandan students who originate from rural areas did not have access to the internet. That is why e-education was not possible during the Covid-19 related lockdown. According to MINICT (2017), there had been substantial public investments in ICT infrastructure development, such as national and metropolitan fibre networks. Such investments have been open to private enterprises to facilitate the creation of enhanced services and private sector investment in the field of ICT (MINICT, 2017). Under the scheme, many of the critical national infrastructures were built. A fibre optic backbone of 4000kms has been laid across Kigali, districts, and border posts (MINICT, 2017). Therefore, if Rwanda wants to provide e-education to its students, the government must recognise that almost every investment it has made has mainly focussed on Kigali City, leaving out other cities, towns, and rural areas.

6.6. Improve the intellectual capacity for developing local content and invest in the infrastructure for local hosting

Rwanda is currently facing a problem of low literacy levels which affect both the ability to produce and consume e-services. The Rwandan Government admits that “there is a limited production of local content that translates into limited services for citizens” (MINICT, 2017, p. 11). The content available on most internet service providers in Rwanda “is not translated into a local language that can be understood by wider citizens” (MINICT, 2017, p. 11). In fact, most of the content is hosted by internet providers outside Rwanda because “The cost for hosting in Rwanda is still high” (MINICT, 2017, p. 11).

6.7. Reduce the geographical divide by increasing Broadband Internet penetration in rural areas and other urban areas

There are “an estimated over 2.8 million households” in Rwanda (The New Times, 2019, p. 1), and most people and households with access to these ICT tools are in urban areas, mostly in Kigali City. According to the MINICT (2017, p. 11) “Internet penetration rate in Rwanda stood at 39.76% (May 2017) but because most internet users are concentrated in Kigali, this creates a high geographical divide”. The weak internet penetration rate in Rwanda is often attributed to several factors, including “high cost of internet, lack of awareness by the citizens, lack of local content and services in the local language, weak telecommunication infrastructure, which is very prevalent in rural areas, and a very small number of digitally literate citizens to utilise the internet” (MINICT, 2017, p. 11).

6.8. Create a start-up friendly innovation ecosystem to reduce the high attrition rate of SMEs start-up in Rwanda

The role of Small and Medium Enterprises (SMEs) in providing e-services and e-education cannot be over-emphasised in a country where most people have no access to smartphones, computers and lack ICT skills. For example, SMEs could assist in providing internet facilities to rural people via internet cafés, and they could assist students with low or no computer skills to use their facilities to read, study or access education material during the lockdown.

6.9. Improve the socio-economic situation of Rwandans to improve the current low device penetration (smartphones, tablets, and PCs)

An analysis of mobile connections in Rwanda between 2019 and 2021 shows that “there were 9.37 million mobile connections in Rwanda in January 2020” but “the number of mobile connections in Rwanda decreased by 153,000 (~1.6%) between January 2019 and January 2020” because most people sold off their phones to buy necessities such as food during the Covid-19 lockdown. It is estimated that the “number of mobile connections in Rwanda in January 2020 was equivalent to 73% of the total population” (Kemp, 2020, p. 1).

6.10. Make it possible for ordinary Rwandans to afford ICT equipment

When the international poverty line of living on less than US$3.20 a day per person is considered as the official global measurement of “people living below the poverty line, then 40.7% of Rwandans are poor” (Himbara, 2018, p. 1) and Rwanda’s average of people living below the poverty line is higher than the Sub-Saharan Africa average of 31.7%. Furthermore, when measured by the international poverty line
of living on less than US$5.50 a day per person, 92.2% of Rwandans are poor. Rwanda’s “average of people living below the poverty line is also higher than the Sub-Saharan Africa average of 84.5%” (Himbara, 2018, p. 1). About 66.2% of Rwandans are currently living below the poverty line because of the Covid-19 lockdown.

The National Institute of Statistics of Rwanda’s (NSIR) Labour Force Survey, published in August 2018, shows that “the median monthly earning at the main job in Rwanda stood at $1.47 (+--30,000 RWF) a day for males versus $0.88 (18,200 RWF) a day for females” (NSIR, 2018, p. 4). Martin and Robinson (2007, p. 1) argue that “access increased most rapidly for individuals at highest family income levels and most slowly for individuals with the lowest income levels”, the low income for most Rwandans earning monthly salaries make it impossible to afford ICT equipment and services. Lower salaries for females make it even harder for them to afford, given that they tend to earn just over half the monthly salaries earned by their male counterparts. This would directly explain the gender disparity in Rwanda’s access and use of ICT equipment and access to e-services.

6.11. Lower the price for internet connectivity to the levels that can be afforded by ordinary citizens, especially in rural areas

Igihe.com, a government newspaper mouthpiece stated that fast internet of 4 G covers 95% of Rwanda, but on 08 June 2020, Igihe.com reported that 62.9% use the internet, but only 1% of Rwandan citizens can afford 4 G. Most (46%) Rwandans using cell phones to access the internet use 2 G because they cannot afford 4 G or 5 G. Currently, only 4.6% of Rwandans who use the internet use 4 G. Therefore, even if 4 G covers 95% of Rwanda’s territory, as the government newspaper reports, such coverage would not increase access to the internet, because only a few people could afford it.

If one uses the examples of the three biggest internet service providers (ISPs) in Rwanda, namely the Mobile Telecommunications Network (MTN) Rwandacell, Terracom Rwanda and Airtel, it becomes obvious that most Rwandans cannot afford the internet. For example, according to an organisation called Balancing Act (2021, p. 1) to subscribe to MTN internet in Rwanda, “one requires a whopping RWF130, 000 for an internet card plus RWF20,000 monthly fees. At Terracom, an Evolution-Data Only (EVDO) card for specialised computers and laptops with 400Kbps speed costs RWF150, 000. Monthly subscription is U.S. $63 (about RWF35,000). Terracom’s Asymmetric Digital Subscriber Line (ADSL) goes for RWF50, 000 per month”. These tariffs are comparatively the highest in the East African region (Balancing Act, 2021). There is no doubt that these ISP charges are way beyond most Rwandan citizens’ affordability. For example, before the increase of 10% in 2020, Balancing Act (2021, p. 1) estimated that “The primary school teachers in Rwanda were paid less than 22,454 RWF, while the highest-paid earned RWF5,480 per month”. At the secondary school level, the minimum wage was “RWF23,827 while the maximum salary is RWF153, 450 per month” (Balancing Act, 2021, pp.1). After the 10% increase in 2020, it was estimated that “A freshly recruited primary school teacher earns RWF44,000 per month” (as of July 01, 2020) (The New Times, 2020, p. 1). However, the National Union of Teachers in Rwanda (Syndicat National des Enseignants au Rwanda or SNER) argued that Rwanda’s teachers’ salaries remained lower than the regional average and suggested that “RWF150,000 was required for a Rwandan teacher to meet their monthly basic needs such as meals, transport, and accommodation” (The New Times, 2020, p. 1).

The unavailability of ICT infrastructure and the high cost of ICT tools explains why most Rwandan people in rural areas have very limited access to these ICT tools. The Government of Rwanda explains this problem by stating that most Rwandan people do not have access to these ICT tools because “Smart devices such as computers and smartphones are relatively expensive compared to rural citizens’ disposable income” (MINICT, 2017, p. 11). The “operationalization of the POSITIVO PC production in Rwanda was expected to boost the device penetration” but few Rwandans can afford the POSITIVO PC price (MINICT, 2017, p. 12).

6.12. Increase ICT infrastructure and affordable electricity access and use in both rural and urban areas

According to the MINICT (2017, p. 11) “with only 27% of electricity penetration, ICT service provision in the rural areas is almost impossible”. In 2017, the Government of Rwanda explored the idea of “a partnership with Rwanda Energy Group to prioritise electrifying public sites to facilitate ICT services delivery” but, even if this initiative could have succeeded, it would not have solved the low ICT penetration problem. Without access to “off-grid electricity solutions” it would be impossible to expand ICT penetration in the rural areas or to provide e-education services to the people living there (MINICT, 2017, p. 11).

6.13. Establish maintenance of information and data assets

There is evidence that Rwanda has been moving forward with its digital transformation since 2010. As a result, data and information have been generated. However, because of a lack of infrastructure and skills, these data and information have not been harnessed efficiently or updated (MINICT, 2017, p. 11).

6.14. Improve access to affordable 4G and 5G internet infrastructure

According to the government-owned newspaper, Igihe.com, Rwanda was ranked third among countries that have access to fast internet in Africa in 2010. The government newspaper also claims that Rwanda was ranked 87 out of 180 by Ookla, an American company that specialises in speed and performance tests of internet connection. However, the Ookla ranking was made when Rwanda was still using 2 G internet, and when internet access was limited to about 823,494 (8%) of people living in Rwanda. This number was comparatively small but higher than 5040 (0.1%) of people who were supposed to have access to the internet in early years. Fewer people have access to or can afford 4 G internet in Rwanda. 4 G internet was introduced in Rwanda by a South Korean Company called KT Corporation in 2014. Since then, the Government of Rwanda claims that about 1,202,204 (10.6%) of people living in Rwanda have access to the internet. The Government of Rwanda claims that more than four out of 13,15000 million people in Rwanda now have access to the internet. It also claims that over 95% of Rwanda’s territory of 26,338 square kilometres is covered by 4 G internet in 2021 (South Korean Operator Korea Telecom (KT), 2018).

Despite the government’s claims that the 4 G LTE high-speed network in Rwanda has reached 95% coverage in 2018, the GSMA Intelligence (2019) which defines mobile broadband as “technologies that are 3 G or above” scored Rwanda 42.2%. In Sub-Saharan Africa, Rwanda was ranked in cluster three, at number 13 in Africa which means that it is an emerging country far behind number one Mauritius (65.2%) and number two South Africa (59.1%) on the continental ranking (GSMA Intelligence, 2019). The fact that Rwanda scored 42.2% in the 2019 mobile broadband technologies ranking suggests that the availability of affordable modern ICT infrastructure has not penetrated all corners of government operations in Rwanda. This is a major setback for a government that planned to become a knowledge-based economy in 2035 (after failing to achieve the same dream in 2020).

7. Conclusion

The purpose of this study was to explore the effects of the lockdown on Rwanda’s public education and how e-education could have assisted in providing public education during the Covid-19 lockdown. The article argued that the underlying ideas behind the phenomenon of e-government, was to ensure that efficient public goods and services are provided by both government (the primus inter pares) and its non-governmental
socio-economic partners to all the citizens, irrespective of where they reside (inside or outside the country). ICT is a critical factor in the facilitation of e-government, the establishment of a virtual government, and the provision of uninterrupted access to e-services during and outside the COVID-19 pandemic. As argued in this article, the uninterrupted provision of e-services on 24 h, seven days per week, and 365 days per year basis is what makes e-government different from the traditional way of providing public services. The article argued that e-education anywhere, and in Rwanda specifically, could only be achieved through digitisation as well as digitalisation. These two processes are important to change the way public education is provided in Rwanda before and after Covid-19.

The results show that the lockdown imposed by the Rwandan Government to curb the spread of Covid-19 has negatively affected public education because the country has not provided e-education services to children during the lockdown. If one looks at the above argument, it can be concluded that the lack of ICT infrastructure, lack of investment, poverty and unaffordability of ICT tools, and lack of ICT skills (to create and consume e-teaching and e-learning content) were the major reasons why the government could not provide e-services to the students during the lockdown.

Based on the discussion and findings in this article, the ability of the Rwandan Government to address the impact of the Covid-19 lockdown and impacts of possible future lockdowns that require the total shutdown of education, the Rwandan Government will need to establish affordable and accessible e-government infrastructure that provides e-education to all Rwanda’s students in both rural and urban areas. However, because most Rwandan citizens reside in rural areas which are generally impoverished and where ICT infrastructure, as well as other infrastructures such as electricity, are still lacking, it will be important for the Rwandan Government to provide such ICT infrastructures and to ensure that they are affordable for all Rwandans, especially the poor and the women. The Rwandan Government’s inability to establish ICT infrastructure that is accessible and affordable for all Rwandans was one of the many reasons why it was unable to provide e-education during the lockdown. Consequently, no Rwandan school child was allowed to progress to the next grade in the year 2021 (except those in pre-schools).

This article has outlined several policies and practical strategies and actions that could be implemented by the Rwandan Government to make e-education possible. The implementation of the proposed policy proposals will help to avoid or mitigate the impact of future catastrophic events and pandemics, as well as meet the requirements of education in the fourth and possible fifth industrial revolutions.

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