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THE ROLE OF DIGITAL SOLUTIONS IN ECONOMIC RESILIENCE AND GROWTH OF RWANDA SERVICES SECTOR IN POST COVID-19

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I. GENERAL INTRODUCTION

1.1. Background to the study

Technology understood as the combination of knowledge, skills and use of equipment, is a key driver of economic growth because it allows increase of quality and quantity as well as effective production. Information Technology (IT), in particular, discovered in the 1980s contributes to facilitation of people's daily activities. Since their invention, IT also called Digital Solutions (SD) has developed quickly and penetrated all domains of socio-economic life. Nowadays, the digital solutions play a significant role in financial services, ecosystem development, employment generation, and economic growth by driving key segments in the economy (Dörner and Edelma, 2015). Digital solutions have transformed lives especially in all businesses searching to increase productivity to facilitate tasks, and to hasten achievement of results.

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In both developed and still developing countries, Information Technology (IT) has become a key factor of development and has been put in the heart of economic changes (Seki, 2008). Out of economic activities, Information Technologies penetrated also the social lives with easy exchange of information through various social media platforms to which almost all social categories of people are familiar all over the World. Social media are used not only in seeking and sharing information, but also in all kinds of businesses. Hence, digital solutions have become

a tool for building resilient communities that are better prepared to withstand, adapt to, and recover from shocks during times of crisis through the use of social media, e-commerce, networks which provide extensive and real-time information, data collection, processing and keeping, etc. (Sirimanne, 2020).

In this way, digital solutions have been also, in many countries, a shield against economic shocks because they allow the maintenance of economic growth during and after crises. Since the appearance of COVID-19 pandemic by end 2019, IT is playing a key role in data processing, exchange of information and maintenance of activities in various domains in spite of lockdowns. In fact, the pandemic has pushed the global economy into a recession, with millions of people losing their jobs and livelihoods; the pandemic spread very rapidly worldwide reaching more than 213 countries in all continents, infecting and killing more than three million people (WHO). Small economies as well as big and strong ones have seen their GDP decreasing.

In order to face the pandemic consequences, it was important to develop and plan for different scenarios around how the economy or industries will evolve and therefore determine what actions founders and leaders need to take to survive, and eventually thrive in different situations (Singh, 2020). It is in this regard, that the Government of Rwanda has recommended the enhancement of the use of remote services with hope that this alternation could alleviate economic depression due to the pandemic. The digitalization of all possible services both in Public and Private Sector is recommended as an alternative way to avoid the complete stopping of activities which would led to long lasting economic crisis.

1.2. Problem statement

Digital solutions have been an alternation and important tool for the maintenance of economic activities during lockdowns. In fact, with schools, religious institutions and companies temporarily closing, many have been forced to rethink their approaches" (Mbabazi, 2020). However, some services cannot be delivered or consumed without a face-to-face contact. These include for example, hotels and restaurant which was strictly closed during the lockdown. For those services, the pandemic of COVID-19 caused inevitably hard shocks.

Prevention measures that include lockdowns of people, institutions, cities, and businesses affected the production and the selling. In order to maintain a certain level of productivity and alleviate economic depression, the Government of Rwanda has strongly recommended and

facilitated digitalisation of all possible services. However, this ambition faces a challenge of developing a high technology in a small economy because this requires new skills and capabilities in how public services are designed, operated and maintained (Brown, Fishenden, and Thompson, 2014). According to World Bank, substantial progress and key investments in this area is made, but critical challenges lie in bringing more Rwandans online, increasing the use of digital services and crowding in the private sector (World Bank, 2020).

For this, it is important to analyse how the digital solutions have helped the Rwandan Economy resiting against the pandemic shock and to examine possibilities of economic growth after the pandemic.

1.3. Research objectives

The general objective of the study is to identify the role played by the digitalization of services in creating resilience against COVID-19 shock allowing the maintainane of a positive economic growth.

Specifically, the research aims to reach the following objectives:

- To identify the kind of digitalization used by the Rwandan Services Sector in order to maintain activity during COVID-19 lockdowns;
- To examine the extent to which Services Sector was affected by COVID-19 in the first half of Year 2020.
- To measure the economic resilience instilled by digital solutions in service delivery during the second quarter of year 2020,
- To predict the needed level of digitalization for maintaining a positive economic growth for the Rwandan Economy in the aftermath of COVID-19.

1.4. Research questions

- What are e-services used during COVID-19 lockdowns to maintain activities in Services Sector of Rwanda?
- To which extent COVID-19 has affected Services Sector during the second quarter of year 2020?
- What is the level of economic resilience created by e-services during the second quarter of year 2020?
- What it is the level of Services digitalization needed in Rwanda to maintain a positive economic growth in the aftermath of COVID-19?

1.5. Hypothesis of the study

- Different kinds of e-services were developed in Services Sector during lockdowns to maintain activities;
- The COVID-19 pandemic has affected Services Sectors at a very high level;
- During the Second Quarter of Year 2020, e-services contributed to maintain a good level of economic resilience;
- An increased level of digitalization is needed to maintain a positive economic growth of Rwanda.

1.6. Relevance of the sudy

This study is important to the Rwandan society because it helps to understand the economic impact of the COVID-19 pandemic. Analysis made about economic resilience and growth economic during the lockdowns give a clear picture of economic chock caused by the pandemic. The identified contribution of e-solutions in ensuring the ongoing of some activities during COVID-19 crisis is meaningful to the Government or Rwanda in general and to the Ministry of Finance and Economic Planning because the study assesses the implementation and performance of the ICT policy.

The research is also important for the Economic Policy Research Network (EPRN) whose mission is to play a pivotal role in leading economic policy analysis in the country. Findings of the research about the economic resilience gained by different services thanks to e-solutions can be published by the EPRN in accomplishing its role of suggesting policy measures which would improve ability to cope with externalities.

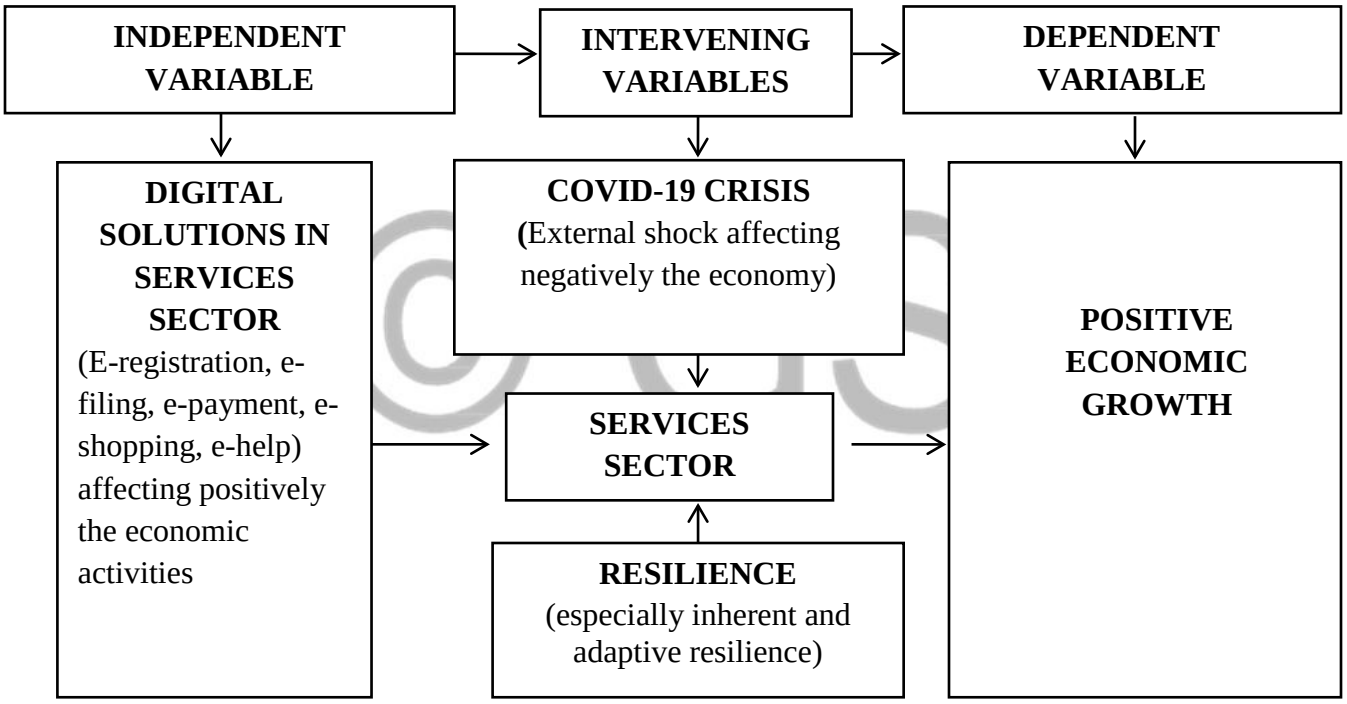
In short, the findings of this research are important to the public as well as to the private sector because they indicate how much the use e-services can solve present and future challenges when troubles impede the normal course of things. Findings would inspire economic decision makers in identifying where to put emphasis for economic recovery after the crisis.

1.7. Variables of the study

The research examines the role played by the Digital solutions in economic resilience during lockdowns and the possibilities of maintaining a positive economic growth in post COVID-19. It has three variables: the principle **Independent Variable** is “Digital Solutions” which are

supposed to instill resilience to Services Sector of Rwandan Economy and to allow Economic Growth (**Dependent Variable**). Hence, "Economic Resilience" is an **Intervening Variable** and at the same times a **Minor Independent Variable**. The study analyse first the existence of "Economic Resilience" against the Pandemic crisis as a condition sine qua non for the possible "Economic Growth". Hence, the "Crisis caused by COVID-19" is a **Second Intervening Variable** which impacts negatively the Economy while "Digital Solutions" brings a positive impact to the Economy. For data analysis, the possible economic growth will be forecasted on the basis of the economic resilience developed by the "Digital Solutions" used in Services Sector of Rwanda with a focus to the Second Quarter of Year 2020.

Figure1: Conceptual framework



Source: Conceived by the researcher

II. LITTERATURE REVIEW

2.1. Importance of digital solutions

Digital solution is the alternative concept used for "technology". This is defined as the combination of skills and equipment for trying to bring facilitations in man's life. Calculations have been the first activity to be affected by this man's continuous research for an easy life. This

happened in 1980's with the invention of the first computer. The rapid development of computer solutions has achieved the use of online services with the invention of "internet" which supports "e-services" also known as digital solutions.

All economic activities have been nowadays affected by the use of digital solutions. The impact is very big and varies from one industry to another depending on level of effort put by the management in embracing these new technologies. Being digital is about using data to make better and faster decisions, devolving decision making to smaller teams, and developing much more iterative and rapid ways of doing things (Dörner and Edelma (2015). In some countries like the USA, it is believed that competing in a global economy, regions must have an economic base composed of firms that constantly innovate and maximize the use of technology in the workplace (SSTI, 2020).

Digital solutions have transformed lives especially in businesses. The Internet of Things, for example, is starting to open opportunities for disrupters to use unprecedented levels of data precision to identify flaws in existing value chains. In the automotive industry, cars connected to the outside world have expanded the frontiers for self-navigation and in-car entertainment. In the logistics industry, the use of sensors, big data, and analytics has enabled companies to improve the efficiency of their supply-chain operations (Dörner, K. and Edelma, 2015).

2.2. Digital solutions and service delivery in public and private sector

When digital solutions are used in requesting and delivering a service, they are referred to as "e-services" to mean 'electronic services'. These are generally defined as the provision of services via the Internet whereas classic channels including telephone, call center, public kiosk, mobile phone, and television are also to be considered (Rowley, 2006). The delivery of service with the help of technology implies three main components, namely a service provider, a service receiver and the channels of service delivery or technology used. When public agencies are delivering service to citizens or to businesses, the latter are the service receiver while internet is channel of e-service delivery. In private sector, the level of development in the use of e-services depends largely to commitment and investment made by the Governments in the development of ICT infrastructure.

Digital solutions have been an engine of development in many countries. According to Roy, J. (2017) digital government scholars and enthusiasts have sought a shift in mind-set away from an industrial production model of service delivery toward a more participatory and collaborative

eco-system of direct citizen involvement. This involvement in public service delivery is for sure a good step in development as this streams the access to information. In fact, opening up government data provides indeed the opportunity to involve innovators from inside and outside governments to create innovative ways to tackle old and new problems (Roy, 2017). An additional advantage is that the recourse to new technology has the potential to increase government efficiency and effectiveness, as well as to renew the delivery of services and the internal public sector operations (Roy, 2017).

Digital solutions have enormous potential to boost development by easing accessibility even during the pandemic, reduction of time spent in requesting a public service, reduction of costs of a service, and use of less effort in handling cases. According to German National Regulatory Control Council, digital solution can produce a reduction of up to 50% of the time normally spent in interacting with public administration and the cost normally spent by companies when interacting with the public administration (Daub, M. et al., 2020).

2.3. Economic growth

It is important to make a distinction between “economic growth” and “economic development”. On one hand, “economic development” is “a process that generates economic and social, quantitative and, particularly, qualitative changes, which causes the national economy to cumulatively and durably increase its real national product. On the other hand, “economic growth” refers to “increase of the national income per capita, and it involves the analysis, especially in quantitative terms, of this process, with a focus on the functional relations between the endogenous variables” (Haller, 2012).

For Schumpeter, the economic growth and economic development are two components of the “dynamic evolution of the economy” where the “growth component” brings about gradual, continuous and slow evolution due to the changes in the factor availability, and the “development component” brings about spontaneous and discontinuous change in the channels of output flow due to changes in the technical and social environments (Evangelista, 2018).

Economic growth is a narrower concept compared to economic development. Sometimes, economic growth is simply measured as the rate of change in GDP referring “to the quantity of

goods and services produced while economic development can be referred to as the qualitative increase in economic wealth of countries or regions"(Harerimana, 2018).

Schumpeter regarded the rate of innovations as important factor of economic growth of output while the population growth is its exogenous variable. As for the process of economic development, it is synonymous of discontinuous technical change, i.e., innovation (Evangelista, 2018)

Economic growth is generally measured annually and can be either positive, or zero, or negative. "*Positive economic growth* is recorded when the annual average rhythms of the macro-indicators are higher than the average rhythms of growth of the population. When the annual average rhythms of growth of the macro-economic indicators, particularly GDP, are equal to those of the population growth, we can speak of *zero economic growth.* As for a n*egative economic growth,* it appears when the rhythms of population growth are higher than those of the macro-economic indicators" (Haller, 2012).

2.4. Economic resilience

Resilience means the capacity to recover from crisis, difficulties or hardness. The concept is mainly used in the domain concerned with "disasters". In this context, resilience is understood as "resistance and emphasizes the importance of pre-disaster mitigation measures that enhance the performance of structures, infrastructure elements, and institutions in reducing losses from a disaster. Resilience reflects a concern for improving the capacity of physical and human systems to respond to and recover from extreme events (Tierney and Bruneau, 2007).

In general context, resilience is revealed by literature as "consistent cross-disciplinary treatments in which resilience is viewed as both inherent strength and the ability to be flexible and adaptable after environmental shocks and disruptive events" (Tierney and Bruneau 2007). Four domains of resilience are identified: technical, organizational, social and economic. In general, social and economic resilience relate to ability to identify and access a range of options for copying with disasters and calamities. If individual, groups and communities have many options, they are more resilient, if they have not many options, then they are less resilient.

An economy is resilient when a society has ability to minimize welfare losses for a disaster of a given magnitude (Hallegatte, 2014). Two dimensions of economic resilience are distinguished: *Static Economic Resilience* and *Dynamic Economic Resilience*. *Static Economic Resilience* is the efficient use of remaining resources at a given point in time. It refers to the core economic

concept of coping with resource scarcity, which is exacerbated under disaster conditions […]. *Dynamic Economic Resilience* is the efficient use of resources over time for investment in repair and reconstruction. Investment is a time-related phenomenon—the act of setting aside resources that could potentially be used for current consumption in order to re-establish productivity in the future relates to *Dynamic Resilience* (Rose, 2013).

The difference between the two resilience aspects is that while the Static Economic Resilience does not completely restore damaged capacity, Dynamic Economic Resilience refers to the ability and speed of the system to recover ((Pimm, 1984). On macroeconomic level, resilience has two components such as (a) **instantaneous resilience**, which is the ability to limit the magnitude of immediate production losses for a given amount of asset losses, and **(b) dynamic resilience**, which is the ability to reconstruct and recover.

Rose (2016) quoting Tierney (2007) and Cutter (2016) provides another classification which makes a distinction between **inherent** and **adaptive** resilience:

- **Inherent resilience** refers to capacity already built into the system, such as the ability to utilize more than one fuel in an electricity generating unit, the workings of the market system in offering price signals to identify scarcity and value, and established government policy levers.
- **Adaptive resilience** is exemplified by undertaking conservation that was not previously thought possible, changing technology, devising market mechanisms where they might not previously exist (e.g., reliability premiums for electricity or water delivery), or devising new government post-disaster assistance programs" (Rose, 2016).

All the above aspects of resilience have been summarized by Briguglio, L. et al. (2020) in only three aspects of economic resilience ability (a) to recover quickly from a shock; (b) ability to withstand the effect of a shock; and (c) ability to avoid the shock altogether". The author gives an analogy which recall the economic shock caused by the COVID-19, by arguing that "a person exposed to an influenza virus may (a) get infected but recovers quickly; (b) withstand the effect of the virus, possibly by being immunized; and (c) avoid the virus altogether by staying away of infection sources (Briguglio, L. et al., 2020). This happens also to any economy if it experiences external shock like the COVID-19.

Three scenarios can result from this shock:

The *first scenario* occurs when an economy can bounce back the shock after being adversary affected thanks to a resilience associated with a "shock-counteraction". The second scenario occurs when an economy has put in place mechanism to endogenously react to negative shocks to reduce their effect to zero or negligible. This resilience is referred to as "shock-absorption". The third scenario occurs when an economy has an inherent resistance allowing avoiding chocks (Briguglio, L. et al., 2020).

2.5.COVID-19 and its economic impact

COVID-19 (Corona Virus Infection Disease of the Year 2019) is the name given by the World Health Organization (WHO) to the new highly infectious respiratory disease. It emerged in September 2019 in Wuhan, Hubei Province, China. The virus that causes COVID-19 is mainly transmitted through droplets generated when an infected person coughs, sneezes, or exhales. The droplets are too heavy to hang in the air, and quickly fall on floors or surfaces. One can be infected by breathing in the virus if he/she is within close proximity of someone who has COVID-19, or by touching a contaminated surface and then his/her eyes, nose or mouth. The COVID-19 pandemic is considered as the most crucial global health calamity of the century and the greatest challenge that the humankind faced since the 2nd World War (Maity, 2020).

2.6. Digital solutions and economic resilience

New technologies are factors of economic resilience, which can be measured by the reduction of poverty, improvement in education system, access to resources and development of protective resources including infrastructure (Daub et al., 2020). Advantages offered by digital solutions are numerous. They allow the continuing of activities in spite of the pandemic lockdowns; digital interactions are less time consuming for people and reduce the administrative burden on companies, which can support business as economies recover from the effects of COVID-19. Moreover, in public sector automation boosts productivity, reduces backlogs and frees up resources for other priorities. Furthermore, digitaliztion provides to employees higher level of job satisfaction due to fewer repetitive tasks and happier customers (Daub et al., 2020).

2.7. Measuring Resilience

There is a considerable debate in the litterature on the composite of indices of Economic Resilience (Briguglio, 2020). Many researchers have understood the concept as an economic situation that can be assessed by considering adjustments and adaptations made during hard period, innovations and resource substitutions done in the aftermath of the hard period (Daub et

al., 2020). However, translation of these indicators into a measurable thing is not easy. For Rose (2013), the Business Index (BI) can be used to measure resilience *static resilience*, and *dynamic resilience* with the use of a reference point or a baseline to perform a measurement.

Completing this attempt of Rose, Briguglioet al. (2020) has suggested the measuring of economic resilience of any economy by calculating the simple average index of five components of the economy including Macroeconomic Stability, Microeconomic Market Efficiency, Good Governance, and Social Development.

2.8. Digital solutions and economic resilience in Rwandan Economy

Rwanda has integrated Information and Communication Technologies (ICT) in all development plans, in order to transform its agro-based economy into a knowledge-based one. It is in 1998 that ICT for Development (ICT4D) policy was adopted to implement policies and plans that would address Rwanda's development challenges in the information and technology age, in order to accelerate the country's socio-economic development (Republic of Rwanda, 2015). The policy commonly known as National Information and Communication Infrastructure (NICI) was implemented since 2000 through NICI I planned for 2005, NICI II for 2010, and NICI III for 2015 and NICI IV set for 2020. Each plan had its own objectives.

The first phases were dedicated to the creation of a conducing environment and setting required and world-class infestructure. Since the third plan, the emphasis was put on the service development across five areas, namely Skills Development, Private Sector Development, Community Development, e-Government, and Cyber-Security. The fourth plan, or 2020 plan is now completing the NICI process by consolidating the country's ICT transformation (Republic of Rwanda, 2015). The event of the pandemic of COVID-19 intrevened before the completion and the evaluation of this plan but the country were sufficiently equiped with electronic solutions in different sectors so as to recommend the continuing of important activities inspite of the lockdowns and confinements imposed by the pandemic.

Rwanda has counted among a small number of countries in Africa, which have registered an economic resilience in the last decade. Before the COVID-19 pandemic, the annual economic growth rate of Rwandan Economy was maintained above 8. The resilience and the growing economy resulted from different measures taken by the government including the development of ICTs […] (Uraia, 2017). According to Hayward, the World Bank Digital Development

Specialist, Rwanda has already begun charting an ambitious course for achieving rapid digital transformation and demonstrated a clear commitment to embracing the digital economy as a lever for accelerating growth, improving services delivery and increasing job creation (World Bank, 2020).

In this regard and in consideration of the development made by the NICI, the Government of Rwanda has been able to recommend to public and private institutions the use of digital solutions in service delivery during lockdowns including e-payment, e- learning, e-commerce, e-filling and e-help. This aimed at the same time to limit the contacts between people which favour the spreading of COVID-19 and to avoid the cease of activities. Online applications and various platforms have been extended to daily activities of population by the digitalization of financial services like mobile money and mobile banking, agriculture services like e-Soko, healthcare services like e-health provided by Babyl Company, andmost of administrative services provided through the platform of “Irembo”.

Furthermore, new development is expected in new technologies exploitation since the National Strategy for Transformation 2018-2024 (NST 1) has also put in the centre the use of digital solutions. For example, in the financial sector digital transformation will touch the automation of Umurenge SACCOs and implement a series of sensitisations to increase uptake of electronic and digital financial services (Republic of Rwanda, 2017). In short, with reference to achieved targets and plans to be implemented in the near future, there is no doubt that new technologies have provided to Rwanda an inherent resilience already before the economy is affected by COVID-19.

2.9. Relationship between e-services, economic resilience and economic growth

With reference to the above literature review, it is identified that digitalization not only boots economic activities but also provide alternatave solutions when productivity is challenged. Hence, there is relationship between the Digital solutions mainly used in service delivery and the economic resilience because e-services create inherent and adaptive resilience of an Economy.

Well developed can offer ability to resist and limit the magnitude of the crisis and provide ability to recover from the crisis. In addition, they can bring inherent capacity to maintain acquired resources, and allow innovations. After the crisis, created resilience would allow the maintainance of a positive economic growth or even the transformation of a traditional economy into a modern and knowledge-based economy.

III. METHODOLOGY

The following section makes exposure of the population of the study, the sampling techniques, the selected sample, the research design, the data collection techniques and the data analysis methods.

3.1. Population of the study

The population of the study refers to all items from which a sample could be drawn for the study. In connection with objectives of the study, the target population is made of thirteen (13) services identified by NISR as making the Services Sector of the country. These represent 45% of the GDP and during the lockdowns were almost alone in operations and hence, by drawing inference, stand for the whole economy of the country.

3.2. Sampling techniques

The sample is the unit selected from the population to represent the whole population. A census sample was used by selecting all 13 making the Services Sector of the country. These services are:

i. Maintenance & Repair of Motor Vehicles,
ii. Wholesale & Retail Trade,
iii. Transport,
iv. Hotels & Restaurants,
v. Information & Communication,
vi. Financial Services,
vii. Real Estate Activities,
viii. Professional, Scientific & Technical Activities,
ix. Administrative & Support Service Activities,
x. Public Administration, Defense&Compulsory Social Security,
xi. Education,
xii. Human Health & Social Work Activities,
xiii. Cultural, Domestic & Other Services.

Source: NISR (2020*). Rwanda National Accounts, Q2, 2020.*

The research wanted to analyse resistance instilled by digitalization in these services had against the economic shock of COVID-19 in order to forecast their possible economic growth after the crisis. These services make a good sample from Rwandan economic activities because they are the ones which are the most facilitated by digital solutions and whose operations could be maintained during the COVID-19 lockdowns. The researcher assume that the inference of findings to all economic activities of the country is possible because, before the crisis, the services represented 45% of the GDP while during the crisis, they remained almost alone in operations thanks to digitalisation. This means also that the way the services behave during and after the economic crisis may give an idea of the situation of the whole economy.

3.3. Research design

This research has adopted a quantitative approach and analysed cause-effect relationship between the digitalisation of services and their economic resilience, individual GDP and GDP share before forecasting the Economic growth rate.

3.4. Data collection

Only secondary data were collected by the researcher. Two sources of information were used for all intents and purposes. These are:

- Statements of Cabinet decisions From March 2020, up to September 2020
- Report on Rwanda National GDP by the NISR for the Second Quarter of year 2020.

3.4.1. Statement of Rwandan Cabinet decisions

Since the appearance of COVID-19 in Rwanda on March14, 2020, the Cabinet held meeting every two weeks to assess the situation and to take measures against the pandemic outbreak. With the closing of majority of services, the cabinet indicated services that were allowed to open and those which are strictly closed. The cabinet recommended also some e-service delivery and to develop new e-solutions in order to allow more activities to continue operations in spite of the lockdowns. Each time, when a change in preventive measures was taken by the Cabinet, it was communicated to population through radios, TVs and social media. It is from these statements that data related to level of digitalisaion of services were collected.

3.4.2. Report of the NISR for the Second Quarter of year 2020.

Another source of secondary data has been the *Report on Rwanda National GDP* published by the NISR for the Second Quarter of Year 2020. For 13 services identified as main contributors to

GDP for the mentioned period, the researcher gathered data related to GDP per service, GDP share, and Growth Rate of each service. All statistical analyses conducted in this study were based on these data for the achievement of the research objectives.

3.5. Data analysis methods

3.5.1. Comparison

The *Comparison* between economic indicators of the last Quarter of year 2019 and those of the first Quarter and the second Quarter of year 2020 have helped to assess the economic impact of COVID-19 on services performance. In fact, an economic shock undergone by each service is determined by increases or decreases of its GDP, GDP shares and Growth rate during the period under study.

3.5.2. Calculation of resilience indices

In order to find the average of GDP index and the average GDP share index for the services supported by digitalisation during the two quarters of the year 2020, the researcher has used the simple index formula(Brigulglio et al., 2020) which follows: XSij = Xj – Minj/Maxj-MinJ

where :

- XSij is the value of the standardised observation on contribution of a service to economic growth rate,
- Xij the actual observation on the contribution of a service to Growth rate,
- Minj: is the minimum observation on the contribution to gowth rate,
- Maxj: is the maximum observation on contribution do growth rate.

The Standarised observations found for analysed variables are always an array of values between o and 1. The Mathematical average of standardised observations was used to determine the *economic resilince* that each analysed service has gained thanks to use of digital solutions during the second quarter of year 2020, corresponding to the first lockdown period made necessary by COVID-19.

3.5.3. Correlation analysis

For the determination of the relationship between the independent variable (digital solutions in service delivery), intervening variables (COVID-19) and the dependent variable (Economic Resilience) the *correlation analysis* were used. These have helped to verify the hypotheses of the

study as whether or not the use e-services enhanced during lockdowns especially in the second quarter of year 2020 activities have contributed to economic resilience against COVID-19 shock.

3.5.4. Regression analysis

After the calculation of the economic resilience and its relationship with the economic indicators, the forecasting of economic growth supported by the economic resilience was assessed by the regression analysis. This statistical analysis helped to measure how much the variation in "Economic Growth" is explained by "Digital Solutions" which allowed "Economic Resilience" of the Services Sector. In other words, regression analysis was used to predict the needed level of "digitalization" to maintain a positive "Economic Growth" in post COVID-19 crisis.

IV. FINDINGS AND INTERPRESTATION

4.1. Use of digital solutions in different services during the COVID-19 crisis

From March, 2020, the Cabinet held meetings with a frequency of two weeks to issue preventive and compulsory measures for every Rwandan citizen to curb the pandemic. The announced measures were always followed by recommendations about the use of e-service which would allow continuing operations in spite of the lockdowns. Majority of services were closed but some others were allowed to continue operations especially those which are deliverable online. For 13 services making the Services Sector of the Economy, the situation was different form one another.

Analysis of Cabinet decisions about the operating of services and recommendations about migration to e-services where possible depicts the situation of 13 services targeted by the study as follows:

Table 1: Cabinet decisions and recommendations for e-solutions

Service	Cabinet decision	Used or recommended Technology
Maintenance & repair of motor vehicles	closed	e-payment, e-help
Wholesale & retail trade	Only food pharmacist items	Telephone call and e-payment
Transport	Closed except transport of goods	e-registration, e-filing, e-payment, and e-help
Hotels & restaurants	closed	None
Information & communication	open	e-registration, e-filing, e-payment, e-delivery, and e-help
Financial services	open	e-banking (e-registration, e-filing, e-payment, e-delivery, and e-help)

Real estate activities	open	e-payment
Professional, scientific & technical activities	Open only online	E-registration, e-filing, e-payment, e-delivery, and e-help.
Administrative & support service activities	Open only online	e-registration, e-filing, e-payment, e-delivery, and e-help
Public administration & defense; compulsory social security	Open only online	E-registration, e-filing, e-payment, e-delivery, and e-help.
Education	Open only online	e-learning (e-registration, e-payment, e-delivery, and e-help)
Human health & social work activities	Open mainly online	e-registration, e-filing, e-payment, e-delivery, and e-help
Cultural, domestic & other services	Closed	e-payment, e-delivery

Source: Processed from the *Statement of Cabinet Decisions of 1/04/2020.*

4.1.1. Understanding recommendations for e-solutions

a) *The service of Maintenance & Repair of Motor Vehicles*, even if it is strictly closed during the lockdown, can use-solutions in terms of e-payment and e-help. In fact, pending payment can be done by phone (Mobile Money, Tigo Cash) while an assistance by phone call can also be delivered to moto-vehicle owner by a technician to whom he/she is familiar.

b) *Wholesale & Retail Trade*: only food and pharmacist items were allowed to operate during the lockdown according to Cabinet decisions. However, the use of e-solutions in these services is limited to use of phone call and e-payment.

c) *Transport*: This service is open only for transport of goods while transport of people is prohibited. In addition, its operating can have recourse to e-solutions for limiting contacts between people by using e-registration, e-filing, e-payment, and e-help.

d) *Hotels & Restaurants* were strictly closed from the beginning of lockdown and given the way these services rendered, there is no e-delivery possible.

e) *Information & Communication* is the Master of digital solutions and guides the whole process of e-services which have 5 components: e-registration, e-filing, e-payment, e-delivery, and e-help. This means that in this area, a customer can ask a service online, be registered, file data electronically if necessary, pay and receive the service online, and in case of problem in service operating, an assistance online (e-help) can be provided. A service with these 5 components is entirely digitalized.

f) *Financial Services* is also among Sub-sectors completely digitalized with its electronic transfers and e-banking which include all the five component of e-service.

g) *Real Estate Activities*: this sub sector was favored for different reasons. It continued its operations during the lockdown while it is open to the only e-solution of e-payment.

h) *Professional, Scientific & Technical Activities* were operational only online and fortunately they lend themselves to digitalization because the five components of e-services are possible in the country.

i) *Administrative & Support Service Activities* are also keen to digitalization because all 5 components of e-service were used during the lockdown which has allowed these services to continue to operate during lockdown.

j) *Public Administration, Defense&Compulsory Social Security*: the sub-sector can be fully digitalised with the 5 components of e-services. Examples of such service delivery include among others: e-taxation, e-procurement, and electronic court cases management.

k) *Education*: with introduction of e-learning recomended especially to universities and to secondary school where possible, education has maintained a certain level of operations during the lockdown.

l) *Human Health & Social Work Activities:* face-to-face delivery of this service was allowed only in case of emergency while all kinds of e-service were also possible. In fact, with Babyl Company, in addition to e-payment, e-registration, e-consultation, and e-prescription were developed rending the Health care service totally digitalized.

m) *Cultural, Domestic & Other Services*: activities of this sub-sector were closed in the lockdown. However, in addition to e-payment facilitated by phones, some cultural services continue to be consumed during the lockdown through TVs and social media.

4.2.2. Identification of digitalization level for Services Sector during the lockdown

During lockdowns, Services sub-sectors which were partially closed strived to become more effective by finding new e-solutions which would allow remote service delivery. Some closed services also tried to invest e-service delivery which would allow the coming back in operations. Every service which has contributed to GDP during the second quarter 2020 was evaluated as for the use of standard components of e-service as identified from Information & Communication Sub-sector. These components are: e-registration, e-filing, e-payment, e-delivery, and e-help.

In order to determine the level of digitalization of the Services Sector during the lockdown, all 13 sub-sectors were assessed against the use of all five components of e-service delivery. From the above table, each component of e-service carries 1 point. This means that services with all 5

components score 5/5 to mean that they are 100% digitalized. On the contrary, a smaller score was attributed to a service which has less that 5 components of e-service.

For 13 services targetedby the study, the level of the digitalisationis determined as follow

Table 2: Level of digitalisation of Services Sector during the second quarter of year 2020

Ord. Nr.	**Service**	**e-registration**	**e-filing**	**e-payment**	**e-shopping**	**e-help**	**Total score**	**%**
1	Maintenance & repair of motor vehicles	0	0	1	0	1	2/5	**40%**
2	Wholesale & retail trade	0	0	1	0	0	1/5	**20%**
3	Transport	1	1	1	0	1	4/5	**80%**
4	Hotels & restaurants	0	0	0	0	0	0/5	**0%**
5	Information & communication	1	1	1	1	1	5/5	**100 %**
6	Financial services	1	1	1	1	1	5/5	**100 %**
7	Real estate activities	0	0	1	0	0	1/5	**20%**
8	Professional, scientific & technical activities	1	1	1	1	1	5/5	**20%**
9	Administrative & support service activities	1	1	1	1	1	5/5	**100 %**
10	Public administration & defense; compulsory social security	1	1	1	1	1	5/5	**100 %**
11	Education	1	1	1	1	1	5/5	**100 %**
12	Human health & social work activities	1	1	1	1	1	5/5	**100 %**
13	Cultural, domestic & other services	0	0	1	1	0	2/5	**40%**
	Total Score	8/13	8/13	12/13	8/13	9/13	45/65	**69. %**
	Percentage	**(62%)**	**(62%)**	**(92%)**	**(62%)**	**(69%)**	**69%**	

Source: Analysed from the *Statement of Cabinet Decisions of 1/04/2020*.

According to above table, for some services, it was impossible to continue operations during the lockdown. These services include Hotels and restaurants which are probably the most affected Sub-sector because they were strictly closed during the first quarter of year 2020 until 30 April 2020 (Republic of Rwanda, 2020). All other services could have at least one component of electronic solutions thanks to the use of mobile money, mobile banking, and electronic transfer.

Services whose operations survived thanks to only e-payment have scored 1/5. These include Wholesale& Retail Trade and Real Estate Activities. For the latter, some activities like constructions were exceptionally authorized to maintain operations but services were rendered face-to-face and not online. Maintenance & Repair of Motor Vehicles as well as Cultural, Domestic & Other Services are also among the most impacted services and scored 2/5. Transport was affected but was able to operate with digital registration, digital filing, digital payment and possibility of phone call assistance, but the e-delivery was impossible. For this, it scored 4/5. All remaining services were in one way or another able to operate through a digital solution completing all five components of digitalization namely e-registration, e-filing, e-payment, e-delivery, and e-help. Those services include Information & Communication, Professional, Scientific & Technical Activities, Administrative & Support Service Activities, Public Administration & Defense; Compulsory Social Security, Education, and Human Health & Social Work Activities.

The indirect observation has attributed to those services a score of 5/5 to mean that they strived to operate during the lockdown thanks to recourse to digital solutions endorsed by a fully online service delivery. For a general observation from the above findings, it is revealed that 7/13 equivalent to 54% of service activities were able to operate thanks to digitalization during the lockdown imposed by the COVID-19 while the level of digitalization in services has recheaced69.4% which denote a good achievement.

4.2. Assessment of Services Sector resilience against COVID -19 impact

As it could be expected, COVID-19 had a negative impact on Rwanda Economy. According to Nations Institute of Statistics of Rwanda (Republic of Rwanda, 2020), in the 2ndQuarter of year 2020, the GDP at current market prices was estimated at 2,175 billion, down from 2,346 billion in Quarter 2, 2019. The services continued to lead in terms of shares to GDP with 45% compared to 28% and 19 % of Agriculture and Industry respectively while the remainder of 9% is attributed to net taxes on products.

Having maintained operations during COVID-19 lockdowns, Services has resisted against the crisis thanks to the recourse to digital solutions. This resistance can be identified by analysis of some economic indicators namely the GDP per Kind of Service, the GDP Share and the Growth Rate.

4.2.1. Analysis of GDP per kind of Services during COVID-19 lockdown

The GDP per kind of Service have decreased during the first quarter and the second quarter of year 2020. The decrease is estimated to have achieved 12.7% compared to the same period of the previous year (Republic of Rwanda, 2020). The following table shows the figures of GDP per service in the 3 successive quarters for the determinations of increases and decreases by kind of Service.

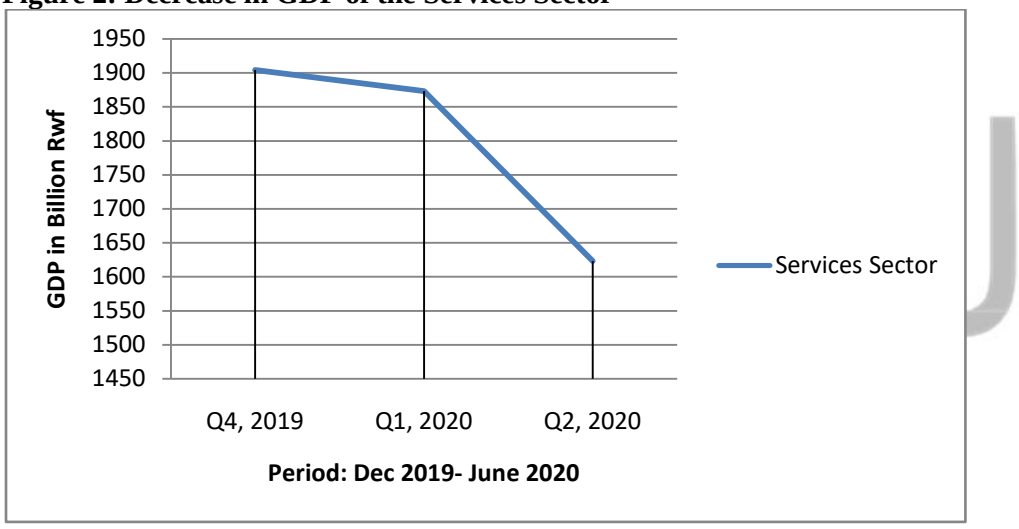
Table 3: Comparison of GDP by Kind of Service in 3 successive quarters

Ord. Nr.	Service	Q4, 2019	Q1, 2020	Increase/ decrease %	Q2,2020	Increase/decrease %
1	Maintenance & repair of motor vehicles	13	13	0%	9	-31%
2	Wholesale & retail trade	203	207	2%	165	-20%
3	Transport	163	142	-13%	97	-32%
4	Hotels & restaurants	45	37	-18%	14	-62%
5	Information & Communication	50	36	-28%	46	28%
6	Financial services	62	57	-8%	52	-9%
7	Real estate activities	150	157	5%	148	-6%
8	Professional, scientific & technical activities	56	52	-7%	53	2%
9	Administrative & support service activities	84	80	-5%	76	-5%
10	Public administration & defense; compulsory social security	134	141	5%	130	-8%
11	Education	66	66	0%	23	-65%
12	Human health & social work activities	37	51	38%	47	-8%
13	Cultural, domestic & other services	126	115	-9%	117	2%
	Total	**1189**	**1154**	**-0.4%**	**977**	**-15%**

Source**:** Data processed from Republic Rwanda (2020), *Gross Domestic Products-2020 Q2*, 2020.

In the first quarter of 2020 which ends with the beginning of COVID first lockdown, there has been already a decrease in GDP for almost all services, except Wholesale & Retail Trade which has an increase of 2%; Real Estate Activities which marked rather an increase of 5% as well as Human Health & Social Work Activities which had an increase in GDP of 38%. It is noted that Information&Communication which was the mostly affected services in the first quarter (-28%) has recovered in the second quarter (28%). The findings reveal the resistance of Information&Communication as leading service digitalization. Increases in GDP noted in the second quarter with some other services are also attributable to the same fact as their operations were made possible by the use of digital solution. The services having an increase of GDP in the Second quarter of year 2020are Professional, Scientific & Technical Activities with an increase of 2% and Cultural, Domestic & Other Services also with an increase of 2%.All other services taken separately continued to have a declining DGP.

Figure 2: Decrease in GDP of the Services Sector



Source: Processed from secondary data

In spite of the remarkable performance of sub-sector of Information & Communication Activities, there is a general decrease of -15% in the GDP of the Services Sector in the second Quarter, 2020.

4.2.2. GDP share of services at current price

It has been proven by the study of Brigulglio, L. et al., (2020) that the highest GDP of a country reflects the high economic resilience. By extrapolation, we assumed that the services wich had

the highest GDP share during the lockdown are those with the positive contribution to the economic resilience of the country.

Table 4: Services GDP share

Service	**Q4, 2019**	**Q1, 2020**	**Q2,2020**
Maintenance & repair of motor vehicles	0.50%	0.50%	0.40%
Wholesale & retail trade	8.30%	8.60%	7.60%
Transport	6.60%	5.90%	4.50%
Hotels & restaurants	1.80%	1.50%	0.70%
Information & communication	2.00%	1.50%	2.10%
Financial services	2.50%	2.40%	2.40%
Real estate activities	6.10%	6.50%	6.80%
Professional, scientific & technical activities	2.30%	2.20%	2.40%
Administrative & support service activities	3.40%	3.30%	3.50%
Public administration & defense; compulsory social security	5.50%	5.80%	6.00%
Education	2.70%	2.70%	1.00%
Human health & social work activities	1.50%	2.10%	2.20%
Cultural, domestic & other services	5.10%	4.80%	5.40%
Total	**48.30%**	**48%**	**45.00%**

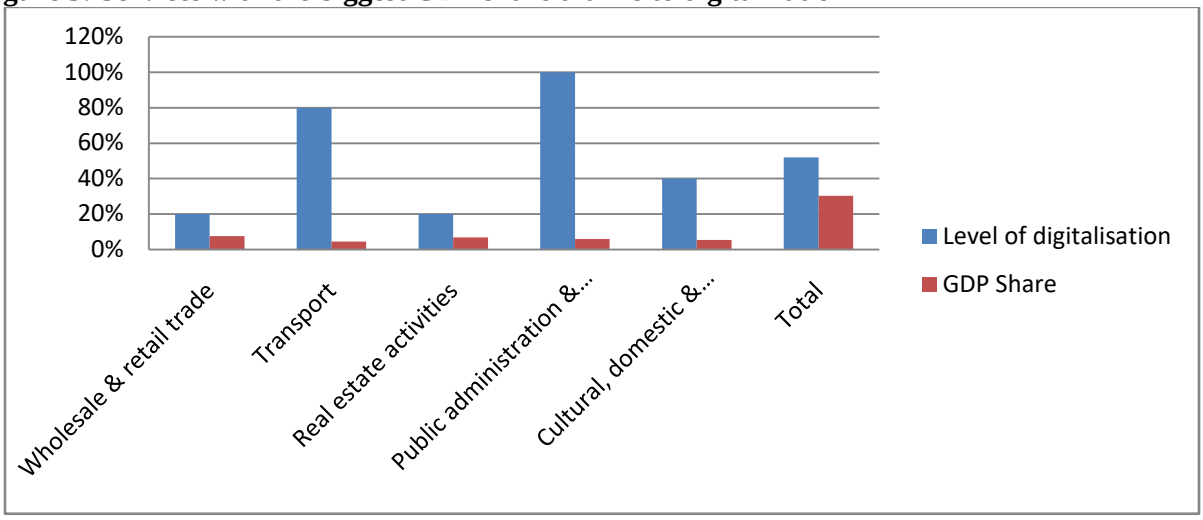
Source: Republic of Rwanda, *Gross Domestic Products -2020 Q2,* 2020.

It is noted from the above table that services have contributed by 48.30% to the GDP in the last Quarter, 2019, by 48% in the first Quarter, 2020andby 45% in the second Quarter, 2020.

Five services are taken as the biggest contributor to DGP share and these are: Wholesale& Retail Trade (7.6%), Real Estate Activities (6.8%), Public administration, defense & Compulsory Social Security (6%), Cultural, Domestic & Other Services (5.4%), and Transport (4.50%).The 5 services can be considered as the most contributing to the resilience of the Services Sector in the second quarter of year 2020, as they represent 30.30% share of the National GDP. This

resistance ability is also due to digitalization of these Services as their digitalisation represents 52% of e-solutions in the whole Sector.

Figure 3: Services with the biggest GDP share thanks to digitalization



Source: Processed from secondary data.

4.2.3. Contribution to the growth rates

The growth rate of services would give ideaabout services which have contributed most to positive Economic Growth. It is assumed that the services with positive growth rate have contributed positively to economic growth while those with a negative growth rate have contributed to GDP drop. This occurs mainly during the second quarter of the year 2020.

Table 5: Growth rates by service

Service	2019 Q4	2020 Q1	2020 Q2
Maintenance & repair of motor vehicles	0.0	0.0	-0.2
Wholesale & retail trade	1.2	1.0	-1.9
Transport	0.6	0.0	-2.0
Hotels & restaurants	0.2	0.1	-1.1
Information & communication	0.5	0.5	0.6
Financial services	0.3	-0.1	-0.2

Real estate activities	0.0	0.0	-0.5
Professional, scientific & technical activities	0.2	0.0	-0.1
Administrative & support service activities	0.2	0.0	-0.2
Public administration & defense; compulsory social security	0.1	0.8	-0.2
Education	0.0	-0.1	-1.7
Human health & social work activities	0.0	0.6	0.1
Cultural, domestic & other services	0.3	0.0	-0.2
Total	**3.7**	**2.6**	**-7.7**

Source: National Institute of Statistics of Rwanda, September 18, 2020

Data in the above table reveal that the grow rate of services which was 3.7 in the last quarter of 2019 drop to 2.6 in the first quarter of 2020 and become negative by 7.7 in the second Quarter, 2020. Almost all services have a negative growth rate except Information & Communication (0.6) and Human Health & Social Work Activities (0.1).

The 2 sub-sectors have contributed to positive Growth Rate by resisting to economic crises caused by the pandemic thanks to their digitalization achieving the level of 100% as seen above.

3.2.4. Calculation of resilience index

By the above analysis of the GDP of each service, the contribution to national GDP and to the Growth Rate, it is revealed that the digitalised services has been successful. But, we need to estimante the intensity of this resilience instilled by digital solutions.

Following the model to Brigulglio, L. et al. (2020), we have determined the resilience index by computing the average of GDP index, GDP share index, and the Growth rate of each services targeted by the research. Observations for GDP, GDP Share and Growth Rate have been standardised for having their index from which the Resilience index was calculated.

Table 6: Economic Resilience index for the first quarter, 2020

Nr.	Service	GDP index	Growth rate	GDP share index	Resilience index
1	Maintenance & repair of motor vehicles	0.00	0.00	0.00	0.00
2	Wholesale & retail trade	1.00	1.00	1.00	1.00
3	Transport	0.00	0.00	0.00	0.00
4	Hotels & restaurants	0.00	0.10	0.00	0.03
5	Information & communication	0.00	0.50	0.00	0.17
6	Financial services	0.00	-0.10	0.00	-0.03

7	Real estate activities	1.00	0.00	1.00	0.67
8	Professional, scientific & technical activities	0.00	0.00	0.00	0.00
9	Administrative & support service activities	0.00	0.00	0.00	0.00
10	Public administration & defense; compulsory social security	1.00	0.80	1.00	0.93
11	Education	0.00	-0.10	0.00	-0.03
12	Human health & social work activities	1.00	0.60	1.00	0.87
13	Cultural, domestic & other services	0.00	0.00	0.00	0.00
	Average	**0.31**	**0.22**	**0.31**	**0.28**

Source: Analysed from secondary data

The calculation of resilience index reveals that, in the first quarter 2020, only Financial services and Education have negative resistance index (-0.03). On the other hand, 5 services have resilience index of 0: these are Maintenance & repair of motor vehicles, Transport, Professional, scientific & technical activities, Administrative & support service activities, and Cultural, domestic & other services. Other 6 remaining services have a positive resilience index and this leads to average resilience index of 28% for the whole Services Sector in the first quarter of 2020.

Table 7: Economic Resilience index for the Second quarter, 2020

Nr.	Service	GDP index	Growth rate	GDP share index	Resilience index
1	Maintenance & repair of motor vehicles	0.00	-0.2	0.00	-0.07
2	Wholesale & retail trade	0.00	-1.9	0.00	-0.63
3	Transport	0.00	-2	0.00	-0.67
4	Hotels & restaurants	0.00	-1.1	0.00	-0.37
5	Information & communication	1.00	0.6	1.00	0.87
6	Financial services	0.00	-0.2	0.00	-0.07
7	Real estate activities	0.00	-0.5	1.00	0.17
8	Professional, scientific & technical activities	1.00	-0.1	1.00	0.63
9	Administrative & support service activities	0.00	-0.2	1.00	0.27
10	Public administration & defense; compulsory social security	0.00	-0.2	1.00	0.27
11	Education	0.00	-1.7	0.00	-0.57
12	Human health & social work activities	0.00	0.1	1.00	0.37
13	Cultural, domestic & other services	1.00	-0.2	1.00	0.60

	Average	**0.23**	**-7.6**	**0.54**	**0.06**

Source: Analysed from secondary data

In the second quarter 2020, the situation has completely changed because 4 other services are added to Financial services and Education in having a negative resilience index. These are Maintenance & repair of motor vehicles, Wholesale & retail trade, Transport, Hotels & restaurants. The deterioration of the situation is such that the resilience index for the Whole Service Sector drops from 28% to 6% in the 2nd Quarter, 2020. This verge of resistance is leveraged by the positive resilience index of Information and Communication (87%), Professional, Scientific & Technical Activities (63%), Cultural, domestic & other services (60%) Human health & social work activities (37%), Administrative & support service activities (27%), Public Administration, Defense & Compulsory Social Security (27%), and Real Estate Activities (17%).

4.3. Relationship between Digitalisation and Economic Resilience

In order to reach the overall objective of the research and to verify its first hypothesis, a statistical analysis was conducted with the correlation analysis to check accuracy about the level of the relationship between digitalization, economic indicators examined and economic resilience supported by the digitalization of services.

The relationship between the use of digital solutions in services and their economic growth and resilience was analysed with the help of correlation analysis.

Table 8: Correlation analysis

Variable	**Parameter**	**Digital Solutions**	**GDP index**	**GDP Share index**	**Growth Rate**	**Resilience Index**
Digital Solutions	Pearson Correlation	1	.044	.204	.236	.210
	Sig. (2-tailed)		.885	.504	.437	.491
	N	13	13	13	13	13
GDP index	Pearson Correlation	.044	1	.507	.475	.717**
	Sig. (2-tailed)	.885		.077	.101	.006
	N	13	13	13	13	13
GDP Share index	Pearson Correlation	.204	.507	1	.702**	.870**
	Sig. (2-tailed)	.504	.077		.007	.000

	N	13	13	13	13	13
Growth Rate	Pearson Correlation	.236	.475	.702**	1	.917**
	Sig. (2-tailed)	.437	.101	.007		.000
	N	13	13	13	13	13
Resilience Index	Pearson Correlation	.210	.717**	.870**	.917**	1
	Sig. (2-tailed)	.491	.006	.000	.000	
	N	13	13	13	13	13
**. Correlation is significant at the 0.01 level (2-tailed).						

Source: Analysed from secondary data

The correlation analysis reveals that a slightly positive relationship exist between the "Use of digital solutions in Services Sector" and the computed"Economic Resilience"($r = 0.210$, $P>0.05$) which means that the Use of Digital Solutions has brought a small positive influence to "Economic Resilience". The relationship with the economic indicators namely the GDP index, the GDP share index, and the Growth rate is also positive but not very high: Digital Solutions are insignificantly positively correlated to GDP index ($r = 0.044$, $P>0.05$), but the coefficient of correlation is improved with the GDP share ($r=0.204$, $P>0.05$) and with Economic Growth ($r= 0.236$, $P> 0.05$). It is to be noted that there is a positive and highly significant relationship between all the economic indicators calculated and the economic resilience of the Services Sector.

4.4. Prediction of the Economic growth

The regression analysis was used to predict the economic growth achievable by the use of digital solutions which allowed economic resilience of Services Sector of Rwanda. The regression of the Economic Growth upon the Use of Digital solutions and the calculated Economic Resilience returned the results presented in the following table:

Table 9: Regression of Economic growth upon the use of Digital solutions in services sector

Model	**Coefficient**	**S.E.**	**Standardised Beta**	**F**	**t**	**Sig**
(Constant)	-0.817	0.184			-4.229	0.001
Use of digital solutions	0.225	0.252	0.109		0.894	0.392
Economic Resilience	1.459	0.198	0.902		7.374	0.000
$R^2 = 0.853$						
Adjusted $R^2 = 0.824$						
F				29.115		0.000

Predictor: Constant, Use of Digital solutions, Economic Resilience
Dependent variables: Economic Growth

Source: Analysed from secondary data

The model returned an adjusted R squared of 82% percent implying that the two independent variables (Use of digital Solutions and the Economic Resilience) could explain jointly up to82% of the variation in the Economic Growth. The significance value for this analysis is the probability of getting an F-value of 29.115 or higher if the null hypothesis is true. To be remembered that the null hypothesis is that "Digitalisation of services have not instilled resilience against COVID-19 in the second Quarter, 2020 for the maintenance of economic growth in the aftermath of the pandemic". Since this probability is so low (<.000 or less than 0 out of 1,000), we would reject the null hypothesis and conclude rather that Digital solutions and the resilience they have brought in Services Sector have explanatory power on Economic Growth. This leads to examine the regression coefficients and their significance to support the alternative hypothesis according to which each independent variable has an influence on the dependent variable.

The regression coefficients (Standardised Beta coefficients) are 0.109, 0.902 with p-values of 0.395, and 0.000 respectively. These results show that Digital solutions have not directly a significant influence on Economic Growth ($p>0.05$) but the Economic Resilience brought in by the digitalisation has a very high and positive influence on Economic growth ($P<0.05$).

4.5. Forecast of economic growth for Services Sector

With the two independent variables (Digital Solutions and Economic Resilience) the regression equation is: $Y= 0.225x_1+1.459x_2– 0.817$,

Where,

Y: Economic Growth

X1: Digital solutions

X2: Economic Resilience.

With this equation, we can compute the needed level of Economic Resilience for rejoining the projected Economic Growth of 8%for year 2020 thanks to only services which, in 2019 made

alone the growth of 7.6% (AFDB, 2020). With assumption that all services are at 100% digitalized, calculations give the following scenario:

$0.08 = 0.225*1 + 1.459x_2 - 0.817$

$0.08 - 0.225 + 0.817 = 1.459x_2$

$X2 = \frac{0.672}{1.459} = 46\%$

This means that to rejoin the Economic Growth Rate of 8% thanks to Services Sector, there is a need of Digitalizing all services at 100% which may increase Economic Resilience from 6% to at least 46%.

CONCLUSION

Rwanda has made substantial progress in digitalization of services which has allowed the maintenance of service activities while the country was in lockdown due to COVID-19. Different services are deliverable online at nearly 70% thanks to digital registration, digital filing, digital payment, digital delivery and digital assistance. Services in particular have contributed by 45% to the GDP and to positive economic growth in the second quarter of year 2020, which correspond to lockdown period. During this crisis, services experienced the decrease in their respective growth rate with exception of Human Health&Social Work Activities and Information & Communication activities thanks to sustained recourse to digital solutions.

These two services resisted to COVID-19 shock by maintaining a positive resistence index and and positive growth rate. Comparison with remaining services and statistical analyses have confirmed this finding. Even if some services individually made “zero” resistance against the hardship of COVID-19, all services put together have contributed to economic resilience thanks to digitalization. In fact, all services have statistically a positive relationship with Economic Resilience and Growth.

As a conclusion, digital solutions convey inherent resilience and adaptive resilience because they are a factor of innovations. For this, their use should be enhanced to support economic resilience against hardships like COVID-19. Digital solutions have created ability to limit the magnitude of the crisis and will provide ability to reconstruct and recover after economic shocks as demonstrated by the calculation of achievable level of resilience and economic growth.

POLICY RECOMMENDATIONS

- **To the Ministry of ICT and Innovation**: tough supervision of the implementation of ICT policy to ensure performance of the sector,
- **To the Ministry of Finance and Economy**: extension of financial sector digitalization to microfinance institutions in order to give to people in rural areas access to e-banking;
- **To Private Sector Federation**: capacity building of members with emphasis to increase of ICT knowledge and skills.

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APPENDICES

Appendix I: GDP by Kind of Service at current price (in billion Rwf)

Ord. Nr.	Service	Q4, 2019	Q1, 2020	Q2, 2020
1	Maintenance & repair of motor vehicles	13	13	9
2	Wholesale & retail trade	203	207	165
3	Transport	163	142	97

4	Hotels & restaurants	45	37	14
5	Information & communication	50	36	46
6	Financial services	62	57	52
7	Real estate activities	150	157	148
8	Professional, scientific & technical activities	56	52	53
9	Administrative & support service activities	84	80	76
10	Public administration & defense; compulsory social security	134	141	130
11	Education	66	66	23
12	Human health & social work activities	37	51	47
13	Cultural, domestic & other services	126	115	117
	Total	**1189**	**1154**	**977**

Source: NISR (2020) *Rwanda National Accounts, Q2, 2020.*

Appendix II: Contribution to the growth rate by Services

Ord. Nr.	SERVICES	2019 Q4	2020 Q1	2020 Q2
1	Maintenance & repair of motor vehicles	0.0	0.0	-0.2
2	Wholesale & retail trade	1.2	1	-1.9
3	Transport	0.6	0	-2
4	Hotels & restaurants	0.2	0.1	-1.1
5	Information & communication	0.5	0.5	0.6
6	Financial services	0.3	-0.1	-0.2
7	Real estate activities	0	0	-0.5
8	Professional, scientific & technical activities	0.2	0	-0.1
9	Administrative & support service activities	0.2	0	-0.2
10	Public administration & defense; compulsory social security	0.1	0.8	-0.2

11	Education	0	-0.1	-1.7
12	Human health & social work activities	0	0.6	0.1
13	Cultural, domestic & other services	0.3	0	-0.2
	Total	**3.6**	**2.8**	**-7.6**

Source: NISR (2020) *Rwanda National Accounts, Q2, 2020.*

Appendix III: GDP Share of services

Ord. Nr.	**Service**	**Q4, 2019**	**Q1, 2020**	**Q2,2020**
1	Maintenance & repair of motor vehicles	0.5%	0.5%	0.4%
2	Wholesale & retail trade	8.3%	8.6%	7.6%
3	Transport	6.6%	5.9%	4.5%
4	Hotels & restaurants	1.8%	1.5%	0.7%
5	Information & communication	2.0%	1.5%	2.1%
6	Financial services	2.5%	2.4%	2.4%
7	Real estate activities	6.1%	6.5%	6.8%
8	Professional, scientific & technical activities	2.3%	2.2%	2.4%
9	Administrative & support service activities	3.4%	3.3%	3.5%
10	Public administration & defense; compulsory social security	5.5%	5.8%	6.0%
11	Education	2.7%	2.7%	1.0%
12	Human health & social work activities	1.5%	2.1%	2.2%
13	Cultural, domestic & other services	5.1%	4.8%	5.4%
	Total	**48.3%**	**47.8%**	**45.0%**

Source: NISR (2020*) Rwanda National Accounts, Q2, 2020.*

REPUBLIC OF RWANDA

OFFICE OF THE PRIME MINISTER

Cabinet Communiqué

A Cabinet meeting was chaired by the Prime Minister at Urugwiro Village on Monday, January 4th 2021.

1. The Cabinet approved resolutions of the previous meeting held on December 14th 2020.

2. **Given the recent rise in COVID – 19 cases, with half the total deaths occurring in December, Cabinet tightened existing health measures in order to contain spread of the virus. The public needs to significantly reduce social interactions and limit movements for essential services.**

   In order to contain further spread of the virus, all citizens are reminded of the critical importance of complying with health measures including physical distancing, wearing face masks and hand hygiene. Penalties will be applied for non-compliance.

   The following measures will take effect starting Tuesday, January 5th 2021 and will be reviewed after 15 days upon a health assessment.

   a. **Movements are prohibited from 8 PM to 4 AM.**

   b. **All business establishments including restaurants, shops, markets and malls will close operations daily by 6 PM.**

   c. **Public and private transport is prohibited to and from city of Kigali as well as between different districts**. Travel will only be permitted for medical reasons and essential services. Additionally, **vehicles transporting goods will continue to function with no more than two people on board**.

   d. Domestic and international tourists may travel across districts but must possess negative COVID – 19 test results.
   e. Institutions (public and private) will operate at no more than 30% capacity of staff. Other employees shall continue working from home on a rotational basis.

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