Research Study: "Digital divides or dividends: including basic services in Africa's digitisation agenda": Cases from Mauritius

Final Report

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By

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List of abbreviations

BOM	Bank of Mauritius	MIE	Mauritius Institute of Education
BPO	Business Process Outsourcing	MEL	Monitoring and Evaluation Learning
CAB	Citizen Advice Bureau	MGI	Mahatma Gandhi Institute
CAPI	Computer Assisted Personal Interviews	METEST	Ministry of Education, Tertiary Education, Science and Technology
CBO	Community-based organisations	MITCI	Minister of Information Technology, Communication and Innovation
CEB	Central Electricity Board	MNOs	Mobile Network Operators
CWA	Central Water Authority	MRA	Mauritius Revenue Authority
CSU	Citizen Support Unit	MRIC	Mauritius Research and Innovation Council
CSP	Citizen Support Portal	MUR	Mauritian Rupee
DIA	Digital industries Academy	NCB	National Computer Board
DLTS	Digital Learning and Transformation Strategy	NCERT	National Council of Education Research and Training
EDB	Economic Development Board	NEF	National Empowerment Foundation
EDLP	Early Digital Learning Platform	NGOs	Non-Government Organisations
EGDI	E-Government Development Index	NICTSP	National Information & Communication Technology Strategic Plan
EIU	Economist Intelligence Unit	NSIF	National Social Inclusion Foundation
EU	European Union	NPCC	National Productivity and Competitiveness Council
GDP	Gross Domestic Product	NYBCE	Nine-Year Basic Continuous Education
GDPR	General Data Protection Regulation	OSI	Online Services Index
GNI	Gross National Income	OU	Open University of Mauritius
G2B	Government to Business	PML	Polytechnics Mauritius Ltd
G2C	Government to Citizen	SADC	Southern African Development Community
G2G	Government to Government	SDG	Sustainable Development Goals
GOC	Government Online Centre	SIDS	Small Island Developing States
GWAS	Government Wage Assistance Scheme	SEAS	Self-Employed Assistance Scheme
HCI	Human Capital Index	SMEs	Small and Medium Enterprises
HPC	Household and Population Census	SMS	Short Message Service
IC3	Internet and Computing Core Certification	SRM	Social Register of Mauritius
ICT	Information and Communications Technology	SSP	Student Support Programme
ICTA	Information Communication Technologies Authority	TII	Telecommunication Infrastructure Index
ITU	International Telecommunication Union	UN	United Nations
MBC	Mauritius Broadcasting Corporation	UNDESA	United Nations Department of Economic and Social Affairs
MCB	Mauritius Commercial Bank	UOM	University of Mauritius
MEL	Monitoring and Evaluation Learning	USF	Universal Service Fund
MGI	Mahatma Gandhi Institute	ZEP	Zone d'Education Prioritaire

SUMMARY

The government's vision in the early 2000s to transform Mauritius into a cyber-island, set the stage for investments, policies and regulations enabling Mauritius to embrace the Services and Digital economy. The interdependence between ICT services and other sectors such as tourism, finance, manufacturing, and agriculture has been highlighted during the COVID-19 pandemic. Digitalisation of basic services remains high on the policy agenda in support of the country becoming a financial hub in Africa.

The entire population of Mauritius has enjoyed stable electricity coverage since 2010. Mobile data coverage through 4G stands at 99%, with an average of 151 mobile subscriptions per 100 inhabitants, and 78% of females and 81% of males owning a mobile phone. The cost of internet access is lower than the 2% of monthly GNI per capita threshold established by the ITU, making both fixed and mobile broadband affordable. There are 123 Internet subscriptions per 100 inhabitants, of which 98 are broadband connections, and 82% of these broadband connections operate at speeds greater than 10 Megabits per second (Mbps). Basic literacy levels are just above 90%, while 65 % of the population uses the internet; digital literacy is reported to be 57%. A timely review of the curriculum for capacity development on digital competency for citizens is ongoing.

The aim of this study was to assess the inclusiveness of the basic e-services for Mauritian citizens in key areas, namely, *education, revenue collection, health, finance,* and the provision of *social services*. This was carried out through an analysis of the EGDI, e-participation as well as three selected cases of basic e-services, and considering the impact of the COVID-19 pandemic on these e-services.

The UN EGDI report of 2020 indicates that Mauritius has the highest EGDI score in Africa (0.71). This study analysed the three dimensions of e-government, namely, the Telecommunication Infrastructure Index (TII), Human Capital Index (HCI) and Online Service Index (OSI), and identified areas for improvements to achieve a higher EGDI score, especially as a country needs an EGDI score above 0.75 to become a country with a '**Very High EGDI**'. The TII scores may already be improved based on widespread upgraded local broadband and international connectivity in 2021. The HCI is a function of literacy level, digital literacy and ICT skills. A renewed national campaign using an updated framework and online platforms for capacity development is required to strengthen the Digital Competence of the population. Improvements in OSI could be achieved by: better monitoring and evaluation of the current offer of e-services and comparing them to those evaluated during the EGDI surveys; learning from the range of e-services offered by high-performing countries; reviewing the list of indicators sought in international benchmarking jointly with local ICT stakeholders and e-service providers; and, adopting a participatory approach to understanding the use and adoption of e-services.

In addition to the InfoHighway Infrastructure, which offers the backbone G2G infrastructure to inter-connect governmental digital systems, among government departments, state-owned enterprises, parastatal bodies, and local authorities, three cases of e-services for citizens, which played critical roles during COVID-19 lockdowns, were studied, namely:-

1) The revenue collection service of the government which was adapted to also act as a disbursing agency to financially support its citizens.
2) The rapid mainstreaming of pilot e-services in the education system to ensure that the studies of school children and higher education learners would not be disrupted, while paying attention to equitable access, especially for students located in underprivileged households and regions. Meanwhile, a survey of students of a tertiary education institution showed that Universities have, in general, handled online learning for their students relatively well during the pandemic.

3) The Citizen Support Portal, a digital platform federating several citizen-targeted e-services, serves to manage requests and coordinate human intervention networks for solving the issues. It also depicts how transparency, process accountability, monitoring and evaluation, citizen inclusion, and ensuring the communities' needs are embedded within the system.

Based on these case studies, the inclusiveness of basic e-services were assessed as follows: -

- *Access:* G2C e-services are easily accessible, with widely available internet and broadband connections in the country, while supported in the background by the G2G services of the InfoHighway linking government systems. Citizens lacking digital skills can access the government e-services through the Citizens Advice Bureau or with the assistance of NGO-based social workers.
- *Affordability:* All the e-services are free, while internet connectivity, at less than Euro 0.33 per day, is considered affordable. The government is also providing free Wi-Fi zones in public areas, village halls, hospitals, and transport hubs.
- *Usage:* The e-service portals are user-friendly and e-services are easily accessible by citizens, which facilitate their usage. Citizens with basic literacy and digital literacy challenges get assistance from household members and community helpers.
- *Relevance:* The basic e-services offered have high relevance to users, which were further highlighted during the two lockdown periods with restrictions of movement, e.g. the use of the e-services for payment of taxes also being a channel for financial support.
- *Participation:* While the e-services usage could provide the number of users, this study highlighted a need for greater awareness of, sensitization on the e-services, and better monitoring of the perceived value of the e-service and the satisfaction of the user as feedback.

The following conducive conditions and factors leading to effective provision of inclusive e-services were observed through the cases studied:

(i) Establishment of a long-term vision of digitalisation for inclusive development
(ii) Sustained advocacy & support for ICT regulations and Infrastructural development
(iii) Adopting an intersectoral approach to ICT Development for better synergy and efficiency
(iv) Fostering a culture of digital services & reducing the gap in digital competencies across generations and across socio-economic classes
(v) Providing assistance and digital literacy for citizens' access and use of e-services
(vi) Continuous promotion of e-services & aiming to increase e-participation rates

The following recommendations are relevant for Mauritius:

(i) Greater stakeholders' engagement in the development and review of e-services
(ii) Promote greater integration of G2G and G2C services for the empowerment of citizens
(iii) Benchmark and review the digital competence framework for citizens
(iv) Monitor & evaluate digital service indices and measure the impact of e-services
(v) Tap into the strong local trained human resources for contextualised features of e-services
(vi) Consider Mauritius as a test-bed for innovative e-services in the region

The COVID-19 pandemic has prompted institutions to review challenges and demonstrate their capacity to adapt their delivery of basic e-services. As the country transitions out of the pandemic, there is a need to capitalise on these accomplishments, harmonise and interconnect these existing services. Opportunities for public-private partnerships to facilitate the availability of e-services to Mauritian citizens do exist and some emerged during COVID-19 pandemic. There is also potential for increasing the range and number of e-services, followed by renewed efforts to upgrade the population's digital competencies to use modern, efficient, and time-saving e-services. This would pave the way for Mauritius to move closer to being classified as a country with a "**Very High EGDI**". Ensuring that all citizens are included in this journey will require updating policies and regulations as well as addressing current challenges in the access and usage of e-services.

1.0 Introduction

1.1 Background to this research study

A research programme of the Knowledge Platform on Inclusive Development Policies (INCLUDE) was initiated in 2021, to gather information to support the digitalisation of basic services in Africa. Following a call for proposals, Mauritius along with Benin, Ghana, Rwanda and Uganda, were selected for the collection of cases to

(a) take stock of digital basic service interventions across different countries in Africa.

(b) assess how inclusive these interventions are in reaching and improving the wellbeing of poor and vulnerable citizens.

(c) analyse the enabling environment for inclusive digital transformation, and,

(d) extract lessons and good practices for scaling digital basic services and making them more inclusive.

1.2 The economic development path of Mauritius

Upon becoming an independent country in 1968, the Mauritian economy was primarily driven by its agricultural sector in the 70's through the production and export of sugar. It gradually transitioned to the manufacturing sector in the 80's followed by a phase of diversification in the 90's. During the same period, computerisation programmes were introduced in several ministries. Public access to the internet and the Web were introduced in Mauritius in 1995, followed by regulations to tap into the potential of ICTs. The government's aspiration of becoming a cyber-island, since the turn of the century, set the stage for policies and regulations, supporting Mauritius to embrace the Services and Digital economy with the ambition of turning the country into a financial hub in Africa.

In many countries, governments are working arduously to establish an excellent environment for ICT development, with the firm belief that creating such conditions is the best way to foster the new business formation and increase the number of successful, innovative entrepreneurs and ICT inclusion. An "enabling ICT-friendly environment" is a prerequisite for successful business outcomes, hence justifying a well-designed and fully functional institutional framework. Since markets are dynamic and circumstances change continuously, renewed ICT policies and strategies are necessary to keep the institutional framework up-to-date and ready to adapt to the changing requirements of the market.

The way in which governments around the world think about ICT policies has changed in recent years: it is now widely accepted that such policies not only contribute to economic growth but can also help meet the challenges being faced by society. Therefore, ICT has a role to play in supporting access to basic services such as water, electricity, health care, education, and personal safety/security. Further complications for small countries and Small Island Developing States (SIDS) in particular, include managing reliable and cost-effective access to raw materials and energy supply. In Mauritius, the provision of equitable access to food has been highlighted during the pandemic and the emerging post-pandemic situation[1].

[1] https://newsmoris.com/2022/05/02/mauritius-to-subsidise-essential-food-products-as-cost-of-living-soars/ ; https://www.mra.mu/index.php/eservices1/customs/gsog

1.3 Mauritius as a model economy in Africa

Mauritius has been classified as an upper middle-income country for at least the past 25 years and is often cited as a model of economic and social development in Africa (World Bank, 2022). Many of the indices comparing countries in Africa also show that Mauritius ranks high in the African continent. For example, in 2021, Mauritius was ranked 1st in the Ibrahim Index for African Governance[2] for the 10th year in a row (Mo Ibrahim Foundation, 2020), and it is the only African Country classified as a Full Democracy according to the EIU's Democracy Index 2021 (EIU, 2022). The UN SDG Report 2021[3] ranks Mauritius high among African countries, as illustrated in the Sustainable Development Country Dashboard (Fig 1) (Sachs et al., 2021). The UN EGDI report of 2020 places Mauritius as the highest ranked country in Africa, in the High Index category and very close to the threshold to be classified in the Very High Index category (United Nations, 2020).

Figure 1. Sustainable Development Report 2021 dashboard and trends for Mauritius (Sachs et al., 2021)

1.4 Structure of this report

Following a harmonised format for the research study cases from the five countries, this report is structured into four sections.

Part 1 presents the context of inclusive digital transformation, especially based on indices that enable comparison among countries around the world. It also describes the policy and regulatory environment for inclusive digitalisation. Part 2 of the report provides an overview of digital services provision in Mauritius and focuses on the range of G2G and G2C services available.

Part 3 of the report presents an in-depth analysis of specific G2C services, especially those that made significant contributions during the COVID-19 situation. and provides a better understanding of the inclusiveness of digital services.

Finally, Part 4 of the report addresses the analysis of the inclusiveness of e-services in Mauritius, identification of good practices and lessons learned from the case studies.

[2] https://iiag.online/locations/mu.html?meas=GOVERNANCE&loc=MU
[3] https://unstats.un.org/sdgs/report/2021/

2.0 Methodology

Part 1 of the study, covering the contextual background analysis of the research on digital services, consisted of desk research as most of the ICT policies and regulations in Mauritius are well documented online. Other data sources include Statistics Mauritius, especially a dashboard of indices on the ICT sector development since 2003, e-Government Development Index (EGDI), and E-Readiness global indices, which enabled data compilation and analysis. IT infrastructure accessibility and affordability have been addressed by comparing with other countries' documented reports.

Part 2 of the study, covering e-services provided in Mauritius, was also addressed through the online portals, combined with a comparison of the services listed thereon. Key informants from the Ministry of Information Technology, Communication and Innovation (MITCI) and the National Computer Board were also interviewed.

A set of e-services were identified through desk research. Some e-services have played a significant role during the COVID-19 pandemic given the increased dependence on online means of interactions and provision of services.

The potential case studies identified by the research team were prioritised and confirmed through stakeholders' interactions and data analysis. For each case study of an e-service, an interviewer-administered questionnaire was used with key informants from the organisations involved. The initial round of interviews focused on exploring the purposeful actions of the service providers towards the inclusiveness of their e-services.

The imposition of legal restrictions for public gatherings and closure of community-based service centres, during the study period, had limited the extent of interactions with the targeted service beneficiaries. The exercise was undertaken through smaller focus group interviews with around 4-8 stakeholders for each case, including key informants from the beneficiary groups identified through the service providers.

Following information gathering and preliminary analysis, an instrument was developed for follow-up interviews on the services with representatives of beneficiary groups. Interviewer-administered questionnaires were used in one particular case study, regarding e-education, an online survey was carried out amongst university students who were using the online e-learning platforms.

The interviews with beneficiaries aimed at evaluating the potential for improving the inclusiveness of the e-services, which could enhance the availability of the services, and suggestions of additional services to fulfill their needs.

Finally, a validation workshop was carried out with stakeholders from all four cases and other institutions. It provided an opportunity for discussions on the challenges faced and proposed solutions for the analysis of promising practices. The event also prompted a collaborative reflection on the way forward towards improving the inclusiveness of basic e-services in Mauritius.

PART 1. CONTEXT ASSESSMENT

3.0 Analysis of conditions for inclusive digital transformation

The evolution of performance indicators on enabling environment and infrastructure is well documented online, which eased the desk research and analysis. An overview of the conditions for digital transformation was possible through the regular survey on the UN's EGDI. The research study addresses a range of indicators, organised around a few clusters, and is detailed below.

3.1 Performance of Mauritius in the UN e-Government Development Index (EGDI)

The United Nations Department of Economic and Social Affairs (UNDESA) has been publishing the EGDI, including a survey report, since 2001. The survey is the only global report that assesses the e-government development status of all United Nations Member States. The assessment measures the e-government performance of countries relative to one another, as opposed to being an absolute measurement: it enables each country to compare the level and extent of its e-government initiatives while considering its own national development priorities and working towards achieving the SDGs. The EGDI assessment offers a normalised picture of the performance of each country every two years. Over the past 20 years, the EGDI has established itself as both a leading benchmarking and development tool for countries to learn from each other on e-government, to identify areas of strength and challenges, and as a tool for decision-makers to shape their policies and strategies in this area.

Table 1. Ranking and scores of Mauritius on the EGDI and e-participation Index from 2014-2020

Year	Rank	EGDI Composite Score	E-Participation Index
2020	**63**	**0.7196**	**0.6429**
2018	66	0.6678	0.691
2016	58	0.62306	0.66102
2014	76	0.53375	0.52941

Source: UN-E-Government Survey 2020

In the 2020 EGDI[4] survey, Mauritius was ranked 63rd out of 193 countries assessed (Table 1). Mauritius has the highest EGDI index in Africa (0.71) followed by Seychelles (0.69), South Africa (0.69), and Tunisia (0.65) (Annex A). Amongst the Small Islands Development States (SIDS), Mauritius is ranked 3rd, the top 2 being Singapore (0.9150) and Barbados (0.7279) (EGDI, 2020). The e-Participation index for Mauritius has dropped in the EDGI 2020 assessment.

The e-Government Development Index (EGDI) is a weighted average composite index of normalised scores on three dimensions of e-Government, namely (i) the status of the development of telecommunication infrastructure or the Telecommunication Infrastructure Index (TII), (ii) the inherent human capital or the Human Capital Index (HCI), and, (iii) the scope and quality of online services or the Online Service Index (OSI).

In the case of Mauritius, all indices have generally improved over the years except recently for the Online Service Index which has not kept up with the trends relative to other countries, and the score appears to have stagnated over the past two assessments (Fig. 2).

[4] https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2020

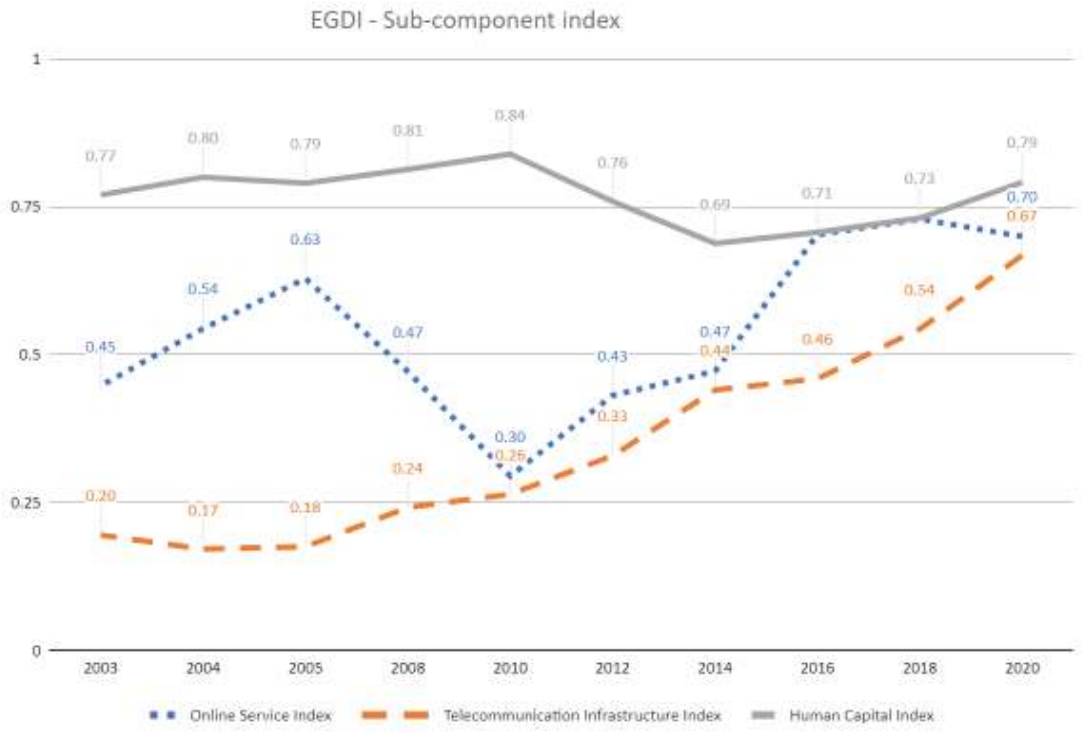

Figure 2. Evolution of the EGDI score of Mauritius by sub-component over the past 10 surveys

A further comparison of the sub-component indices across Africa in 2020 indicates that Mauritius is leading in the Human Capital index in Africa but is overtaken by South Africa under Online Service Index, and Seychelles under Telecommunication Infrastructure index (Annex B).

While Mauritius leads the African continent on the EGDI, it will have to achieve an EGDI score above **0.75** to join the category of countries with a "**Very High"** Index. However, the progress and performance of a country depend on continuous improvements on the sub-component indices, which are normalised during every biennial survey. Therefore, classification as a 'Very High Index' country can only be achieved if all the sub-component indices remain on an upward trend. Each of the sub-component indices, as well as the E-participation index, are characterised below, with some consideration for areas that can lead to improved scores.

3.1.1 Infrastructure development

There has been a steady improvement in the Telecommunication Infrastructure Index (TII) to its current score of 0.67 in 2020 (Fig. 2). Access to a reliable supply of electricity is one of the foundations of ICT infrastructure. With a population of 1.3 million in 2020 and around 465,000 households, Mauritius has achieved 100% access to electricity for its population since 2010. Mobile data coverage through 4G stands at 99% and there are 151 mobile subscriptions per 100 inhabitants (78% of females and 81% of males in the population own a mobile phone) (ITU, 2020)[5]. Smartphones and other devices are popular as 71.7% of the local internet user base (regardless of age)[6] regularly access Facebook, while the reach of "Facebook Ad" was 95.4% in 2022.

[5] https://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/Digital-Development.aspx

[6] https://datareportal.com/reports/digital-2022-mauritius

The broadband rollout has been mainstreamed since 2017, and the country continues to improve its high-speed broadband connectivity to serve the entire island, complementing optical fibre connections with mobile broadband, with the aim of making high-speed data transmission ubiquitous. Mauritius is currently the 8th most fibre-connected country in the world[7] (Fibre-to-the-Home Global Alliance, 2022). Fixed-line broadband subscriptions (comprising mostly households with optical fibre connectivity), as well as mobile-based home broadband, are available at competitive rates. The Internet subscriptions ratio stands at 123 connections per 100 inhabitants, of which 98 broadband connections per 100 inhabitants (ITU Digital Development Dashboard, 2020). Furthermore, 82% of broadband connections are at speeds greater than 10 Mbps. Internet access and use are well distributed, especially amongst the youth (Fig. 3).

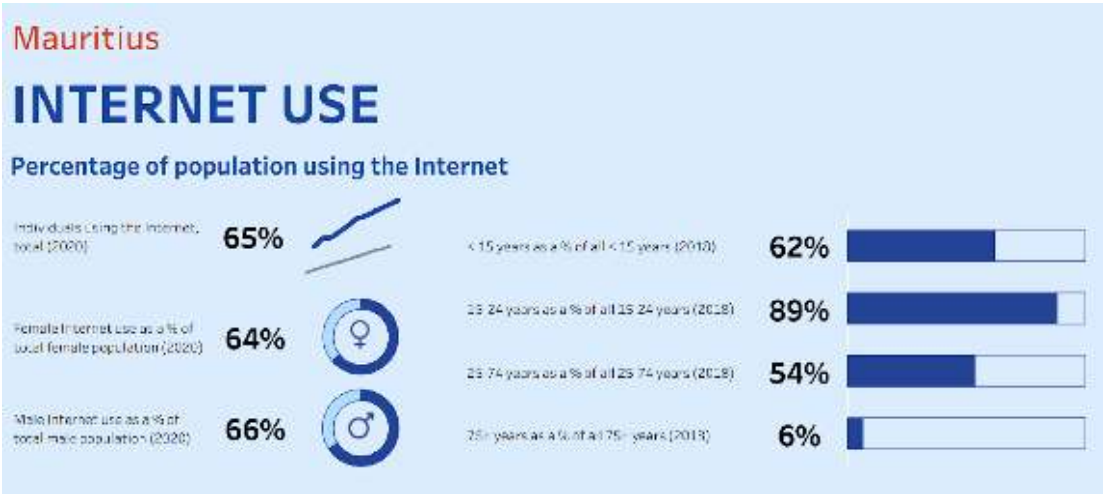

Figure 3: Internet use by gender and age group in Mauritius (Source: ITU Digital Development Dashboard 2020)

Introduced in Mauritius in 2021, 5G technology[8] is yet to be fully explored by developing countries, including Mauritius. It offers multiple benefits to an island state, including faster connectivity, reduction in geographical isolation, and the opportunity to engage with economic activities beyond its borders.

Mauritius is often cited as a reference in the region for hosting data recovery centres, its remote back-office offerings, medical tourism, and higher education hub[9] based on a robust, reliable state-of-the-art ICT infrastructure. The challenge of power cuts to institutions and businesses which can happen during cyclones needs to be addressed through investments in backup sources of power supply.

The international internet bandwidth has risen steadily and, with the recent addition of a 21 Terabits (Tbits) capacity undersea cable connection in 2021, now stands at 145 Gigabits per second (Gbps) (see Fig. 5 below). With the increased international connectivity, the Mobile Network Operators (MNOs) are working towards expanding the 5G network service across the island, starting with the more densely populated areas. The recent addition of international bandwidth capacity coupled with an extensive optical fibre network may lead to the TII score rising further.

[7] https://www.key4biz.it/wp-content/uploads/2022/05/Global-Ranking-2022.pdf
[8] https://www.statista.com/statistics/1215456/5g-cities-by-country/
[9] https://openknowledge.worldbank.org/handle/10986/35627?show=full

3.1.2 Digital literacy

The EGDI Human Capacity Index (HCI) score has consistently averaged around 0.75 and in 2020 a higher score of 0.79 was achieved (Figure 2), which is the highest for any country in Africa. The HCI is a function of literacy level, digital literacy, and ICT skills.

Basic literacy level was measured at 89.8 % during the Housing and Population (HPC) census in 2011 and a new HPC census, being carried out from May to July 2022, is expected to confirm that the literacy level now exceeds 90%. While literacy levels have not changed rapidly over time, Mauritius can only expect to improve its HCI score if the digital competence of the population is regularly upgraded.

The languages spoken in Mauritius include English, French, Creole, Bhojpuri, and other Asian Languages. The media landscape consists of 5 Radio channels (both private and public), 5 public TV channels broadcast 24/7, 70 Printed media channels, 65 of which are in English and French (7 Daily, 17 Weekly, 46 at lower frequency). This puts Mauritius in a good position for enhancing and democratising access to digital literacy.

Digital literacy is about being able to critically evaluate the flood of information available through digital media. This includes technical skills such as the ability to use diverse digital technologies, determine which digital tools are best suited for specific tasks, and agree on the best ways to share information. It is an essential skill for navigating the digital and information age**.** To ensure the inclusiveness of e-services in Mauritius, it is imperative that every citizen attains a minimum level of digital competence qualifying to become an e-citizen (Ronchi, 2019). The ITU dashboard 2020[10] indicates that digital literacy stands at 57% of the population, of which 33% have basic ICT skills while it is reported that 65% of the population uses the Internet regularly. There is therefore scope for improvement of digital competencies amongst the population.

In line with the investment in the ICT sector in the early 2000s at the national level and the vision to transform Mauritius into a 'Cyber Island', the National Computer Board initiated a basic training programme on ICT literacy in 2005 for all citizens. The programme also consisted of buses converted into Cyber-caravans to reach remote areas. The Universal ICT Education Programme was based on the Internet and Computing Core Certification (IC3) Course developed by Certiport Incorporation (USA) which was the first globally accepted, standards-based, validated certification program for basic computing skills at that time. ICT had also been introduced as a subject in primary schools by that time.

By 2013, more than 266,000 Mauritius citizens, representing a third of the adult population in Mauritius, had completed the programme. In the same spirit, in 2014, the curriculum of the IC3 was incorporated in the mid-Secondary School curriculum ensuring that all students acquired the basic skills by the end of their compulsory schooling years.

The National Computer Board is currently reviewing the digital literacy curriculum for citizens. The EU Digital Competence Framework[11] is being considered as one of the foundations to assess the digital skills computation of its population. Given the use of online educational channels and platforms during the COVID pandemic, there is potential to also use the medium for sensitisation campaigns, to provide access to learning materials, and to provide online training. Every citizen could be encouraged to acquire at least a basic level of digital competence ensuring they can easily adapt to any changing contexts. Furthermore,

[10] https://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/Digital-Development.aspx

[11] https://joint-research-centre.ec.europa.eu/digcomp_en

an online platform will facilitate testing, offer certification tools and enable monitoring of the digital competence of the population.

The functionality of digital competency could be classified into four categories to facilitate a learning pathway from one level to the next as follows: -

Level 1 (Minimum): Competence to seek and access information/news/entertainment online
(Search engine, Interactive forms, use of social media)
Level 2 (Basic): Competence to communicate and learn online
(Communication tools, passive learning contents)
Level 3 (Desirable): Competence to interact and exchange online
(Learning platforms, Knowledge Sharing tools)
Level 4 (Empowered): Competence to innovate and provide services online
(Collaboration tools, content & service creation)

Internet access connectivity for both fixed and mobile broadband is affordable in Mauritius, and this complements the widespread availability of infrastructure and continuously improving digital competency of the population to use e-services. The cost of internet access is lower than the 2% of monthly GNI per capita affordability threshold established by the ITU. The reduction in costs of internet connectivity is attributable to the competition amongst several players in the marketplace as well as regular reviews of the tariffs carried out by the Information and Communication Technologies Authority (ICTA).

3.1.3 Online Services Index (OSI), the e-Readiness index, and e-Participation

Based on the two recent EGDI Reports, there are signs that Mauritius has not been keeping ahead of the curve in some areas, namely the Online Services Index (OSI). The OSI score is based on the types of e-services offered along with their access and use by the different categories of users in the population, in comparison to other countries' offerings. In 2018, the OSI score for Mauritius was 0.73, it dropped to 0.67 in 2020.

Ramessur (2009) observed that the barriers inhibiting citizens' e-readiness are resistance to change, absence of opportunities for e-participation and e-consultation, and lack of awareness. In 2016, a study on the adoption of e-government services by Lallmahomed et al. found that citizens do not necessarily perceive the tangible benefits (financial, better time management etc) of using e-services offered by the government as most of the citizens are still used to the traditional services offered in government offices. These barriers still seem to represent challenges to the adoption of public e-services today, although the COVID-19 experience may have helped to improve appreciation of online services.

The EGDI survey of 2020 compared the extent to which countries provided 20 online transactional services as part of computing the score for the OSI (EGDI, 2020). While there are numerous digital services being offered in Mauritius, the range and number of services, as well as the documented extent of use of these services, are determining factors for the OSI. Improvements to the OSI score could be achieved with better monitoring and evaluation of the current offer of e-services; learning from good practices of the e-services offered by high-performing countries, and comparing the types of e-services listed from the most recent EGDI survey with the current offer, and addressing the gaps in new e-services that need to be developed and introduced. This research study on the inclusiveness of basic digital services is especially relevant to addressing aspects of the OSI.

In 2021, The Network Readiness Index, developed by the Portulans Institute[12], compared 139 national economies based on four pillars: Technology, People, Governance, and Impact. In 2021, Mauritius joined the classification as a high-income country, albeit for a short duration, as it has since re-joined its traditional group as an upper middle-income country due to the impact of the COVID 19 situation. However, the e-Readiness Index provided a glimpse of how Mauritius fared vis-a-vis other countries with a higher GDP per capita. Mauritius ranked 71st out of 130 and second in Africa following South Africa. The comparison showed that based on the GDP per capita level, Mauritius should have achieved a higher Network Readiness Index score. The report identified strong points as well as areas for improvement. For the latter, the report proposes that Mauritius could improve further on Access (e.g., international internet bandwidth, internet access in schools, etc.); Economy (e.g., High Tech/Medium Tech manufacturing processes, patent applications, online gig economy), and Businesses (e.g., websites for businesses, Gross Expenditure on R&D, proportion of professionals in the workforce). These observations provide insights on indicators that the ICT stakeholders and e-service providers should aim to improve, especially as the country targets re-entering the category of high-income countries in the future.

The EGDI score on the e-Participation Index for Mauritius dropped from 0.69 in 2018 to 0.64 in 2020, which is lower than the score achieved in the EGDI survey in 2016. The e-Participation index measures how deeply the government engages with the general public online. It ranges from information provision, and consultation, to decision-making. E-Participation is defined by the UN as "the process of engaging citizens through ICTs in policy, decision-making, and service design and delivery so as to make it participatory, inclusive, and deliberative"[13] (Le Blanc, 2020). Le Blanc also identified the following factors that limit e-Participation: (i) deficiencies in technology access and digital skills, (ii) lack of understanding of citizens' motivations to participate, (iii) reluctance of public institutions to genuinely share agenda setting, and decision-making power.

A holistic approach is essential to improve e-Participation while minimising the impact of limiting factors. Free public access to an e-service can bridge the digital divide of accessibility in the first instance. Complementary efforts such as improving the level of digital skills of the population can further the accessibility of e-services. In general, making a participation practice digital mostly allows for doing more, faster and cheaper (Le Blanc, 2020).

Sensitisation of e-service provision is also required to motivate the citizen to use an e-service. This motivation can be brought about either online or offline or using a combination of both. The role of intermediaries to assist citizens in accessing and using an e-service is crucial until the citizen is fully engaged with the e-service, and is confident to use the e-service directly. These intermediaries can be online assistants through dedicated and free telephone lines, community helpers, or family members, who are able to nurture the familiarity with the e-service and its value addition. Strategies involving citizens in the design and development of public e-services, as well as regular feedback from the users, are key factors for the success of an e-service. Feedback on the user experience obtained through an intermediary can also serve to empower the citizens on the design, functionality, delivery of the e-service, and its improvement. Intermediaries (digital, institutional, human) are an important element in ensuring e-Participation.

[12] https://networkreadinessindex.org

[13] https://www.un.org/esa/desa/papers/2020/wp163_2020.pdf

A participatory approach should be used to better understand the use and adoption of an e-service. Ideally, the designing approach should match the end-user perspective, capturing and identifying his/her need for an e-service. In this way, e-services could be developed to meet unfulfilled needs, improve the daily life of citizens and facilitate administrative tasks. The use of demographic data can also help identify communities needing specific messaging or requiring specific e-services. Mauritius is currently carrying out its Housing and Population Census (HPC) from 1st May 2022 while the last exercise dates back to 2011. It is the first time that Statistics Mauritius is using Computer Assisted Personal Interviews (CAPI)[14] to collect census data. The census survey program facilitates data collection for analysis. Data validation of information collected is facilitated through the InfoHighway. In line with the concepts of open data, the government could consider the extent to which social demographic data could be interrogated, by geographic region, such that programmes can be better designed to target the population and be more inclusive.

Each stage in the process incrementally improves the chances of a citizen using a digital public service regularly. Eventually, the perceived value of the e-service and the satisfaction of the user are the key factors that determine whether the user will re-use the e-service at a later stage.

3.2 General observations on conditions for inclusive digital transformation

With the highest EGDI in Africa and the third position amongst SIDS, along with adequate and stable electric supply across the country, Mauritius is well endowed to accessing internet connectivity within a household for work and leisure. It has a high density and penetration of broadband connectivity, achieved within the last 5 years, and a high and almost equitable distribution of mobile phone ownership between males and females. Furthermore, Mauritius has a high literacy rate which underscores the long-term vision to build up ICT literacy for all segments of the population (a) from the youth to the elderly, (b) public and private institutions building capacity in ICT skills, and (c) encouraging investment in ICT projects, which explains its high score on the HCI.

The ICT sector has progressively developed accompanied by a robust regulatory framework with special emphasis on ICT investment, access to infrastructure, data protection, with some challenges in resolving the legislative aspects of freedom of access to information. In addition to the global indices EGDI and the ITU Dashboard, regular updates of indices on the ICT sector are provided through the Statistics Mauritius dataset on ICT and the National Computer Board.

The government can leverage these positive attributes, to offer e-services and expect a high level of uptake among the population. In 2020, the EGDI points to a slowdown relative to other countries on the offer and uptake of such e-services, demonstrated by lower scores of the OSI and e-Participation indices. There is a need for better engagement of the public in the design, development, and use of e-services.

The EGDI 2020 survey was carried out in 2019, before the advent of the COVID-19 pandemic. The next EDGI survey report is expected in 2022, based on data gathered in 2021, during the pandemic. It remains to be seen how the pandemic situation may have, on one hand, increased sensitization of the need to use digital services offered by the government, while on the other hand, limited potential opportunities for economic activities that could have been facilitated through digital services.

[14] https://statsmauritius.govmu.org/Pages/Censuses%20and%20Surveys/Census/census_2022.aspx

4.0 Analysis of policy context surrounding digitalization

4.1 The role and development of the ICT sector in the economy

The Mauritian economy is diversified and still relies on its traditional sectors such as the production of sugarcane, the textile industry as well as its offshore financial activity (Fig 4). In 2020, the country's economy was driven by the services sector, which accounted for around 67.7% of GDP, with tourism (catering, accommodation, leisure, etc.) and financial services being the most important activity areas of the economy.

The industrial sector accounts for almost 17% of GDP, the ICT Sector[15] 7.4%, and the agricultural sector around 3.9% (EDB, 2020). Medical tourism, outsourcing, new technologies, and the luxury industries are the sectors currently being promoted and developed.

The ICT sector is expected to grow further as an important sector of the economy. The ICT/BPO sector itself currently provides employment to around 30,000 individuals through 850 establishments in the country. Many of the new areas of development of the economy rely on and integrate well with the ICT infrastructure and services available in the country.

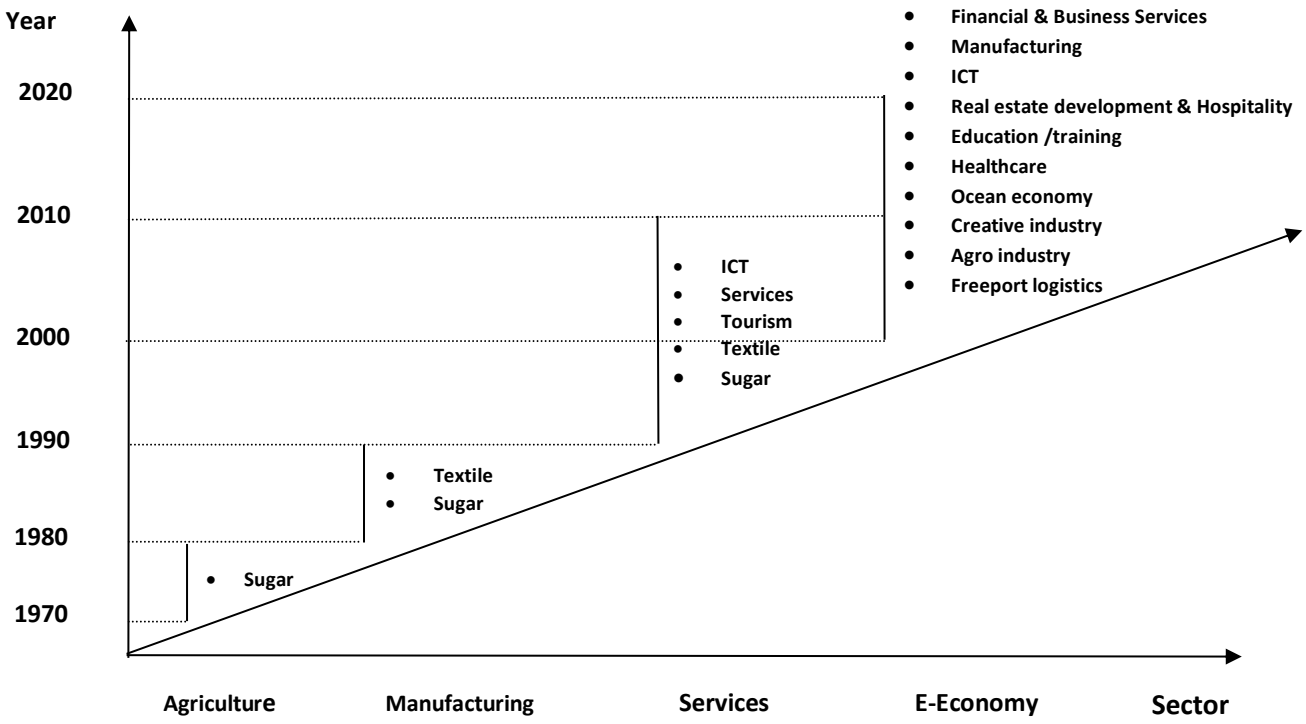

Figure 4. Evolution of the Economic sectors in Mauritius post-independence (Source: EDB, 2020)

[15] https://www.edbmauritius.org/ict

4.2 Developing Institutional capacity to support the ICT sector

The development of the ICT sector in Mauritius took off around 2000, with the announced vision of the government to transform Mauritius into a Cyber Island. In addition to launching the digital literacy initiatives for citizens, the NCB has also focused its attention on the development of ICT entrepreneurship, with the setting up of an ICT Incubator Centre which became operational in 2003. The Incubator Centre was aiming at tapping into ICTs to support an outward-oriented manufacturing sector, tapping into opportunities provided by regional and international trade agreements and counter-act volatile energy costs. The Centre has since been transformed into a Technopreneurship programme to encourage innovation and creativity in the sector.

In addition to the digital literacy programme becoming compulsory for high school leavers, ICT is also offered as a subject for high school final examinations. To date, 60% of secondary school students choose ICT as a subject for their studies. Mauritius has also consistently been investing in ICT skills capacity building, to address human resources and technology development needs in the ICT sector of both public and private institutions. The growth of the ICT sector has led the University of Mauritius to set up a separate Faculty of Information, Communication and Digital Technologies[16] in 2017 to ensure capacity building and research at the tertiary level. Polytechnics Mauritius Ltd (PML) is addressing the advanced fields of digitalisation and introduced a Diploma in Emerging Technologies in 2021, covering technologies such as Programming languages, GUI Tools & Distributions, Artificial Intelligence, Internet of Things, Mobile technologies & networks, big data, cloud computing, IT security, soft skills and team building[17]

Both ICT investment and the establishment of public institutions in the ICT ecosystem have contributed to enhancing the ICT capacity building in the country. These have resulted in public institutions that are adequately staffed and have the technical capacity to operate large ICT projects, such as the Government Online Centre and the InfoHighway infrastructure.

Skills development is now shifting towards innovation and entrepreneurship in the ICT sector and eventually applying ICTs at the service of other key sectors including agriculture, manufacturing, finance, etc. aiming to boost competitiveness. The Mauritius Research and Innovation Council[18] (MRIC) is supporting research interventions around emerging technologies, while the National Productivity and Competitiveness Council[19] (NPCC) has hosted a series of webinars aiming at enterprises adopting digitalisation across the board through its "Enterprise Go Digital" programme (NPCC, 2022)[20]. The Economic Development Board (EDB) is actively promoting foreign investments in the ICT sector[21] and has also been entrusted with the responsibility of setting up a Digital industries Academy (DIA) to ensure the availability of new skills in the ICT sector and to create a national pool of talents.[22]

4.3 National policies, strategies, and regulatory environment for digital services

Government interest in the ICT sector started in the early 1990s with the setting up of its computerisation programs in Ministries. This was followed by the enactment of laws, policies, and strategies to explore the comparative advantage offered through ICT. Around 2000, with the announced

[16] https://www.uom.ac.mu/foicdt/
[17] https://poly.ac.mu/it-emerging-technologies/diploma-in-emerging-technologies-internet-of-things/
[18] https://www.mric.mu/projects/emerging-technologies
[19] https://www.npccmauritius.org/en/
[20] https://npccmauritius.org/en/about-enterprise-go-digital.html
[21] https://www.edbmauritius.org/
[22] https://www.edbmauritius.org/ict

vision of the government to transform Mauritius into a Cyber Island, the country also started a process of aligning its regulations and reforms to promote and create trust in the ICT sector. Instrumental to this process was the setting up of the Information Communication Technology Authority (ICTA) as a regulatory body in the digital space.

The creation of the Board of Investment in 2001 (presently the Economic Development Board) facilitated foreign direct investment in the ICT/BPO sector while creating a level playing field for local enterprises through its set of competitive incentives. Both private and public sectors shared the understanding of the potential offered by ICT as tools to create jobs, wealth, and prosperity and continue to collaborate to advance this sector. Similarly, regulations of tariffs by ICTA to promote healthy and competitive pricing have been instrumental to the sustained decrease in the cost of internet connectivity over the years. There are periodic reviews of tariffs by ICTA to address both operators' and consumers' needs.

Today, several institutions operate, regulate and facilitate the ICT sector in Mauritius, under the Ministry of Information Technology, Communication and Innovation (MITCI). The key to the country's ICT sector development has been the successive formulation of National Strategic Plans since 1998, and periodic reviews and updates in 2006, 2011 (NCB, 2006; 2011)[23] with the latest being the Digital Mauritius Strategic Plan 2030[24] released in 2018. The Strategic Plan lays emphasis on the formulation of an innovative, effective, and sustainable Public Sector creating an enabling environment for business facilitation development.

A wide range of policies and regulations have been enacted to facilitate the development of the ICT sector. The changing ICT landscape for Mauritius, especially the infrastructure development combined with policies and regulations, is graphically illustrated in Figure 5. Furthermore, Links to the Policy, Strategy, and Regulatory documents are listed in Annex B.

The subsequent regulatory framework, the liberalisation of the telecommunications sector, and investment in infrastructure for connectivity have boosted private sector participation over the years, resulting in 3 major Mobile Network Operators (MNOs) currently operating in the local market along with the setting up and relocation of ICT companies from abroad, especially in the BPO sector.

Mauritius introduced its Data Protection Act in 2014 and subsequently revised it in January 2018. It is aligned with the European Union General Data Protection Regulation (GDPR). However, the discussion for a Freedom of Information Bill was initiated at the Cabinet level in 2015 but it is yet to be enacted.

The current Digital Government Transformation Strategy 2018-2022[25] provides directions for a digital Government, aligned with Vision 2030[26], the Public Sector Business Transformation Strategy[27,] and the Digital Mauritius Strategic Plan 2030[28]. It elaborates on the government's vision to transform Mauritius into a high-income, sustainable, innovative, and inclusive economy, with modern infrastructure, global connectivity, advanced skills and technology. The COVID-19 pandemic has affected the ICT Strategic Plan's implementation, and a new strategy document for the period 2022-2028 is under preparation.

[23] https://mitci.govmu.org/Documents/Strategies/NICTSP20112014.pdf

[24] https://mitci.govmu.org/SitePages/ViewAllReports.aspx?RType=Policies%20and%20Strategies

[25] https://mitci.govmu.org/Documents/Strategies/Final%20Digital%20Government%20Transformation%20Strategy%202018%20-%202022.pdf

[26] https://www.un-page.org/files/mauritius-vision-2030pdf

[27] https://civilservice.govmu.org/Pages/PSBTB/Public-Sector-Business-Transformation-Strategy-(PSBTS).aspx

[28] https://mitci.govmu.org/Documents/Strategies/DM%202030%2017%20December%202018%20at%2012.30hrs.pdf

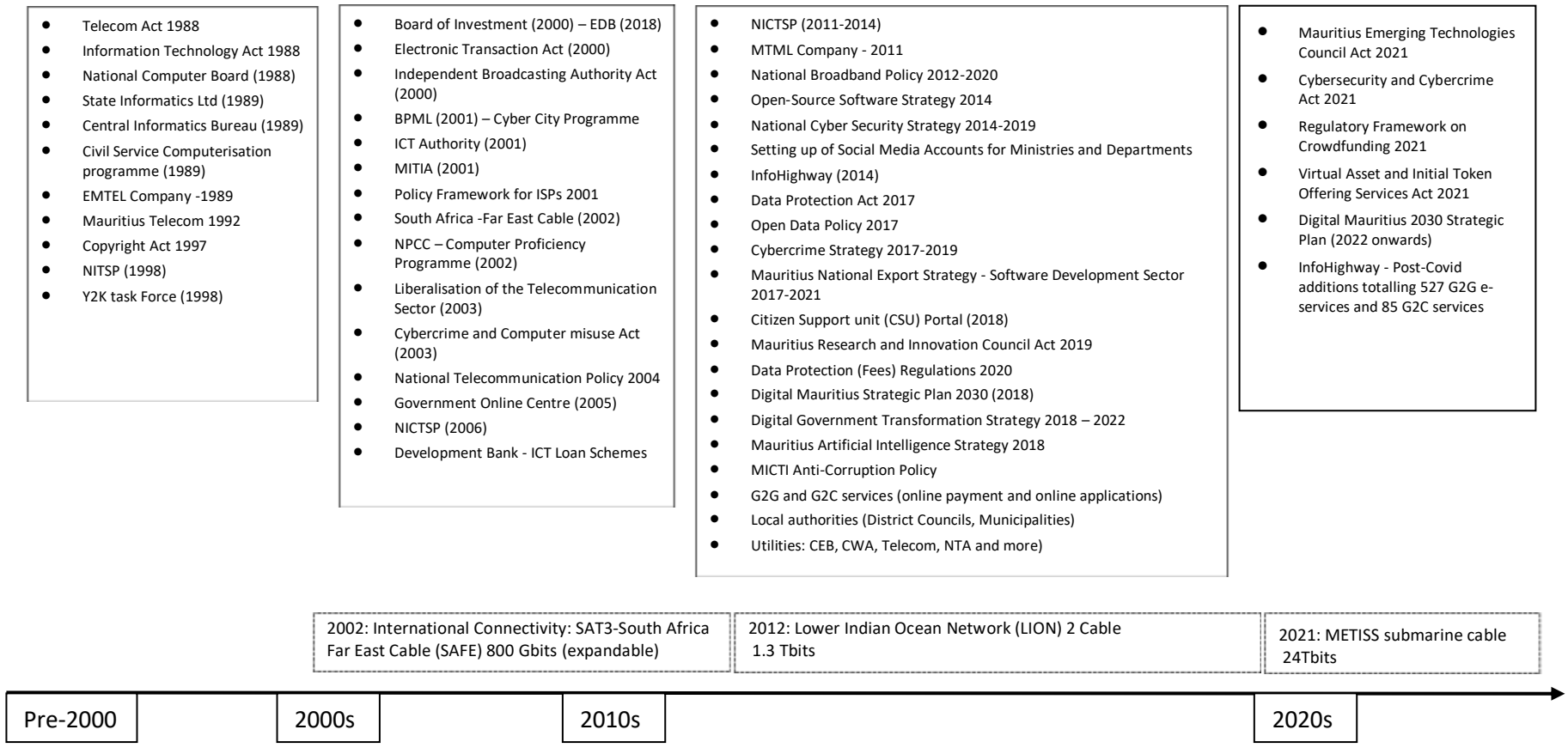

Figure 5. Milestones in the Policy and Regulations, technology introduction and applications of ICTs in Mauritius (Source: MITCI website)

4.4 General observations on the policy context surrounding digitalisation

The government announced its vision in the early 2000s to transform the country into a Cyber Island, following which the policy and regulatory frameworks for the ICT sector were established. The strategies and regulations have undergone regular updates since then, aligning themselves with the evolving economic requirements of the country.

The government has kept up with technological advances, innovation, and the digital revolution. It adapted and aligned to the emerging global regulatory frameworks by reviewing its ICT institutions and regulations. Thus, a stable governance system, long-term vision, planning & implementation, regular updating of policies, and adaptations of the regulations, have been the cornerstones of the development of the ICT sector in Mauritius.

With the economy becoming more dependent on its services sector, especially tourism and financial services, ICT has an important role to play in offering services online. This interdependence has been highlighted during the COVID-19 pandemic. Digitalisation of basic services remains high on the policy agenda. Applications of ICT in supporting other economic sectors such as agriculture, finance, and manufacturing are being explored to help modernisation as well as optimising their resource allocations.

However, there is a need for better coordination amongst the different stakeholders (public and private institutions) for a harmonised approach to digitalise its basic services and to avoid any duplication, as well as a stronger need for engagement and participation of its citizens in the design and implementation of services. The local media have embraced ICT-based channels of communication and citizens have a wide range of platforms available to provide feedback on public sector services, constituting an ongoing dialogue on the range and quality of services required. This mechanism allows continuous adaptation of the enabling environment as well as the services offered in response to emerging needs, technologies, and policy changes in regional and global contexts.

PART 2. MAPPING OF DIGITAL SERVICE INTERVENTIONS

5.0 Mapping of digital basic services focusing on G2G and G2C services

5.1 The enabling environment for digital services

ICT usage in the public sector has shown promising results over time, with improved operational efficiency and development of its e-services. The delivery of high-quality e-services enhances transparency and facilitates access to governmental services and public information. It raises the level of citizens' trust and expectations in government, thereby strengthening the role of the public sector to offer its services.

The adoption of e-services and the creation of e-Government initiatives started with the creation of the Government Online Centre (GOC)[29] in 2005. Progress on the provision of online services in the past decade has been guided by government priorities and funding. Greater interactions with the public through the rise of social media along with the wide-scale availability of broadband connectivity has accelerated the process, during the last 5 years. The Digital Mauritius 2030 Strategic Plan was developed in 2018 and recommends interventions around Digital Government, ICT Infrastructure, Innovation, Talent Management, Cybercrime and Cyber Security. It laid the foundation for the development and wide-scale use of e-services by government agencies and citizens.

The Digital Government Transformation Strategy 2018 - 2022[30] is aligned with Vision 2030[31]. It sets the course for accelerated public sector digitisation efforts to enhance operational effectiveness and efficiency and to provide better service to citizens. It lays emphasis on data usage to support the Government machinery, optimise, transform service delivery, and achieve large-scale business optimization whilst improving effectiveness.

The Government Online Centre (GOC) manages, hosts, and secures all the e-services provided by the government, government-owned bodies, parastatals institutions, Municipalities, and District Councils. Through this facility, the Government connects government to government (G2G), government to business (G2B), and government to citizen (G2C) services. The principal e-government infrastructure, the InfoHighway platform provides a secure, data-sharing platform interconnecting different government services, aiming at improving the e-services to the government departments as well as its citizens.

5.1 The InfoHighway Infrastructure as a core G2G service to support G2C services

The InfoHighway programme was initiated by the Ministry of Information Technology, Communication and Innovation (MITCI) in 2014. It is an infrastructure service platform that provides for sharing of data amongst Government Agencies, which allows multiple Government agencies to share data via e-Services with other agencies. It facilitates connections to multiple systems that were previously unconnected and enables the transfer and combination of information across these systems. The system reduces paperwork and speeds up the citizen's search requests across government agencies. The InfoHighway system[32] became operational in 2017, starting with around 7 connections amongst services of different

[29] https://ncb.govmu.org/ncb/governmentonline.html

[30] https://mitci.govmu.org/Documents/Strategies/Final%20Digital%20Government%20Transformation%20Strategy%202018%20-%202022.pdf

[31] https://mof.govmu.org/Documents/Documents/Budget%202018-2019/Three%20Year%20Strategic%20Plan%20201819-202021.pdf

[32] https://ih.govmu.org

government agencies. Today, the system dashboard highlights services connected through the InfoHighway which has steadily increased to 557 connected G2G services (Fig 6 (a)) from 31 providers (Figure 6(b)). Over the past 5 years, the system has addressed almost 5.5 million requests and saved over 7.5 years of human resources in seeking information from other departments.

The InfoHighway mechanism requires the establishment of a 'connection' between two organisations following an initial negotiation between the 'publisher' and the 'subscriber' organisations. The process requires approval by a committee that also considers the legal implications it might entail. Once the connection is structured and built-in, the InfoHighway only registers the transactions between these two systems, without accessing the contents or purpose used. The InfoHighway serves as an independent, third-party broker of the exchange of information, monitoring only the volume of data exchanges. This system constitutes the backbone for brokering government e-services.

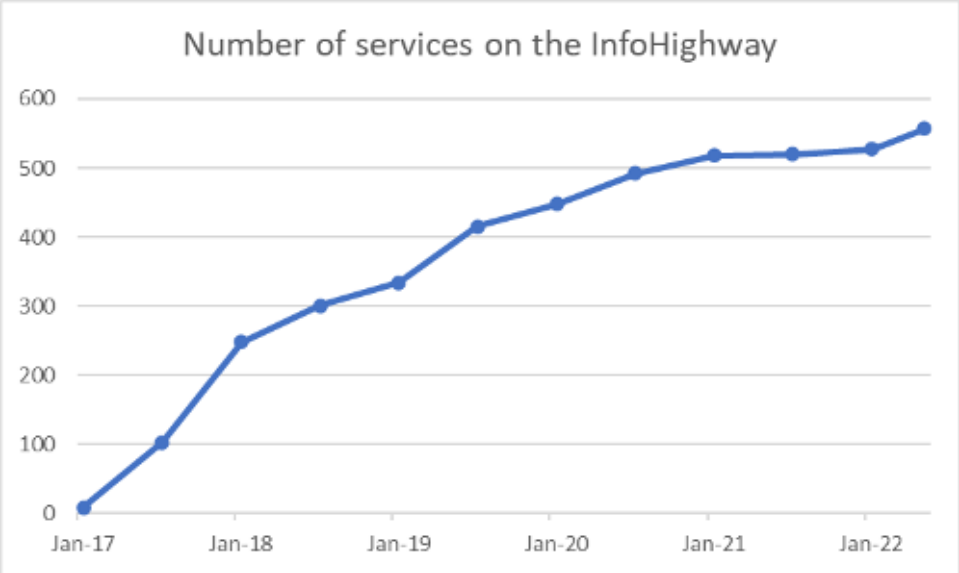

Figure 6(a). Evolution of the number of services connected to the InfoHighway

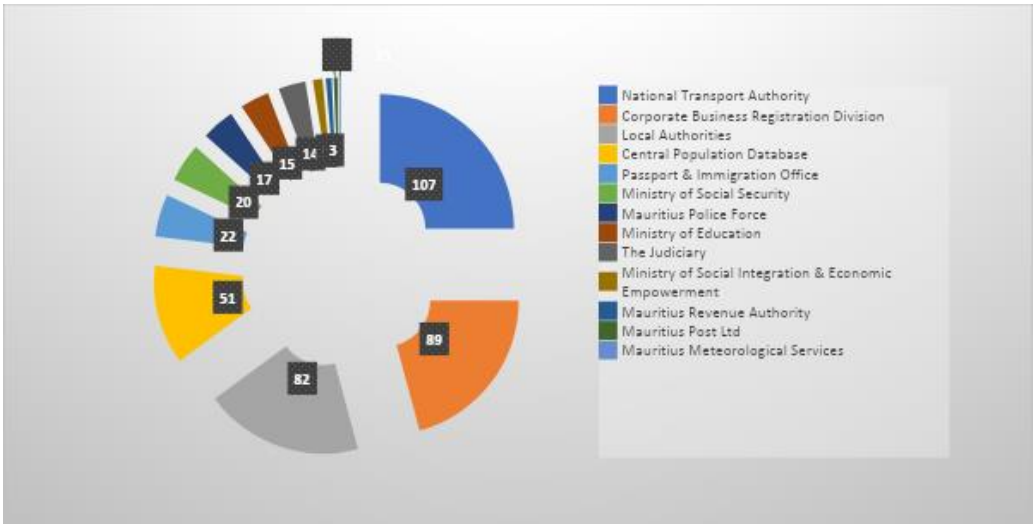

Figure 6(b). The number of services offered by a range of providers on the InfoHighway in 2019[33]

[33] https://ih.govmu.org/assets/docs/InfoHighway-Workshop_v1.0.pdf

The service providers, on the other hand, manage the end-user interface through their own e-services while they access information from other systems, to fulfill the requests, through the InfoHighway. The InfoHighway operates in the background without the citizen's knowledge of the infrastructure that serves the information system that they are interacting with. While all of the interconnected government e-services are making use of the InfoHighway gateway, the usefulness of the InfoHighway itself is not as well-known as the user-facing systems or applications, even though it played a crucial role in enabling the government to provide online services to respond to the needs of its citizens during COVID-19 pandemic lockdowns.

The InfoHighway is currently only responding to requests from government agencies for interconnections. Furthermore, the existing connection details are not public knowledge. There seem to be missed opportunities for greater synergies to be built on top of the InfoHighway. Therefore, wider communication about the InfoHighway and its services would likely generate further opportunities for using InfoHighway which is currently not being exploited, and initiate potential collaborations with the private sector around current online interactions with citizens.

5.2 E-service portals for citizens

While the InfoHighway hosts 557 G2G e-services for various ministries, departments, local authorities, Municipal and District councils, 85 G2C e-services are accessible to citizens and distributed across a range of service areas (Figure 7) through the government online portal.[34] The larger clusters of e-services are provided by the Ministry of Gender Equality and Family Welfare, Mauritius Examination Syndicate, Registrar of Companies, and Ministry of Agro-Industry and Food Security.

Similarly, FASIL[35] is a prototype user-friendly portal listing 67 e-services for citizens, a subset of the government online portal. Synchronisation of the listing across the two portals is required or alternatively, they could provide multiple entry points to a single overall harmonised portal to display all the e-services.

Most e-services offered in Mauritius, being a small island state, currently have country-wide coverage. Prior to COVID-19, some systems were managed at local government levels. Following the pandemic situation, all government e-services have been centralised to ensure non-disruption. The consolidated approach provides a single point of entry for a distributed online service, which is eventually linked to the local government systems (e.g., application for a land development permit, payment and management of Trade Licences).

[34] https://govmu.org/EN/Pages/viewalleservices.aspx

[35] https://goc2020.govmu.org/fasil/digital-services/

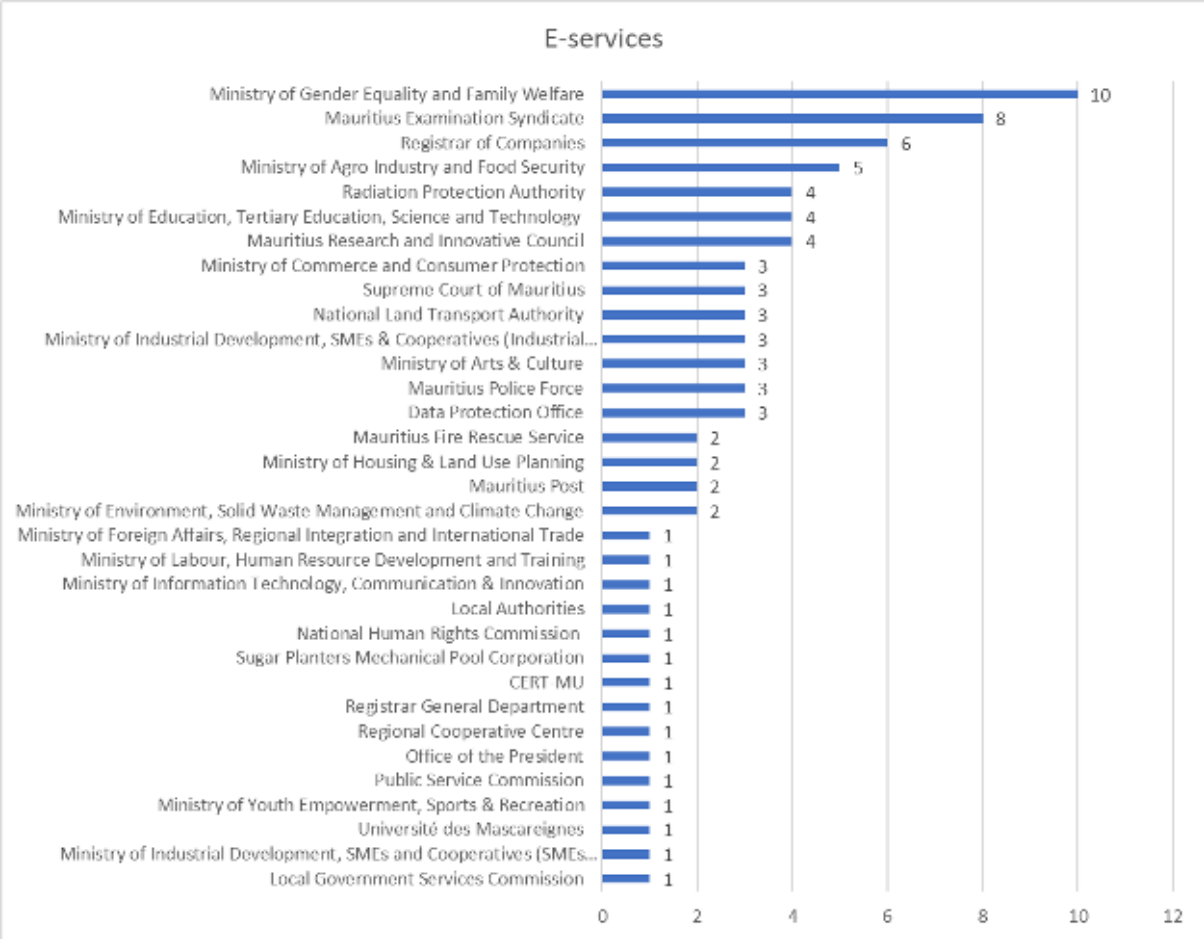

Figure 7 - Distribution of E-services as categorised on the government online portal

The heightened awareness to use online services during the COVID-19 pandemic has prompted calls for websites to be revamped and new portals to be set up for higher online visibility, especially those aiming to be more inclusive and transformational. Some of these e-services include: -

- Entry point to all online e-government services: https://fasil.govmu.org/fasil/digital-services/
- Identity authentication: MauPass HomePage (govmu.org) ;
- Digital Signature (https://mausign.govmu.org); https://fasil.govmu.org/fasil/digital-se
- Queuing and appointment system: https://morendezvous.govmu.org);
- Citizen Support Portal: About Citizen Support Portal | Citizen Support Unit (csu.mu).

5.3 Citizen e-services infrastructure as an ecosystem

Historically, government and private sector organisations have developed systems for their users based on their own perspectives. With the mainstreaming of online payment (and FinTech), actors in the banking and telecom sectors have addressed the gaps on a customer need basis.

With the convergence of e-services through mobile devices and Apps, there is growing evidence of coordination of services between private sector services and public sector regulatory requirements. For example, the MauCAS QR Code (Bank of Mauritius,2022)[36] is an interoperable mechanism that enables citizens to make payments at any merchant location across all the banking and mobile service providers.

[36] https://www.bom.mu/sites/default/files/governors_speech_qr_code_1.pdf

In a few cases, such as the Utility sector, multiple e-services, in different formats, are available for the same function. For example, payment of electricity utility bills can be made directly through the Central Electricity Board online portal[37], via internet banking facilities offered by various banks, through mobile apps e.g. My.t wallet, MCB juice, Emtel Cash[38], and, an application, Mokouran[39] developed by the Electricity Utility provider. Under this application, additional information pertaining to previous bills, fault reporting, consumption overview, invoices, and updates are available. Similarly, water utility bills can be paid through the Central Water Authority[40] portal, which can alternatively be settled through internet banking facilities, banking mobile apps, CWA mobile app[41,] and over the cash office counter.

Figure 8- Visibility materials on government e-services from the National Computer Board

New e-services were introduced on the InfoHighway infrastructure, implemented during the pandemic, enabling citizens to use their own unique identification on the government services (MauPass)[42] to access their personal data located on government services portal. It provides access to updated, authenticated information about the citizen. It includes queries by financial institutions such as Birth Certificates, Marriage Certificates amongst others. Furthermore, each citizen has the option of placing these documents within a secured space on the Government Infrastructure (MoKloud service)[43]. It monitors the access and data usage ensuring the security and privacy of data. The user can manage access to banks, utilities, and other institutions in the digital space. Similarly, a Digital Signature facility is fully functional for private sector operators to access secure data and undertake financial transactions which can easily be translated to value-added services for citizens (Fig. 8). With the high penetration of mobile communications, citizens are being provided with more options to settle their utility bills in an effective manner, rather than queuing at the various cash office counters around the island. For

[37] https://payment.ceb.mu/
[38] https://ceb.mu/customer-corner/paying-your-bill
[39] https://apps.apple.com/mu/app/mokouran/id1483753761 ; https://play.google.com/store/apps/details?id=cebcustomerportal.cebcustomerportal&hl=en_AU&gl=US
[40] https://pay.cwa.mu/pay-your-bill.html
[41] https://play.google.com/store/apps/details?id=com.workforce180.android.cwa&hl=en&gl=US
[42] https://mokloud.govmu.org/
[43] https://mokloud.govmu.org/

individuals who still prefer to pay their bills over the counter, the Mauritius Post Ltd[44] is facilitating payments of electricity and water utility bills through its outlets, easily accessible over the whole island (see Figure 10 Section 6.3.1). The post offices also provide complementary desk support services for the Citizens Services Unit (CSU).

5.4 General observations on basic digital services

The combination of a functional and accessible ICT infrastructure to its citizens, familiarity with the use of ICT-enabled technology at the household level, and a range of computerised systems in government, have led to the possibility of developing a series of e-services at both G2G and G2C levels.

The COVID-19 situation has demonstrated that a population accustomed to physical proximity and in-person interactions to access basic services had to transition and adopt ICT-based platforms. The landscape of digital services continues to evolve: during the pandemic, new e-services emerged addressing specific needs of the citizen, each justified by the service developers (e.g utility payments). The user has a wide range of options for specific functions available, however, each requires a different user identification process to log on for each service separately.

A range of public sector e-services is available through a couple of government portals offering compilations of e-services within the public sector, with some overlap. Nevertheless, the range of e-services demonstrates the value of having a common G2G infrastructure supporting G2C services. Efforts toward harmonising and interconnecting these services are envisaged in the next ICT strategy. There are emerging potential opportunities for public-private partnerships to facilitate the availability of e-services to its citizens. The implementation of the MauCAS system, which was initially driven by regulatory purposes by the Bank of Mauritius (BOM), is such an example.

Finding synergies amongst e-services and their integration onto a common platform would enhance their effectiveness for inclusiveness. Beyond a simple compilation of e-services listing, a focus on inclusiveness, targeting citizens by the range of e-services, could be better facilitated through a portal dedicated to the citizens and their needs. A platform that could support such an offer already exists (the Citizens Support Portal, covered in one of the case studies) which is currently designed to facilitate access to a subset of public services.

The main challenge is the extended involvement of citizens in the formulation of the e-services, especially learning and experiences gathered during the pandemic. Stronger involvement of the e-service stakeholders towards greater adoption and use of these services needs to be addressed and further explored for integrating these e-services into an all-inclusive package.

[44] https://www.mauritiuspost.mu/about/list-of-post-offices

PART 3. ANALYSIS OF INCLUSIVENESS OF DIGITAL SERVICES

Following the review of existing e-services in Mauritius and the focus of this research study on the inclusiveness of G2G and G2C services, a few selected examples have been identified as case studies. The InfoHighway infrastructure is described as a core G2G e-service while the proposed G2C services, provide further insights on how the combination of services amongst government departments and systems leads to developmental impact.

The case studies include the following: -

(a) The establishment and operationalisation of the Wage Assistance Scheme (during the COVID-19 pandemic) by the Mauritius Revenue Authority (MRA)
(b) The provision of educational e-services to students during the pandemic and beyond (through the Student Support Programme portal) under the supervision of the METEST
(c) The operation of the Citizen Support Portal, by the Citizen Support Unit under the supervision of the Prime Minister's Office

The study also gathered perceptions on usage, appropriateness, and relevance of the e-services from Community-based organisations (CBO) and NGOs amongst the communities they support and interact with.

6.1 MRA Wage Assistance Scheme during the COVID-19 Pandemic

The Mauritius Revenue Authority (MRA) was established in 2006 as a state agency for revenue collection and management of revenue laws. It deals with corporates, small and medium enterprises, individuals, and any other legally registered entity operating in Mauritius. Since 2012, the MRA has gradually shifted from a paper-based system to a completely online system by 2018, allowing users to seamlessly access, submit financial returns and benefit from support provided by the government. It opted for an Enterprise Resource Planning system, as opposed to a tailor-made application, which provided flexibility and a modular approach to implementation. It enabled rapid adaptation to changes in policies and regulations and improvements over time. The MRA is now managing an effective and efficient revenue-raising system.

6.1.1 COVID-19 lockdowns creating an emergency situation for e-services

The government's action to financially support the working population during the outbreak of Covid-19 provides a good context of how the choices of the systems and mechanisms of digital e-services at the MRA enabled the institution to react promptly to a societal need.

The sudden discovery of cases of COVID-19 and the flaring up of the number of cases in the Mauritian community in mid-March 2020 provided the backdrop and a trigger event for the need for the MRA services to be as inclusive as possible. The MRA found itself in a position to shift its attention from its normal target of the tax-paying working population to include as many of the working population in Mauritius as possible. This was in response to the sudden total lock-down which meant the closure of all businesses and government offices, with the exception of essential services. While the government could ensure that government employees would be paid their salaries during the lockdown period, it needed to identify a similar mechanism to sustain employees in the private sector. These measures were required to avoid massive layoffs and hardships for individuals who depended solely on private income for sustenance and livelihood.

The unexpected imposition of lockdown was dramatic for a small island population where people were used to travelling to the service providers and interacting physically, and, where the use of e-services and e-commerce was optional. Thus, rapid adaptation was required, whereby within a week into lockdown, online ordering of groceries for delivery, as well as working from home, became the new norm. The government's challenge was to find a way to financially support households of employees in the hospitality, manufacturing, and service sectors as well as self-employed entrepreneurs who had no means of income.

6.1.2 Urgent creation and operationalisation of inclusive e-services

Under these circumstances, the MRA, with its staff working from home, was able to develop and implement an online system to assist the government's plan to support public and private sector employees requiring financial assistance, within four days after the start of the lock-down period. The wage assistance scheme was proposed for the corporate sector to contribute toward their employees' salaries and a similar mechanism was devised for the self-employed.

The Government Wage Assistance Scheme (GWAS) targeted private sector employers, approved or registered charitable institutions as well as charitable trusts and charitable foundations. Based on their regular salary payrolls and beneficiaries respectively, they were provided with financial assistance equivalent to basic wage of all their employees capped at MUR 25,000 per month for all Mauritian and expatriate employees, full-time or part-time, drawing a monthly basic wage of up to MUR 50,000. Over 15,000 employers benefited from the scheme to support the salaries of some 200,000 employees.

As for the self-employed individuals, a large majority of them were not amongst the already registered MRA tax-payers. All citizens above 18 years of age, compulsorily have a National Identity Card[45], registered on the Civil Status Department system. Each self-employed individual submitting a request under the Self-Employed Assistance Scheme (SEAS) was required to fill out a simple form online. Each application was validated using the person's unique National Identity Card number at the Civil Status Office, connected through the InfoHighway Infrastructure. Thus, out of 251,000 applications for the Self-Employed Assistance Scheme (SEAS) received, payments for financial assistance of MUR 5,100 per month (half of the basic monthly salary) were made to some 190,000 applicants starting from mid-March 2020. The scheme was open to all self-employed citizens, the approach was as inclusive as possible of the working adult population in the country.

This exercise enabled MRA to pivot from a revenue-raising institution into a financial support disbursement channel, which had access to and was supporting targeted adult working population during its hardship. Furthermore, the existing linkages between the MRA and other government institutions, through the InfoHighway infrastructure, along with the MRA's existing linkages with the banks, ensured that the financial assistance was provided directly in the bank accounts of the rightful applicants.

The Government Wage Assistance Scheme (GWAS) and Self-Employed Assistance scheme (SEAS) were extended until August 2020. Some sectors including the hospitality sector (hotels, beach activities, transportation amongst others) which were frequently affected, continued to benefit from this measure until December 2021. The MRA's staff attributes the success of the organisation to providing such a timely and rapid response to the government scheme to the following set of incremental factors that

[45] https://mnis.govmu.org/Pages/Index.aspx

enabled all the elements to be assembled in response to the Government's intervention on wage assistance during COVID:

(a) The establishment of the MRA itself, in 2006, bringing a set of related government services under one organisation through institutional reforms; providing flexibility of operations; a dedicated IT department and streamlining of workflows.
(b) The focus on innovation using ICTs, with the establishment of the Information Services Department to manage the ERP-based scalable backbone of the system. This enabled the integration of different systems, and later the incorporation of web-based user interfaces to the system. A Disaster Recovery Plan was already set up in 2011 and reviewed annually since.
(c) By 2013, most people were able to fill in and pay for their tax returns online. This was followed by the linkages with the Bank of Mauritius and Commercial Banks facilitating both payments from and refunds to taxpayers. Regular user surveys enabled the Income Tax form to be simplified and improved over the period 2014-2016.
(d) Linkages with the InfoHighway Programme with other IT systems in government as of 2014, and additional linkages with other government systems and updates made possible through the InfoHighway.
(e) The introduction, in 2017, of a social role of the MRA with the implementation of Negative Income Tax, a mechanism to support the population with a lower income level. This was followed in 2018, with a service for the collection of social contributions from employers and employees – enlarging the database to cover the monthly waged employees in the workforce and their employers.
(f) Innovations in the ICT services in 2019, with server virtualization and mechanisms to work remotely.

6.1.3 A new role for the institution based on the new e-service

In 2022, with the rising prices of food commodities, the government used the same mechanism to financially support the working population registered onto the MRA database, targeting the most economically vulnerable working population.

Through the implementation of the GWAS and SEAS, the MRA was called upon to respond to a need and played a major role in supporting the working class and pensioners across the country, while strengthening its social role during the pandemic. It represents a strong case of an institution making its services as inclusive as possible, in a short time. It has also enabled the MRA to be perceived differently, with a social role: during this period, the MRA had more outgoing payments than incoming receipts through taxes and related levy charges.

The digital revolution has really impacted and benefited society at large during a critical phase that otherwise would have led to chaos and social unrest. MRA was also able to manage the COVID-19 Solidarity Fund, for contributions from individuals and companies benevolently willing to provide support to mitigate the effects of the pandemic. The MRA has developed several mobile apps such as MRAeasy, Customs@Mu, and DrugFreeMoris which provide enhanced specific user interfaces for their other services.

6.2 Provision of educational e-services during the pandemic and beyond

6.2.1 Social inclusiveness in the education sector

In 1975, the Government of Mauritius advocated and implemented a free education policy, and it provided equal rights of education to its citizens from pre-primary to tertiary levels. Schooling became compulsory until the age of 16. In July 2005, it introduced free public transport to all students, as a way of ensuring education access to all. In 2020, 82,542 students were enrolled in primary schools, 105,606 students in secondary schools, and 48,568 in tertiary education[46]. Special programmes have been introduced to ensure inclusiveness in the education sector.

In 2003, the 'Zone d'Education Prioritaire' (ZEP) project was launched to address the low academic pass rates (35% to 40% pass rates) amongst students in certain locations across the country. These students generally lag behind in numeracy, literacy and require special care and assistance. Out of the 318 primary schools in the country, there are 27 'Primary Support Schools', located both in urban and suburban areas, 14 of which are located in the capital. To reinforce inclusiveness in education, these students are provided with books, uniforms, school bags, shoes, free internet connection while free meals are also provided during the day with the collaboration of the private sector (Euro 1.3 million annual expenses on the Food support programme). The school-targeted initiative has transitioned into a community project, with social, psychological, and financial assistance also provided to the parents.

6.2.2 Introduction of ICTs and e-services in education

Under the School IT Project, ICT Labs were set up in Primary Schools in the Year 2000, while Secondary Schools were already equipped with IT labs, with PCs connected to the Internet. The labs are managed by qualified personnel and service providers. In 2012-2013, under the Sankore[47] Project, interactive projectors and Laptops were provided to schools for Grades 4-6.

In 2017, as part of the Nine-Year Basic Continuous Education (NYBCE) reforms, the Early Digital Learning Platform (EDLP) was introduced to ensure students get equal exposure to technology, addressing the digital divide, while also transforming the teaching and learning environment through the use of digital technologies.

Since 2018, 257 primary schools are connected to 10 Mbps high-speed internet, with WIFI hotspots. The Ministry of Technology, Communication, and Innovation is currently in the process of providing 20Mbps broadband Internet Connectivity to all secondary schools (both Public and Private). As part of the ICT initiatives of the Ministry, current pilot project initiatives in secondary schools include coding for girls in smaller groups and Technology Enhanced classrooms in 6 schools.

The Student Support Programme (SSP)[48] was introduced by the Ministry of Education, Tertiary Education and Scientific Research in 2018 to accompany the implementation of the nine-year schooling approach. It enabled access to educational materials beyond the school premises (Figure 9). The platform was developed jointly with the Open University of Mauritius (OU), Mauritius Institute of Education (MIE), Mahatma Gandhi Institute (MGI), and the National Council of Education Research and Training (NCERT),

[46] https://education.govmu.org/Pages/Downloads/Statistics.aspx

[47] http://www.govmu.org/English/News/Pages/Sankoré-Project--Handing-Over-of-Last-Batch-of-Equipment-.aspx

[48] https://ssp.moemu.org/eresources.php

India. The portal is designed based on the pedagogical student-centred approach which enables the students to have more ownership of their learning processes and become independent learners.

The e-delivery mode provides flexibility for students to learn at their own place and pace. The students can view the tutorials online, pause, rewind, forward, and control the pace of the taught lessons. The content can be accessed through personal computers, tablets, and smartphones. The objective of the SSP is to support all students in their quest to achieve academic and personal success irrespective of their economic and social backgrounds. Supplementary instructions are provided free of charge to all students enabling them to consolidate their learning process.

Figure 9. The Student Support Programme portal (Source: SSP Website)

6.2.3 Experiences with e-services in education during COVID:

The COVID-19 pandemic in 2020 led to the sudden closure of schools, whereby students had no options but to study from home. Initially, teachers and students innovated on their own initiatives using social media platforms to support the learning process including WhatsApp, Google classroom, and Zoom. The SSP became instrumental during the pandemic. The online platform, along with televised broadcasts of classes through a dedicated national Television Channel, played a crucial role in making education accessible to the students. Challenges to accessibility were noted in vulnerable households through internet connectivity and the absence of devices. It is estimated that 60% to 70% of the student population benefited from this innovative approach to learning during the sudden first wave of COVID-19.

The lessons learnt in the first wave prompted the Ministry of Education, Tertiary Education, Science and Technology to pursue and improve the use of ICT tools, in case of any forthcoming lockdown. Teachers benefited from training on the use of online tools including MS Teams for conducting online classes. Meanwhile, lessons were continuously being developed for the SSP with the help of the Mauritius Broadcasting Corporation (MBC) and using the Open University. The contents were broadcasted at scheduled times on the National Television channel, and simultaneously available through the video feeds from the SSP. The feeds were categorised under 17 subjects covering the entire school curriculum. To date, the SSP continues to supplement learning at schools and scheduled educational programmes

on television. It provides access to the learning materials, through video feeds and a mobile app. The SSP was initially planned as a pilot project but eventually implemented on a larger scale during the pandemic.

The introduction of the SSP represented a few challenges to households, whereby access to the internet and ICT equipment were limited for the number of learners in the family. Some students did not have access to the ICT equipment and had to acquire them later, and some resorted to soft loans offered by the Development Bank of Mauritius under the computer scheme. Around 7000 households are registered as vulnerable groups through the Social Register of Mauritius (SRM). The database is maintained by the National Empowerment Foundation (NEF) and the National Social Inclusion Foundation (NSIF) following the family income criteria. The vulnerable households were given specific attention during the pandemic, 5000 families benefited from free internet connectivity specially to support children's access to education.

The academic year for both primary and secondary school students was extended by half a year from November 2020 to June 2021, enabling both the students and the teachers to complete the syllabus. Unfortunately, the second period of lockdown occurred in 2021.

During the second wave, in 2021, the Ministry of Education, Tertiary Education, Science and Technology was better prepared and teachers trained to impart knowledge online to students. Teachers were equipped to conduct online classes through Zoom and Microsoft Teams, and WhatsApp were used to share class notes. The InfoHighway infrastructure facilitated the monitoring of student attendance to the online classes as would have been the case during face-to-face situations. The academic year for 2021 was further extended for six months.

Good internet connectivity throughout the island facilitated this process and quality-assured and accredited content was streamed through the SSP portal. Students in the ZEP areas were provided with free internet packages for their households and almost all school-going children had access to the materials. The SSP contents were continuously updated through its repository and remained accessible to students which were useful during the second prolonged lockdown period. It is imperative to systematically address system content gaps to ensure curricula alignment for learners. Analysis of the platform indicates that its full potential is yet to be tapped: the online learning resources are not only accessible to students for revision purposes but are also available to learners outside the school system. The SSP programme offers the possibility of conducting online tests for learners to certify for a specialised skill set. The platform can also serve to respond to specific needs for continuous education, as well as a remedial measure for students dropping out of the formal education system but who are willing to continue their studies.

6.2.4 Experiences in the tertiary education sector

The Tertiary Education sector was effectively managed during the last COVID 19 pandemic. For example, the University of Mauritius handled the online delivery of lectures seamlessly during the lockdown periods, and this is still effective even though public restrictions gatherings have been discontinued.

The University of Mauritius (UoM), set up in 1965 as the first public tertiary education institution in Mauritius, currently has around 10,000 students for its undergraduate, postgraduate, and commissioned degree programmes. In March 2020, following the national lockdown period, the UoM

authorities implemented their Digital Learning and Transformation Strategy (DLTS) to enable the university to continue providing training to staff and students without disruptions using tools like Google Classroom, Google Meet and ZOOM. In 2022, even though students are allowed to move on campus for their practical sessions, lectures are still being delivered online to avoid mass gatherings.

As part of this study, an online survey was undertaken by the team in May 2022. The survey addressed students' experience from the Faculty of Agriculture concerning access to e-services for their studies during the Covid-19 period. Out of a population of 369 students, 76 (20.5%) responded to the questionnaire. Over half of the respondents (52.6%) had already started their studies before the onset of the Covid-19 pandemic. The modal range for the household gross income of the respondents (36.8%) is between MUR 20,000 and 40,000 (the minimum salary level is MUR 11,075).

The majority of the respondents (90.8%) have a monthly home broadband internet subscription, with 77.6% using the main service provider My.T. Internet connectivity is generally shared between 2 and 5 persons in a household but almost 60% of the students were the only ones using it for educational purposes. More than two-fifths (43.4%) of respondents did not experience any difficulties accessing online lectures and virtual meetings, while less than 10% found it problematic to share the existing internet connections at home. Internet access for educational purposes (email, Zoom, Google Meet & Google Classroom) did not seem to be a challenge for the students.

6.3 The Citizen Support Portal under the Prime Minister's Office

6.3.1 Origins of Citizens Support in Mauritius

Back in 1989, the economy prospered rapidly following industrialisation in the textiles sector. The government initiated a programme to establish Citizens Advice Bureau (CAB) across constituencies to facilitate greater proximity between local communities and their elected representatives. Its immediate success led to the setting up of 35 CAB offices all over the island (Figure 10).

Building on its achievement, focusing on a model of interaction, the CAB offices tapped into the ICT potential, devising an online service initiative the Citizen Support Unit (CSU) [49](www.csu.mu). The service was launched in 2017, allowing citizens to directly submit their service requests, and share their concerns and ideas with Ministries, departments, parastatals and local authorities through CABs.

To date, 224, 068 requests have been received out of which **91%** have been successfully resolved. The CSU office reviews the requests and eventually liaises with the relevant ministries and institutions to address and solve the issues wherever possible, all through the online system, and using other ICTs.

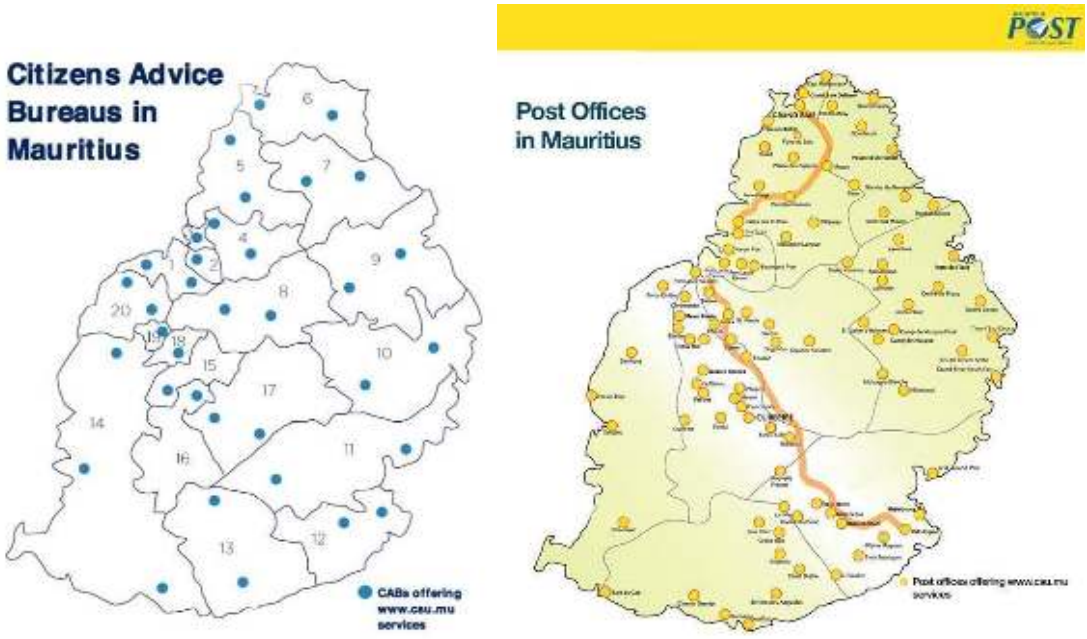

Figure 10. Distribution of service points for the Citizens Support Unit in Mauritius

[49] https://www.csu.mu/index.php

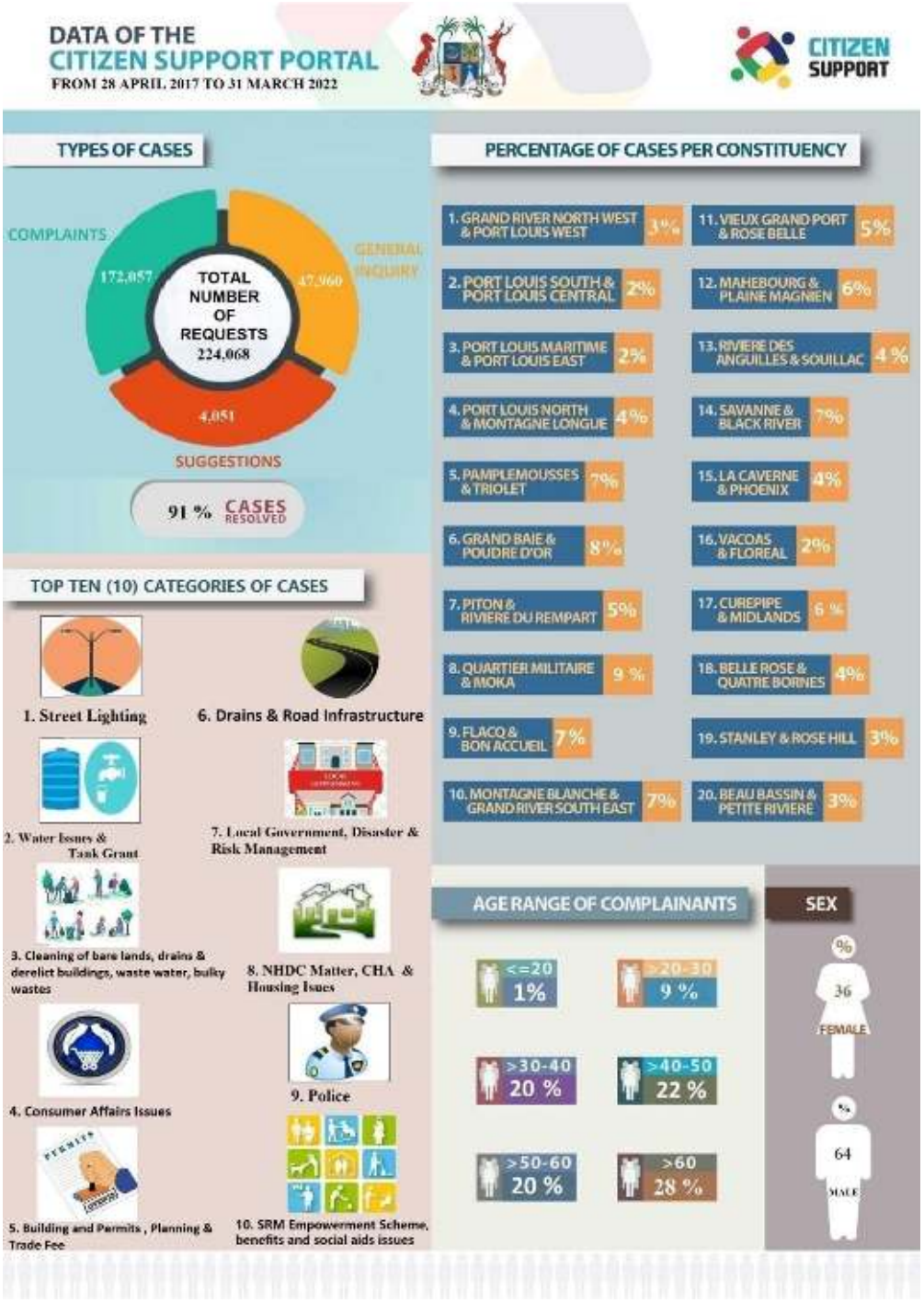

Figure 11. Dashboard of the Citizens Support Portal [Source: www.csu.mu (30/04/2022)]

6.3.2 Operationalisation of the Citizens Support Portal

Internally, each request is categorised and tracked through a ticketing system. It enables follow-up across different departments of government and local authorities and warrants more accountability and transparency from the service providers while remaining connected with CAB offices' coordinators.

The system provides a broader overview and addresses issues arising from the community for policymakers. More than just a platform addressing individual citizens' requests, the Citizen Support Portal provides the Citizen Support Unit with a broader picture of the population's needs.

Citizens who do not have access to computers or internet connection or who cannot use the online portal can physically access the nearest Citizens Advice Bureau. The CAB officer will register their request(s) on the portal (Fig. 11). Follow-ups and updates on the request for information or service are eventually communicated to the user either through SMS or mobile phone.

The latest dashboard (Fig 11) provides an overview of the nature of the requests raised by citizens, the current offer covers the following issues (1) Street Lighting (2) Drainage and Road infrastructure (3) Water issues and Tank Grant, (4) Local Government Disaster and Risk management (5) Cleaning and Waste Management (6) Housing issues (7) Consumer Affairs (8) Police (9) Building Permit, Planning and Trade Fees (10) Social Aids. This list could be reviewed in the future to include more services.

6.3.3 Outreach around the Citizens Support Platform

Through this platform and the approach to the provision of services, the Government is able to allocate resources more efficiently and be in proximity to its citizens. For greater outreach, CSU services have regular broadcasts with airtime on Radio (3 times weekly) to address issues from the public. Recently, CSU has introduced user interface features for persons with disabilities (magnifying and reading text) which accept video, pictures, and voice messages as part of the user submissions to the system. There is regular monitoring and evaluation undertaken by its Secretariat which periodically tracks the progress in service delivery by the stakeholder service providers. Future plans include the use of a chatbot, the use of WhatsApp, and other cost-free applications to communicate with clients.

The Citizen Support Portal has a high priority on the development agenda, namely as a tool for social inclusion in the current Government Plan 2020-2024 (GoM, 2020). It follows the introduction of the Corporate Social Responsibility Fund back in 2009 and the creation of the National Social Inclusion Foundation (NSIF) in 2016 which funds community interventions. There is potential for greater synergies amongst activities of the NSIF, the CSU, and other community empowerment programmes, which could be facilitated through ICTs. Harmonisation can be facilitated through the use of categories of issues and the classification of types of interventions requested by the community. The extent of use and applications of ICTs in the citizen empowerment process could be better explored.

6.4 Perspectives of private and public sector-supported CBOs & NGOs

As part of this study, several NGOs were interviewed as key informants on the accessibility and use of some of the e-services mentioned above. The key questions focus on the accessibility of such services during the pandemic and now. The NGOs originated from the Black River District of Mauritius, located especially around the west coast of the island. There is a high prevalence of Zone d'Education Prioritaire (ZEP) schools and an incidence of underprivileged family households.

Amongst the communities interviewed, increased awareness and use of the e-services, especially during the COVID-19 lockdown periods, were noted. The key requests included (a) access for children to education (b) registration for the Wage assistance scheme and (c) access to general services and facilities offered by the Citizens Support Unit (physically through the Citizens' Advice Bureau or through the Citizen Support Portal).

During the COVID 19 lockdown periods, users accessed the internet mostly through mobile devices. It was more convenient and affordable to use daily internet packages. For example, during the pandemic, school children attended online classes on weekdays using smartphones. Accessing e-services for this segment of the population, in general, was possible, with the assistance of intermediaries, mostly social workers or the children in the households who have achieved a certain level of education and proficiency in the use of ICTs.

According to the social workers interviewed, most youngsters in these vulnerable areas, who owned mobile devices during the pandemic, are now using smartphones for online games and entertainment, while few use the SSP and related educational sites. Very few of these youngsters have access to personal laptops and computers. Their parents, who generally go to the Citizen Advice Bureau (CAB) for assistance, could not do so as all CAB offices remained closed since the pandemic outbreak to avoid contamination. NGOs' social workers have stepped in to facilitate these families' access to e-services on housing, infrastructure development, and assistance allowances to families (wage assistance schemes).

A few coastal villages in the Black River District do not have access to basic necessities including access to potable water and electricity (De Salle-Essoo, 2019), and hence access to internet connectivity becomes a secondary issue. It appears, according to social workers interviewed, that access to e-services is generally heavily compromised in those vulnerable communities.

As of June 2022, the Information and Communication Telecom Authority (ICTA) announced the setting up of Free internet Wi-Fi connections in 234 public places (especially village halls, community clinics and health centres, bus stations, markets, and national parks) in Mauritius and Rodrigues Island[50] as a means of ensuring at least 2 hours of free internet access daily to members of the public. This is supported through the Universal Service Fund[51]. The localities targeted in this study will also be covered through this initiative.

Several NGOs operating in these coastal localities benefit from the corporate community development programmes including hotels and other major development projects. These projects aim at sustainable development and have also earmarked funds for social development in these areas. Several NGOs benefit from grant support from NSIF to partly cover their operating expenses. Social projects include (a) supporting families in raising small poultry farms (b) micro-entrepreneurial initiatives for women along with basic literacy, IT, and financial training (c) relocation of families to new places due to encroachment of unauthorised housing on land earmarked for development. Private Banks have also participated in funding the provision of sanitary services to underprivileged families.

The younger generation has better exposure to education compared to the last generation, and yet a high rate of academic failure is still prevalent at the primary and secondary levels. NGOs believe that skills-oriented programmes have a greater impact. NGOs together with social workers are collaborating with the private sector and financial institutions to empower youngsters, housewives, and the unemployed. At Tamarin (a coastal village in Black River district), there has been growing interest for specialised training given the specificity of its location. These include boat engine repairs (fishermen), mechanical and electrical skills; skipper; first Aid (Rescue at sea); hospitality skills (in collaboration with local hotels); soft skills (functional literacy such as writing a quotation; writing a technical report); IT literacy; life skills (to become good citizens); financial literacy (budgeting). Combining the use of ICTs as part of their training has been a great motivation for the youth to acquire both literacy and digital literacy skills.

[50] https://defimedia.info/acces-internet-la-premiere-des-234-zones-wi-fi-gratuites-de-licta-inauguree-chamarel
[51] https://www.icta.mu/market-usf/

PART 4: DISCUSSIONS & CONCLUDING REFLECTIONS

7.1 An overview of the situation in Mauritius

The ICT Sector in Mauritius has evolved rapidly over the last 20 years and is often cited as a case study for development[52]. Early in the 2000s, the government envisioned transforming Mauritius into a Cyber-Island - a term that was trendy at the turn of the Millennium. ICT development has been steady and while delays were noted, implementation of its strategies and policies have been systemic and incremental.

The existence of a stated and shared vision by all stakeholders on the role of ICT for the country has provided the guiding principle and facilitated the implementation process. ICT growth can be attributed to the conducive and enabling environment created through the accompanying institutions, policies and regulations updates, and alignment with technological and societal innovations. The continuity of the programs was noted, even with changes in successive governments.

With a diversified economy following independence of the country in 1968 (Zafar, 2011) (Figure 2), Mauritius is now building on a strong services sector and exploring new areas for development. For a small island developing state, its ICT infrastructure and human capital are determining factors providing sound technical capacity supporting digitalisation of its services. Mauritius is a signatory of the African Continental Free Trade Area agreement, Free Trade Agreements with India and China aiming to grow into a financial and trade hub in the region[53] (EDB, 2021).

Mauritius has been classified as an Upper Middle Income[54] Country for the past 25 years. The country aspires to become a High-Income Country by 2030 as per the current Government Programme[55] which may also be aligned with a desire to achieve classification as a country with a '**Very High**' EGDI.

Mauritius was ranked first in Africa on the EGDI in 2020, with a score nearing the threshold to be classified as a country with 'very high' EGDI which could be achievable with continued improvements. The EDGI HCI component score for Mauritius is the highest for any country in Africa. Several factors can be associated with this performance. Substantial investment in ICT infrastructure and human capital has enabled harnessing the potential of ICTs to create value-added services. Some of the other attributes of the country include (i) a multilingual population with a high literacy level (ii) capacity development programs around digital literacy (iii) formal ICT skills development initiatives (iv) gender parity in the 68% of the population using the internet.

As an island state, sudden lockdowns brought by the COVID-19 pandemic situation reminded the population that proximity to service providers cannot be taken for granted, irrespective of geographical size, and this has highlighted the importance of digitalisation and the ability of the country to offer basic e-services. The emergency situation created opportunities for the private sector to establish, and upgrade its service delivery mechanisms including e-commerce and home delivery. Mauritius was already at a stage where broadband connectivity had largely been rolled out during the COVID-19 pandemic, and several e-services were already under development in different sectors (albeit fragmented). The pandemic accentuated the strengthening/revamping of existing e-services and the

[52] https://openknowledge.worldbank.org/handle/10986/35627?show=full

[53] https://www.edbmauritius.org/newsroom/mauritius-investment-finance-week-ushering-new-era-bilateral-and-economic-ties-uae

[54] https://www.worldbank.org/en/country/mauritius/overview

[55] http://vision2030.govmu.org/English/Pages/index.aspx ; https://govmu.org/EN/communique/Pages/Vision-2030.aspx

development of new services. Meanwhile, the population has also been sensitised to the importance and use of digital services and there is a greater appreciation of digitalisation across Mauritius, as the latter prepares to transition into a post-covid era.

The study has highlighted the InfoHighway Infrastructure, which has been establishing and operating the G2G service, offering a neutral infrastructure, and hosting an inter-governmental system. The three G2C cases are linked to the Infohighway, as they use the common platform to offer their e-service to the citizens.

The first case referred to the national revenue collection service. During the COVID-19 emergency situation, Mauritius Revenue Authority, generally associated with the collection of taxes, was entrusted with the responsibility of acting as the disbursing agency of government financial support contributions to its citizens. In this process, the authority was assigned a very different role from being a collector of funds from its citizens.

The second case looked at the educational system. The parent ministry was able to tap into e-services ensuring that the studies of school children and higher education learners would not be disrupted during the lockdown period while paying attention to equitable access. The study also addressed social inclusiveness for students located in underprivileged households and regions. The systems used during the pandemic are being continued in the post-covid era. A survey of students in one of the tertiary education institutions showed that Universities have in general handled online learning for their students relatively well during the pandemic.

The third case addressed e-services destined to directly serve citizens through the Citizen Support Portal (CSU). This involves a digital platform for managing requests and human intervention for actually solving the issues faced by citizens. The case depicted how the citizen's inclusion, transparency, process accountability, monitoring, and ensuring communities' needs are embedded within the system. Prospects for further system development include additional user interface features and new e-services for citizens.

Finally, views were also gathered from NGOs and CBOs working closely with families in underprivileged regions and addressing the gaps faced by users accessing the e-service. Their interaction gathers regular feedback and perceptions from the end users' perspective, useful for future improvement.

7.2 Cross-sectional analysis of factors that influence inclusiveness

This research study assessed the inclusiveness of basic e-services in education, revenue collection, and the provision of social services. For each selected case study, the design process, development, and implementation were analysed with special attention to the COVID-19 situation, during which inclusiveness would have mattered most. At the same time, an overview of the context and delivery of these e-services provides an insight into the much-required systemic approaches. The case studies have served as examples for the analysis of the inclusiveness of basic e-services in Mauritius, across the factors of access, affordability, use, relevance, and participation.

7.2.1 Access

The systems rely only on the internet connection, and widespread broadband connectivity made e-services accessible through a web browser. Social media played a vital role in connecting citizens on a permanent basis. The InfoHighway, located on a government intranet and housed within the premises of the Government Online Centre (GOC), supports all G2G users in government departments and GoC

provides connections to other entities outside the government network. Some services are available as mobile Apps, which provide very specific and popular functionalities to the end user.

A citizen requiring assistance accessing e-services can seek help at any of the Citizens Advice Bureau or Post Office. This was a popular approach amongst citizens to access the MRA, the Student Support Portal, and the CSP during the pandemic. Hence, access to e-services is not a problem in Mauritius, although it could represent a challenge for low-income households.

7.2.2 Affordability

Mauritius provides internet access connectivity at a rate cheaper than the threshold recommended by the ITU. Most users in Mauritius are connected either through home data packages or mobile devices. This level of connectivity and affordability has been made possible over the last five years. A daily unlimited mobile data package costs less than Euro 0.33. The government is presently rolling out free WIFI zones in public areas, village halls, hospitals, transport hubs and provides up to two hours of free internet access per day, validated through a registered mobile phone. All the e-services are free.

According to UNDP (2020), during the two successive lockdown periods in Mauritius, "(...) the level of connection with the outside world [beyond the household] with internet access was very high even among the lowest rungs of society (...)". In addition, the use of social media platforms such as Facebook, WhatsApp, and Instagram increased among people aged 50 and above not only for leisure purposes but also for sharing real-time information as a form of socialisation under confined conditions. These "new" internet users may continue to use social media post-covid, and explore other features such as e-services. The survey also indicated that only 38% of poor households accessed online education services during the first lockdown indicating the inclusiveness gap for children from poor households to free online educational programmes in that particular situation. However, the situation improved during the second lockdown.

7.2.3 Usage

With reliable and affordable connectivity, the user can easily access the e-service portal. Each service becomes user-friendly with its accompanying video tutorials in the local language. For citizens who are familiar with online services (e.g., all taxpayers who have to submit their returns electronically), accessing new e-services during the pandemic was not an issue. Intermediaries between the citizen and the e-services consisted of community members or family members (children who have learned IT skills at school).

NGOs that provide support to the communities also assisted citizens who could not or had little knowledge on accessing e-service for specific requests. They were already well informed of the existence of the relevant e-services, such as (a) the registration for Wage Assistance for self-employed during the COVID lockdowns, and (b) access to learning materials on the Student Support Programme. Hence, investment in developing digital literacy in combination with functional literacy is essential for citizens in the digital age.

The Mauritius Revenue Authority was able to tap into other Information systems connected through the InfoHighway infrastructure. It enabled validation of registration details, cross-check of claims and the disbursement of financial assistance to a large number of individuals who were newly registered onto their system during the lockdown period. The InfoHighway and MRA scalable information management modules rendered the new process application under Wage/Self Employed Assistance Schemes flexible, eventually linked to banks for disbursement of financial allowances to private sector employees and the

self-employed. The application was developed within 4 days for the Wage Assistance Scheme and within 12 days for the Self-Employed Assistance Scheme.

7.2.4 Relevance

The e-services in the case studies played an important role during the pandemic situation and were relevant to the stakeholder groups. While they all describe their approach to overcoming the challenges, and their ability to innovate and develop e-service delivery mechanisms, most of the service providers were taken by surprise upon the onset of the lockdown in March 2020.

The MRA set up a new payment mechanism within a very short time and registered a large number of citizens previously not registered on its system. Similarly, the Ministry of Education was able to mainstream a prototype from an ongoing project into the main delivery system for primary and secondary school students. The CSP was equipped with a back-office communication system that allowed officers to work from home. Citizens Advice Bureaus staff were still able to offer their services virtually through the portal even though the physical Bureaus were closed.

The case studies highlighted relevant e-services which were successfully adapted to the circumstances and lessons learned. The unconventional implementation of the systems during the pandemic bears testimony to the robustness of the components previously developed, such that they could rapidly be assembled to offer a novel service. Therefore, the design of e-service should give consideration to the actor types, system levels, context factors, program content, types of learning and change processes as well as conditions of sustainability of the service.

7.2.5 Participation

Citizens' engagement with an e-service generally starts off with information provided about the proposed service, followed by citizens' interaction with the service using online and offline mediums. Once the citizens' engagement is confirmed, the value addition process is nurtured until the successful completion of the service. This is the principle of the returning customer.

Citizens' engagement, although desirable, could not always be enforced to address the gaps in service delivery, given the context of the implementation of the cases studied. However, versions of the e-service should consider feedback from the service delivery actors and involve the users, especially after experiencing an emergency situation together. The Ministry of Education offers a good example, whereby it used the lessons from the first lockdown to start a programme of training teachers to manage online tools, designing of learning materials, and the delivery models for students at different levels. Meanwhile, investment was undertaken for producing content for online classes intended for a dedicated television-based learning channel. Following the second and longer lock-down period, the teachers and students were better equipped to fully participate in the e-service experience.

7.3 Good Practices shaping the enabling environment for effective provision of e-services

7.3.1 Establish a long-term vision of digitalisation for inclusive development

The vision of turning Mauritius into a Cyber-Island dating back to the early 2000s provided a common vision for the development of the ICT sector. Successive governments maintained the vision and adapted the enabling environment to support the development of the ICT sector. Adjustments and adaptations were made at each stage, as the technologies evolved rapidly, such as with the use of social media. Similarly, strategies, policies and regulations were developed at different stages as the ICT sector developed, whilst keeping to the long-term vision.

In order to share the vision amongst a wider audience, the impacts of social media are useful as analogies to showcase the impact of inclusiveness of public services digitalisation, and how the population can also be engaged in developing the ICT sector for economic development. The analogy can also be made to the COVID-19 experience as a trigger event that brings more inclusiveness and coordinated action around a shared vision. These concepts would be validated in the design of implementation strategies of the long-term Digital Mauritius Strategy 2018-2030, which can, in turn, be aligned to the African Continental vision for digitalisation for inclusive development.

7.3.2 Advocacy *& Support for ICT regulations and Infrastructural development*

Once the vision for ICT was set and investment in human capital development started, these were followed by long-term investments in connectivity servicing the ICT Sector. These took the shape of investments in complementary connections to international connectivity through undersea cables. Meanwhile, inland investments occurred through the deployment of an optical fibre network across the country which has led to affordable high-capacity connectivity in Mauritius, also serving the development of other economic sectors in all regions of the country. Appropriate legislations and regulations have encouraged market competition among existing players to bring the cost of connectivity down and make broadband infrastructure quasi ubiquitous and affordable to the population.

The convergence of services being offered through improved connectivity, for entertainment, education, and work is enabling new services to be offered, both locally and internationally, by a new generation of entrepreneurs. The government provision of e-services and regulations have also kept up with such development. The new Regulatory Sandbox licensing has paved the way for a framework for crowdfunding[56], and in return, Fintech is facilitating investments in the ICT sector.

Mauritius has adopted a strategy and successfully kept up with the emerging ICTs initiatives. The country's commitment to boosting international internet connectivity is reflected in offering higher bandwidth for broadband connectivity for both households and businesses. It will soon roll out 5G technology. This may lead to new economic activities and services that can tap into the fast connectivity.

7.3.3 Adopt an intersectoral approach to ICT Development

The development of the ICT sector in Mauritius has also been accompanied by a parallel process of development in other sectors of the country. Supported by steady economic growth, the country also invested in improving other infrastructure and amenities such as stable electricity supply, better road networks, reforms in the education sector & legislations related to ease of doing business in Mauritius.

[56] https://blog.fundkiss.mu/what-is-sandbox-regulatory-license-issued-by-economic-development-board-mauritius

These developments have been mutually reinforcing for further development of the ICT sector, and this is even more evident through the emergence of new economic activities for the country.

Achieving impacts of ICTs and digitalisation in Mauritius have required complementary processes from several interrelated sectors, including: -

(a) Policy formulation: exploring synergies amongst policies and adapting regulations around the ICT sector
(b) Formal Training on ICT skills: formalising education through developing ICT skills in the country up to university level
(c) Capacity Development on Digital skills: capacity strengthening of digital competence of the population
(d) Funding the development of the sector: Using ICT tools to support FinTech, and vice versa where FinTech drives financing for investments in ICTs
(e) Adapting democracy and governance in the digital era: Giving a voice to citizens through social media while also using online communication tools to promote healthy debates, exchange of knowledge and promote social innovation

The introduction of innovative e-services has the potential to either disrupt or threaten other existing services, but provisions can be made to complement each if proper boundaries are set during implementation. An example in Mauritius is the introduction of crowdfunding services which sets investment limits on amounts to be mobilised, and also sets a cap on amounts that can be invested by individuals and corporations. These measures have enabled the protection of the other existing financial institutions in the country while providing innovative means of raising funds for SMEs. The success of crowdfunding in Mauritius over the past 2 years has led the government to announce matching of the capital raised by such schemes as part of democratisation of access to funds by SMEs. Similarly, with the introduction of Mobile Wallets, limits have been set on the amounts that can be transferred through this channel, whereby users still need to resort to banking services for larger transfers. This approach enables the innovative e-service to be merged or mainstreamed into the existing ecosystems in the medium term, while the users get used to the concept.

All of the above points to digitalisation as the basis for improved efficiency and synergies amongst social processes. Therefore, the government, private sector, and the population, in general, should promote the adoption of good practices in digitalisation and innovation for social benefit.

7.4 Good practices that improve the inclusiveness of e-services

A range of guiding principles, approaches, and methods applied in the implementation of e-services have been identified, which enhance the inclusiveness of the e-service ecosystems.

7.4.1 *Foster a culture of digital services & reduce the gap in digital competencies*

Mauritius started the process of democratisation of ICT skills within the population early, and enabled at least a third of the adult population to acquire a minimum set of digital skills between 2005 and 2013. Thereafter, the development of these skills has been incorporated into the school curriculum. In fact, the early sensitisation of the population and the acquired skills may have facilitated the explosion of social media use, which in turn has created the demand for improved connectivity at the household level.

The web and social media tools are influencing all aspects of life, and a responsible government assists its citizens to adapt to changing times. Exposure to ICT-based services familiarises the citizen with digital services and helps society to bring about a change in behaviour, while also identifying areas where support is needed. The introduction of an e-service does not necessarily attract citizens unless they have a compelling reason to use the service (Lallmahommed et al., 2016). Processes that gradually nudge citizens towards changing their habits and behaviour towards greater use of digitalisation have been observed through the study. Some examples include (a) the inclusion of ICT skills in the school curriculum, and more recently the introduction of IT literacy skills from pre-primary school; (b) a fully digitalised process for the e-submission of tax returns and employers' returns; (c) use of call centres and automated voice messaging for client-facing services, etc.

The provision of financial and educational support to households in need by the National Empowerment Foundation has also been complemented by the free provision of access to the internet. More recently, the provision of free access to WIFI connections in public spaces and community buildings is another way of ensuring access to free online e-services.

However, with the recent connectivity upgrades to households, the risk of a digital divide is due to the disparity of digital competencies across generations and across socioeconomic classes. The review of the digital skills curriculum and implementation of a renewed framework of digital competency seems appropriate to reduce the lag between improving ICT infrastructure and the citizens' capacity to tap into the resource.

7.4.2 *Assistance and digital literacy for citizens' access and use of* e-services

The previous section focused on means of ensuring that citizens with sufficient digital skills to use the e-services actually use them. Digitalisation of service into an e-service can still be an efficient means of reaching and serving citizens who have low basic and digital literacy. The CSU provides a good case study. The CSU was previously offering an in-house service through its 35 Citizen Advice Bureaus (CAB), as a means of proximity to their clients. The introduction of the federated Citizen Support Portal has a wider reach and is directly accessible by the user through its web interface, hence reducing the need to visit a CAB. The focus of advocacy campaigns is better promoted through a federated e-service offer, through a distributed network. The Citizen Support Portal (CSP) is still backed up by the CSU personnel. The citizen visiting a CAB, benefit from CAB's staff support and assistance to use e-services. These services are also accessible through local Post Offices via the CSP. Assistance can also be provided by any digitally literate member in the community (social worker or household member) to use the CSP. Therefore, as opposed to the traditional model, the citizens now have an ecosystem of networked individuals who can act as intermediaries to interface with the e-service. This was particularly useful during the lockdown

periods when the CABs were closed but all the services of the CSU remained accessible online with the staff working from home and able to serve their clientele.

The e-services studied, especially their use during the pandemic, demonstrate that each service is accessed through its specific channel. In order to improve access and use of the e-services, it may be more useful to better integrate the e-services offer as much as possible. This can be achieved in different ways: (i) offering access points to a compilation of e-services, such as the portal for Government Online Services (ii) federated portal managing requests to various e-services, such as the CSP, and (iii) inherent linkages between e-services, especially government e-services by stronger and wider integration of G2G and G2C, as connected through the InfoHighway. Whichever approach is used should also facilitate linkages with other basic e-services.

7.4.3 Increase e-participation & promotion of e-services

LeBlanc (2020) highlights the fact that provision of information about and providing access to e-services does not necessarily lead to the use of the e-service: this approach addresses the 'inclusion' of the citizen but is not necessarily 'inclusive'. Therefore, there is a need for active promotion of e-services and motivation for targeted groups of users to start making use of the services and continue to use them thereafter. The perceived value of the e-service and the satisfaction of the user determines the re-use of the e-service (LeBlanc, 2020). This is the only way to increase the rate of e-participation of citizens.

The case of the CSP benefiting from the support of the CSU is an example of an institution or network of intermediaries assisting an e-service to reach a higher e-participation rate. In addition to its usual service access points at the CAB and Post Offices, the CSU regularly organises live outreach and advocacy events in different locations within the communities (especially shopping malls), and invites e-service providers to set up stalls at these physical events. It also participates in live radio programmes during weekdays where citizens can query about service, as well as live radio shows at the physical events. Such a mechanism serves as an ongoing sensitisation campaign for the CSP, where the descriptions of the service are broadcasted over radio and web live casts, to complement the online engagement designed into the portal.

This ongoing practice of the CSU in Mauritius appears to be a useful approach to advocating for greater e-participation. It would be very useful if the CSU could also expand the promotion of a wider portfolio of e-services through this existing mechanism. Outreach campaigns can also be organised through social media as a complementary medium for the promotion of e-services. The use of youth, as intermediaries and influencers, is especially useful for communicating messages about e-services to households with low levels of digital skills.

7.5 Recommendations for improved inclusiveness of e-services in Mauritius

Insights have been gained through analysis of the cases studied in Mauritius. In addition to the above practices to improve on the enabling environment and implementation of e-services, a few recommendations are proposed, to improve the inclusiveness of basic e-services in the country.

7.5.1. *Greater stakeholders' engagement in the development and review of e-services*

The study has shown how, during the lockdown periods, e-services had to be developed /adapted and made operational to new situations in a short time span. As a result, the good practice of broadly engaging with users during the process of development of these services was also disrupted during the pandemic. However, as the situation returns to normal, several of the e-services will need to be reviewed. It is recommended to engage with system users at the early development stages, review, and improvement phases of the e-services. The benefits of such participative interactions were also highlighted during the study. For example, the MRA implemented feedback from users over 2 years leading to the simplification of the tax submission form. The Infohighway infrastructure approach rests on the principle that two of its users would already have identified a need to connect their systems in the process of establishing an e-service, hence being demand-driven.

Most of the key informants expressed the need for further engagement with the stakeholders to address improvements to the systems. In general, the experience of using online tools during the pandemic has created a heightened awareness of the e-services amongst the public which has generated interest from both the e-service developers and citizen users to engage around the e-services in the future. The citizens' experiences on the need to interact electronically during the pandemic, and to collaborate online, is a strong foundation to build towards co-governance of e-services through the empowerment of the citizens. While this is more easily said than done, it is a goal that all stakeholders concerned with and engaged in an e-service have to aspire to.

The cases from Mauritius have highlighted practices that promote collaborative management around the provision of an e-service, from both technical and operational perspectives. From the technical perspective, the capacity of the staff of the MRA to offer a new service in the midst of a lockdown attests to the value of well-designed modular services and systems that allow interconnections with similarly designed systems. The capacity to deliver rapidly under pressure is a function of the style of organisation of work in the institution, the organisational culture, and the responsiveness of the personnel to the demands. From the operational perspective, The Citizen Support Portal ticketing service supports tracking of citizen requests' progress, follow-up, transparency, accountability, and good governance of service provision. It demonstrates that public service can operate in a transparent manner, with different components of the service mutually accountable to deliver the service.

Similarly, amongst the e-services for payment and banking facilities, such as payment of utilities, there has been healthy competition amongst service providers, each finding their niche clientele based on the value they provide to the customers. Despite the competition, they were listening to their clients and aligning the solutions to their needs. Such an approach meant that the systems were already largely harmonised. Therefore, when the service providers were all required to comply with regulations on online payments by the central bank, they readily did. However, in the course of complying with this new requirement, they also innovated this procedure which, in turn, now facilitates payment transactions across multiple payment platforms. Therefore, there is potential for increasing the involvement of stakeholder categories (and citizens in general) in the conceptualisation and management of e-services as it stimulates harmonisation of approaches and new collaborative solutions.

7.5.2. Promote greater integration of G2G and G2C services for the empowerment of citizens

Mauritius has demonstrated several aspects of e-services empowering citizens. These include not only the user-end service provision through the G2C, well exemplified by the CSP, but also the capacity of the country to develop a powerful, integrated G2G system that supports many of the G2C systems. The InfoHighway Infrastructure has become increasingly in demand by the public sector institutions; however, this study finds that the full potential of the InfoHighway is yet to be fully exploited.

There is a need for more sensitization, amongst the community of e-service providers, of the InfoHighway's support to G2G services for internal government purposes. Hence the need to explore the potential offered by the InfoHighway in support of G2C services and as a core platform and linking several e-services offerings. It is also envisaged that with increased exposure of the ICT sector actors to the InfoHighway, a paradigm shift will happen if, and when, the private sector is also able to tap into the connections that are enabled by the InfoHighway, albeit while respecting all data security protocols. Synergies have already been noticed amongst private sector actors in the field of online payments, and greater synergies could be found in combination with government-led e-services.

The study has shown that services such as the InfoHighway are indispensable to the provision of e-services, but remain invisible to the end user. Meanwhile, each e-service has tended to be offered independently on a particular platform. However, it is recommended to better integrate the e-services offer as much as possible, initially as part of compilations on a common platform for government e-services, such as the Government Online System, or through the expansion of federated portals of services, such as the CSP. Whichever approach is adopted, or if both are implemented, there is a need to provide the citizen with points of entry to the entire range of e-services.

With the already high level of internet use, literacy, and improving digital literacy, the potential offered by the e-services ecosystem in Mauritius, its citizens could be empowered to become model e-citizens of the future, similar to more advanced economies.

7.5.3. Benchmark and review the digital competence framework for citizens

This study has documented the measures taken in Mauritius to develop the digital skills of the population, launching the use of the IC3 course back in 2005 and mainstreaming the curriculum into the latter years of the compulsory schooling programme. Digital literacy is about being able to critically evaluate the flood of information available through digital media. it is imperative that every citizen attains a minimum level of digital competence qualifying to become an e-citizen (Ronchi, 2019).

Le Blanc (2020) reminds us of the lag period between the rapid improvement in connectivity infrastructure and the ability to tap into the infrastructure. This lag, as was observed in the context of the introduction of optical fibre connectivity in Mauritius, has been shortened due to the improved digital skills of the population. However, The ITU dashboard 2020[57] indicates that digital literacy stands at 57% of the population, while it is reported that 65% of the population uses the Internet regularly. This points to a need to address a potential gap, especially as the new 5G technology introduction, is already underway. Therefore, it is timely that the NCB is reviewing the digital skills curriculum.

The EU has developed a framework for digital competence since 2014 and has updated the framework as recently (evolution of DigiComp 1.0 to 2.2 released March 2022). The framework provides an 8-level scale of digital competence that could also be used in Mauritius. It is recommended that local institutions

[57] https://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/Digital-Development.aspx

review the EU Digital Competence Framework[58] as a means of defining the required minimum digital skills required by citizens of Mauritius, or as a benchmark to assess the level of skills required to use the current e-services. This will enable adequate matching of skills for use of the e-services. Furthermore, the EU Digital Competence Framework has an online self-test functionality that citizens can use to validate their level of competence. Such a system could be integrated within a local online training platform for Mauritius, which would also enable citizens to update and validate their skills. Therefore, the online platform will be able to facilitate testing, offer certification tools and enable monitoring of the digital competence of the population.

7.5.4 Monitor & evaluate digital service indices and measure the impact of e-services

An e-service, just as any project or intervention, requires Key Performance Indicators while addressing its societal purpose and contribution. All the e-services studied provided quantitative data on their general reach and performance, but there was insufficient differentiation amongst the categories of users to determine inclusiveness. Key informants were open to innovating and embracing improvements in the systems to better address inclusiveness, based on profiles of target communities. Through this study, they also appreciated that ad-hoc (albeit regular) surveys can only provide snapshots of the use of an e-service. Instead, regular consultations with target communities such as vulnerable groups and elderly people would enable the assessment of the 'real' needs of these customer segments, devising performance indicators for such needs, and monitoring the achievement of the targets set This mode of monitoring, evaluation, and learning by interacting with the user community can also enhance e-Participation by building trust amongst the target communities to use the e-services effectively. Therefore, a participatory approach to monitoring and evaluating e-services, as well as co-learning from each other is strongly encouraged. This participatory model would be particularly useful if addressed in combination with the capacity strengthening of local digital literacy.

The Monitoring, Evaluation & Learning (MEL) approach at the level of the e-service also enables analysis of e-government and digital services which are regularly reported at the national, regional, and international levels, and benchmarked through analyses such as the EGDI Reports. The study noted that Statistics Mauritius regularly carries out surveys on Telecommunications, ICT access, Internet Usage, External trade, contribution to Gross Value Added (GVA), Employment and ICT Development Index (IDI). The Ministry of Information Technology, Communications and Innovation provides an overview of the regulatory framework through the listing of all policies, strategies, and regulations pertaining to the ICT sector. At the international level, the ITU provides annual reviews of the status of telecommunications, connectivity, and digital literacy across its member countries. These databases form the basis of surveys for comparative assessments across multiple countries such as the EGDI survey and the Network Readiness Index. Therefore, monitoring data on indicators of local e-services eventually contributes to international comparisons of a country's performance.

Given the contribution of MEL data on services at the local level to global indices such as the EGDI, and the government's vision for Mauritius to evolve both in the EGDI and the Income level classification, a local panel reviewing the progress of the global survey indicators is highly desirable. For example, the EGDI 2020 survey considered a set of 20 types of online services across countries in its computation of the OSI. Although the instruments used for these surveys are adapted at each cycle, it is recommended that a systematic review of the survey forms be carried out when the results of comparative studies are released. Hindsight from the surveys carried out, and ensuring that adequate means of measurement

[58] https://joint-research-centre.ec.europa.eu/digcomp_en

of the past indicators are made explicit, is the best way to prepare for the next surveys. A review session of the results of these comparative Indices reports could provide guidance for high-level discussions in the formulation of new research and economic development directions for the country.

While MEL indices is useful at a macro-level, the focus on the inclusiveness of e-services (or any other intervention) can be addressed by using the Social Inclusion Assessment Toolkit (SIAT) (World Bank, 2018) which proposes a simple framework to carry out a self-assessment on the extent of social inclusivity for a development initiative. Such a framework could be systematically adopted across all e-services in Mauritius. The framework of the Social Inclusion Assessment Tool requires addressing four sets of questions, about an initiative as follows: -

(a) *Identification:* Are excluded groups identified? Who is excluded? Are some groups less likely to benefit from a project/program/policy because of their identity?
(b) *Analysis:* Is there an ex-ante analysis on social inclusion? How and why is the particular group (or groups) excluded? What drives the exclusion?
(c) *Actions:* Are there actions intended to advance social inclusion? Social Inclusion is not always about doing more: it is often about doing things differently. What actions are built into a project, program, or policy design?
(d) *Monitoring:* Are there indicators to monitor social inclusion? How would we know if we have made progress? In projects does the results framework contain indicators on inclusion?

Therefore, it is important that MEL is implemented at all levels of e-service provision at the country level. A MEL design that links the social dimension of inclusiveness and the macro-level ICT indices, and its implementation, can greatly improve the inclusiveness of digitalisation of basic services in Mauritius

7.5.5. Tap into the strong local trained human resources for contextualised features of e-services

Mauritius has performed well in adopting a cross-sectoral approach to the development of the ICT sector of the economy, especially through early investments in developing ICT skills in the country, up to the tertiary level. Evidence of the continued interest in developing the ICT sector is the announced establishment of the Digital Industries Academy.

Research and training institutions such as public and private universities should be further involved in the ideation, selection, formulation, prototyping, and development of user-friendly tools and technologies to facilitate the use of e-services. This will provide more opportunities to engage the local talent in the conceptualisation, experimentation, development, and piloting of e-services. It will also enable the application of new technologies such as IoT, AI, FinTech, and Blockchain in the services sector. A recent example of localised features introduced in e-services is the development and implementation of a tri-lingual chatbot (English, French, and Creole) on the Citizen Support Portal. The chatbot serves to improve the efficiency of the service by filtering the queries, addressing the standard requests with readily available responses, and passing on non-standard requests to the personnel.

The active engagement of the local talents in the development and implementation of e-services in Mauritius, both in the public and private sector, could constitute a local community of practice that can further identify good practices and facilitate the extension of the skills into other sectors that are yet to be fully developed in Mauritius, such as e-Health (Annex C) and e-Agriculture.

7.5.6. Mauritius as a test-bed for innovative e-services in the African region

Given the current ranking of Mauritius on the EGDI, the current plans to review capacity development on digital competence; ongoing efforts to pursue ICT skills development at the tertiary level and within the digital industry; and the existing national ICT ecosystem can support the application of digitalisation to offer e-services, Mauritius could be considered as an early adopter of digitalisation in Africa.

If the improvements proposed above are implemented, and the country qualifies as a country with 'Very High EGDI', the citizens of Mauritius and the country itself could also serve as a test bed for the implementation of national systems for e-services, before being rolled out into the sub-region. Such an arrangement could form the basis of a 'Digitisation agenda' for the sub-region and collaboration could be organised through collaboration with SADC Member states on the basis of Government to Government bilateral or multilateral basis, in line with SADC's Industrialisation agenda for the sub-region.

This type of collaboration would also be aligned to the ambition of Mauritius, with its long-established infrastructure of banking and financial institutions, to serve as a financial hub for the region. The experiences, perspectives, and insights gained could be documented and shared across the sub-region and Africa.

7.6 Concluding reflections

This research study was initiated during the COVID-19 pandemic and sanitary regulations were still ongoing in Mauritius by the end of the study. However, the timing of the study has enabled a rich capture of the range of experiences of the e-service providers as well as perceptions of the users. The situation over the past two years has brought new innovations in the ways e-services are designed and offered. More e-services are being added by the government and complemented by innovative e-services by the private sector, especially as the country prepares itself to transition completely out of the regulations introduced during the pandemic. Mauritius has the potential to experiment country-wide, demonstrating the potential of e-services in the context of a small island state in Africa, and sharing its experiences with other countries in the region.

Figure 13. The newly introduced Metro Express Service, bearing the promotion of the campaign #RideWithPrideMoris during the month of June 2022 (Photo courtesy of AllianceMedia & Collectif Arc en Ciel, Mauritius)

The dilemma remains whether these services will be perceived as being temporary measures during the times of the pandemic, or alternately old habits are restored when the situation improves and the economy opens up again. Through this study, stakeholders have been sensitised to the need to ensure inclusiveness of the e-services while disparities in access to and use of these services are actively addressed (Figure 13).

Digitalisation remains high on the agenda of the country's development aspirations, along with the vision of the country to join the category of countries with 'Very High EDGI' while also becoming a high-income country by 2030. The release of the EGDI 2022 soon, its analysis, as well as the findings of this study will provide useful insights for policy recommendations in the ICT sector for Mauritius and other countries in Africa.

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Annexes

Annex A: Evolution of EGDI, sub-Indices & e-Participation scores for Mauritius over time

Scores (Country)\ Year:	2020	2018	2016	2014	2012	2010	2008	2005	2004	2003
EGDI Score for Mauritius	0.7196	0.6678	0.62306	0.53375	0.50658	0.46454	0.5086	0.53166	0.50548	0.47108
World Leader (Denmark)	0.9758	0.915	0.9193	0.9462	0.9283	0.8785	0.9157	0.9062	0.9132	0.9271
Regional Leader (Mauritius)	0.7196	0.6678	0.6231	0.539	0.5192	0.4826	0.5115	0.5317	0.5055	0.515
Sub regional Leader	0.7196	0.6678	0.6231	0.5337	0.5192	0.4645	0.5086	0.5317	0.5055	0.4711
E-Participation Index Score for Mauritius	0.6429	0.691	0.66102	0.52941	0.0789	0.05714	0.11363	0.12698	0.14754	0.0862
World Leader (Estonia, Rep of Korea, USA)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Regional Leader (Mauritius)	0.75	0.8483	0.8305	0.8039	0.6842	0.3	0.4318	0.3833	0.1475	0.2586
Sub regional Leader	0.6429	0.7584	0.661	0.6471	0.3421	0.2286	0.4318	0.3833	0.1475	0.1897
OSI for Mauritius	0.7	0.7292	0.7029	0.47244	0.43137	0.29523	0.47157	0.62884	0.5444	0.44759
World Leader	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Regional Leader (South Africa)	0.7471	0.8333	0.7391	0.6929	0.6013	0.5302	0.6054	0.6288	0.5444	0.5393
Sub regional Leader	0.7	0.7292	0.7029	0.5118	0.4706	0.2952	0.4716	0.6288	0.5444	0.4476
TII Score for Mauritius	0.6677	0.5435	0.4596	0.44061	0.32959	0.26469	0.2423	0.17615	0.17206	0.19566
World Leader	1.0000	1.0000	1.0000	1.0000	1.0000	0.7687	0.814	0.8396	0.86	0.8456
Regional Leader (Seychelles)	0.6925	0.5435	0.4624	0.4721	0.4037	0.3037	0.3011	0.2343	0.2455	0.2412
Sub regional Leader	0.6925	0.5435	0.4624	0.4721	0.4307	0.3037	0.3011	0.2343	2455	0.2412
HCI Score for Mauritius	0.7911	0.7308	0.7067	0.6882	0.75877	0.83883	0.81316	0.79	0.8	0.77
World Leader	1	1	1	1	1	0.9987	0.9933	0.99	0.99	1.422
Regional Leader (Mauritius)	0.7911	0.7308	0.7588	0.7821	0.8502	0.9039	0.8864	0.9	0.87	0.88
Sub regional Leader	0.7911	0.7308	0.7067	0.731	0.8502	0.9039	0.8864	0.9	0.87	0.83

Annex B: List of electronic sources of information consulted

- UN-E-Government-Survey-2020
  https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2020
- Government of Mauritius e-Government portal
  https://ncb.govmu.org/ncb/governmentonline.html
- Mauritius Revenue Authority
  https://eservices.mra.mu/eservicesseashome/
- Economic Development Board
  https://www.edbmauritius.org/
- Statistics Mauritius (ICT)
  https://statsmauritius.govmu.org/Pages/Statistics/By_Subject/ICT/SB_ICT.aspx
- Citizen Support Unit
  https://www.csu.mu/index.php
- Information Communication Telecommunication Authority
  http://www.icta.mu/
- Ministry of Education, Tertiary Education, Science and Technology
  https://education.govmu.org/SitePages/Index.aspx
- Student Support Portal
  https://ssp.moemu.org/eresources.php
- Ministry of Information Technology, Communication & Innovation - List of Policies & Strategies
  https://mitci.govmu.org/SitePages/ViewAllReports.aspx?RType=Policies%20and%20Strategies
  - National ICT Strategy Plan 2011 - 2014
    https://mitci.govmu.org/Documents/Strategies/NICTSP20112014.pdf
  - Mauritius e-Government Strategy 2013 - 2017
    https://mitci.govmu.org/Documents/Strategies/eGovernment%20Strategy%20finalv1.pdf
  - Open-Source Software Strategy for the Republic of Mauritius 2014
    https://ncb.govmu.org/ncb/strategicplans/OpenSourceSoftwareStrategy.pdf
  - National Cyber Security Strategy 2014-2019
    https://ncb.govmu.org/ncb/strategicplans/NationalCyberSecurityStrategy2014-2019.pdf
  - National Open Data Policy 2017
    https://mitci.govmu.org/Documents/Strategies/Mauritius%20Open%20Data%20Policy%20May%202017.pdf
  - Cybercrime Strategy 2017-2019
    https://mitci.govmu.org/Documents/Strategies/National%20Cybercrime%20Strategy-%20August%202017.pdf
  - Mauritius National Export Strategy - Software Development Sector 2017-2021
    https://ncb.govmu.org/ncb/strategicplans/MauritiusNationalExportStrategy.pdf
  - Mauritius Artificial Intelligence Strategy 2018
    https://ncb.govmu.org/ncb/strategicplans/MauritiusAIStrategy2018.pdf

    - Digital Government Transformation Strategy 2018 - 2022
      https://mitci.govmu.org/Documents/Strategies/Final%20Digital%20Government%20Transformation%20Strategy%202018%20-%202022.pdf
    - Digital Mauritius 2030 Strategic Plan
      https://mitci.govmu.org/Documents/Strategies/DM%202030%2017%20December%202018%20at%2012.30hrs.pdf
- Mauritius Vision 2030
  https://www.un-page.org/files/mauritius-vision-2030pdf
- National Computer Board
  https://ncb.govmu.org/
- NCB ICT Indices
  http://indicators.ncb.mu/English/
- Open Data Mauritius
  https://data.govmu.org/dkan/
- Central Informatics Bureau
  https://cib.govmu.org/SitePages/Index.aspx
- InfoHighway Infrastructure
  https://ih.govmu.org
- Open Data Mauritius
  https://data.govmu.org/dkan/
- Government of Mauritius online payment services
  https://fasil.govmu.org/fasil/digital-services/#ds-onlinepyment
- National Authentication Framework
  https://maupass.govmu.org
- Digital Signature
  https://mausign.govmu.org
- Queuing and appointment system
  https://morendezvous.govmu.org

Annex C: The case of E-Health in Mauritius

This study did not focus on the health sector during the pandemic period, and instead only desk research has been possible. The Government of Mauritius has been providing free healthcare services, from primary care to hospital care, including specialised and rehabilitative services, for the past five decades. Mauritians nowadays have a life expectancy of 77.4 years. Infant Mortality is at 13.8 per thousand live births. Mortality from infectious, parasitic, and water-borne diseases has dramatically decreased from 7% in 1976 to 2.8% in 2019[59]. The health sector has over the years been modernised and accessibility to citizens improved (including Rodrigues) with 5 major public hospitals, 6 specialised public hospitals, 6 Mediclinics around the island in addition to 120 Community Health Centres and Area 26 Health Centres (Figure 14)

The government formulated a Health Strategic plan 2020-2024 which includes an E-Health component[60]. However, this is not the first attempt at the E-health strategic plan exercise, the first one dating back to 2011, which unfortunately was not financed and implemented. In January 2022, The Ministry of Health and Wellness jointly with the Ministry of Information Technology, Communication and Innovation signed an agreement with the UNDP Mauritius for an e-health project.

The e-Health project is now part of UNDP's inclusive and multi-sectoral response to COVID-19 through digital transformation. Under this project, the existing paper-based health care system will eventually be replaced by a modern and integrated e-Health system in all public regional and health care centres. It aims at improving the quality of health services across the island and achieving an inclusive health sector through structural transformation[61] including digital technologies and leveraging ICT to transform the health care systems. An Integrated Hospital Management and Patient Care System are currently being implemented at Bruno Cheong Hospital in Flacq on a pilot basis. A free e-health app[62] has been developed to cater to patient medical records, health trackers, and telemedicine.

Chan Sun & Lan Cheong Wah (2020)[63] describe the preparedness of Mauritius to tackle the COVID-19 pandemic as consisting of three components: (i) Prevention strategy, (ii) Outbreak management strategy, and (iii) Communication strategy. The use of digital platforms was useful in managing the Covid-19 situation, namely by providing daily updates to the population on the ongoing health situation, protocols to follow, and vaccination program management. In addition to the Government Information Services website and social media, the EDB had set up a portal to administer and manage Covid-19 vaccination scheduling[64]. Each citizen had the possibility to register for the free vaccination doses from the Ministry of Health and Quality of Life. In addition, a mobile app BesafeMoris[65] was simultaneously developed to provide general information on Covid-19 & the vaccination programme,

[59] https://statsmauritius.govmu.org/Pages/Statistics/Tableau-de-Bord.aspx
[60] Health Strategic plan 2020-2024: https://health.govmu.org/Communique/HSSP%20Final%2015%20September%202020.pdf
[61] https://www.undp.org/mauritius-seychelles/news/signature-portfolio-documents-e-health-initiatives-undp-mauritius-and-ministry-health-and-wellness
[62] https://www.medecin.mu/e-health
[63] https://doi.org/10.1016/j.puhip.2020.100023
[64] https://vaccination.edbmauritius.org/
[65] https://besafemoris.mu/vaccination-program/

facilitate registration, and access the digital vaccination pass. To date 74.18%[66]of the population is fully vaccinated and 2.55% are partly vaccinated. No major disruption of service was experienced during the lockdown period and vaccination program.

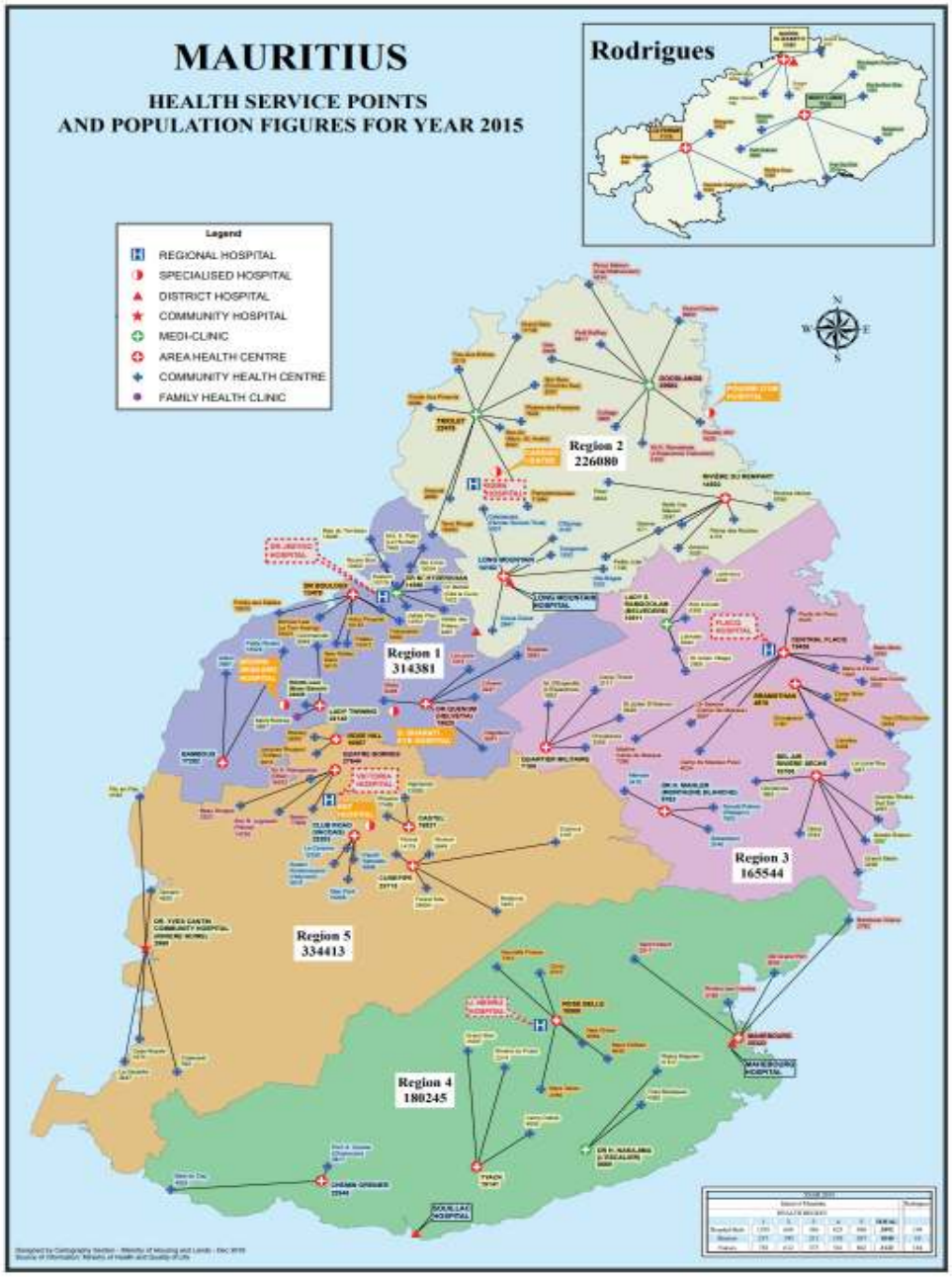

Figure 14. Distribution of health services across Mauritius

[66] https://ourworldindata.org/covid-vaccinations?country=OWID_WRL (accessed 20.06.2022)