South-South Integration and the SDGs:
Enhancing Structural Transformation in Key Partner Countries of the Belt and Road Initiative

OCTOBER 2021

UNCTAD/BRI PROJECT/RP15

Digital Economy of Sri Lanka: National Goals and Lessons from the South

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Abstract

Despite the macroeconomic issues, Sri Lanka remains optimistic during its post-Covid-19 economic recovery, given its relatively developed digital landscape with more than 60% of the population owning mobile phones (about half of them with advanced digital smartphones) and a significant number accessing the internet regularly. The digital economy in Sri Lanka, estimated to be USD 3.47 billion or 4.37% of GDP, is gradually emerging. Sri Lanka's ICT/BPM workforce is supposed to reach 300,000 from 125,000 in 2018, which would then support a USD 3 billion industry from the current USD 1 billion.

Sri Lanka identified 'Building a Technology-based society' as a key national initiative in its National Policy Framework (NPF) named "Vistas of Prosperity and Splendour", adopted in December 2019. The document comprises ten critical policies to achieve the fourfold outcome of a productive citizenry, a contented family, a disciplined and just society, and a prosperous nation. Information and Communication Technology Agency (ICTA) of Sri Lanka, the apex ICT institution of the Government, was assigned to implement the policy guidelines. ICTA's scope relies on three pillars: Digital government, digital economy, and digital society. The digital economy strategy is further subdivided into five key themes: Technology industry development, start-up ecosystem development; technology diffusion; capacity building; and regional cluster development. Additional digital laws and policies are also necessary to enable these developments.

Without deviating from the above policy framework, this paper discusses Sri Lanka's lessons from the most advanced digital economy in the South, the People's Republic of China. (PRC). In size and administration, the two nations are hardly comparable. Still, the paper finds many lessons in moving towards an advanced digital economy. Replicating these lessons does not depend only on willingness but also on the country's readiness. Given Sri Lanka's current capabilities, it could take some measures immediately, but others would have to wait. For example, Sri Lanka may not be prepared to immediately supply AI products or autonomous electrical vehicles to the global market. On the other hand, there is a mature market for E-commerce, education technology, or fintech. It is essential that the successful international approaches are correctly identified and integrated into the digital economy strategy of Sri Lanka for achieving the stipulated targets.

Key words: Digital Strategy, Digital Economy, Sri Lanka

UNITED NATIONS

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1. Sri Lanka: Economic Landscape

Economic transformations in Sri Lanka, a middle-income nation in the Indian Ocean with a GDP per capita of USD 3,682 and a total population of 21.9 million (Central Bank LK, 2021), cannot be discussed isolated from the country's turbulent political environment. For about 30 years, the country lived with ongoing conflicts in the Northern and Eastern parts of the island. A relatively peaceful era dawned with the end of the civil war in 2009, but the relief was brief. Following a highly politically unstable period in 2018, the Easter bomb attacks happened with the immediate loss of 269 lives stemming from five different suicide explosions in various parts of the country. Recovery from these events was not even complete when the Covid crisis began, resulting in lockdowns that lasted for weeks and months. It made 2020 economically the worst year since the country's independence in 1948, with a negative 3.6% growth rate for the year (Central Bank LK, 2021). Sri Lanka's way forward can only be treated in this backdrop.

One of the key concerns of the island nation is its high public debt. Sri Lanka's high debt payments and inflated civil service, which have contributed to historically high budget deficits, remain a concern, says CIA's World Fact Book. The government debt-to-GDP ratio has increased to over 90% (from 87% at the end of 2019), with more than half of the debt denominated in foreign currency. (World Bank, 2020)

On the positive side, over the last 2-3 decades, the economy has been transforming from a predominantly rural-based agriculture economy towards a more urbanized economy oriented around manufacturing and services. Social indicators, particularly education and health-related ones, rank among the highest in South Asia and stand close to those in middle and high-income countries. The national poverty headcount ratio had declined from 15.3% in 2006/07 to 4.1% in 2016. Extreme poverty is rare and concentrated in some geographical pockets though a relatively large share of the population subsists marginally above the poverty line. (World Bank, 2020)

COVID-19 is likely to deteriorate the economic landscape further. It is already predicted to have serious welfare implications. The COVID-19 crisis is believed to have triggered sharp jobs and earnings losses. Informal workers are particularly vulnerable as they lack employment protection or paid leave. A study has found the lockdown has caused loss of income for 64% of the household, out of which 7% lost their entire income. Around 45% of households were seeking financial support for loan repayment, redeeming mortgaged items, paying outstanding credit card balances and other bill payments. (FHSS, 2020)

At the macro level, some industries like tourism were severely affected, with no viable recovery is seen in the near future. Approximately 80% of enterprises have suffered a production and employment drop. More than 80% of the micro, small and medium enterprises (MSMEs) reported a decline in their sales due to delayed or cancelled orders by domestic and foreign buyers. The estimated losses for a period of 3 months period starting from March 2020 are USD 1,400 million. (FHSS, 2020) The third and fourth quarters of 2020 looked more positive, but one could not be certain on how quickly the economy could recover to the pre-COVID-19 situation.

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2. Digital Landscape

Sri Lanka's digital infrastructure facilities have been relatively well developed over the last two decades. As happened in many other places, the number of mobile SIMs has surpassed the population, but this is large because of the multiple SIM usage. A more realistic figure would be 13.5 million mobile phone users (not SIM users) out of a population of about 21.4 million. (LIRNEasia, 2019) That is 63% of the population. Given the sizable child and rural populations, this is an acceptable number. The same survey found 47% of the mobile phone users use a smartphone while the rest use either a feature phone, i.e. a low priced model but with a colour screen, such as Nokia 3310 (7%) or a basic phone (46%). Smartphone ownership is marginally higher in urban areas than rural – probable reason could be the cost issues – and higher among women than men (50% against 42%). As Figure 01 shows, both mobile data and fixed data connections too are on the rise.

Figure 1: Digital infrastructure facilities in Sri Lanka from 2010-20 (in millions)
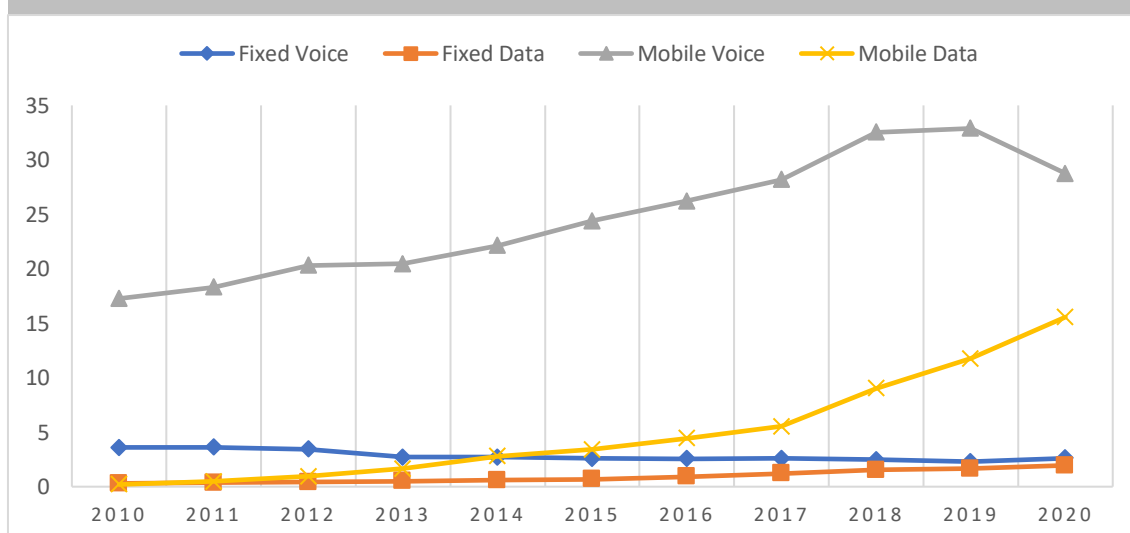
Source: TRCSL, 2020

In an analysis of about 50 Sri Lankan companies across multiple industries, McKinsey analysts place the country's Digital Quality (DQ) at 35 places, higher than the global median of 33. The same analysis finds, in comparison with other Asia Pacific emerging markets, Sri Lanka exhibits strengths in connectivity, digital marketing, investment in digital initiatives, and the ability to move quickly. However, when compared with China, India, and more developed countries, Sri Lanka's position is not too satisfactory. (Figure 02) Sri Lanka's companies, states the survey, lag in appetite for risk, ability to integrate their digital priorities into the overall business strategy, automation of internal and customer-facing processes, and adoption of a collaborative culture between the digital teams and business functions. The analysis finds most Sri Lankan companies, even in more digitally mature sectors, still have room for improvements in each of the four pillars of digital transformation: strategy, capabilities, organization, and culture (De Bustos et el, 2019).

Figure 2: Digital Maturity Heat-map for Sri Lanka's Strengths and Weaknesses compared with other Asian Markets

■ Outperforming compared to other markets   ■ At par compared to other markets   ■ Lagging compared to other markets

	Management practices	Emerging Asia[1]	Developed Asia[2]	China	India
Strategy	Linked to business strategy				
	Bold, long-term orientation				
	Centered around customer needs				
Culture	Risk appetite				
	Test and learn				
	Speed/Agility				
	Internal collaboration				
	External orientation				
Organization	Roles and responsibilities				
	Talent and leadership				
	Governance/KPIs				
	Digital investment				
Capabilities	Connectivity				
	Automation				
	Content and digital marketing				
	Data-driven decision making				
	Customer experience				
	IT architecture				

[1] Emerging Asia includes companies from Malaysia, Thailand, Vietnam, Philippines, and Indonesia.

[2] Developed Asia includes companies from Japan, Australia, New Zealand, Singapore, South Korea, and Taiwan.

Source: De Bustis et el, 2019

2.1.   Sri Lanka's Digital Economy Size

There has never been a universal technique to calculate the size of the Digital Economy element within an economy. The lack of a generally accepted definition of "Digital Economy" or "Digital Sector" and the absence of product and industry classifications for Internet platforms and related services are obstacles to measuring the digital economy. Still, there have been many workarounds. They all depend on the manner how Digital Economy is defined.

In 2016, the G20 Hangzhou summit defined Digital Economy as "a broad range of economic activities that includes using digitized information and knowledge as the key factor of production, modern information networks as an important activity space, and the effective use of information and communication as an important driver of productivity growth and economic structural optimization" Just like agriculture and industrial economies use land, labour and capital as the key factors of production, data becomes the key factor of production in Digital Economy (Yubo, 2020)

Digitization has infused many activities, and indeed almost the entire economy can be included in a broadly defined 'Digital Economy'. However, at the heart of digitization, it is more realistic to focus measurement efforts on a specific range of economic activity. While the term "Digital Sector" denotes specific limits to economic activity, the term "Digital Economy" is often used to indicate that digitization (for example, the use of the Internet) extends to all sectors of the economy, from agriculture to warehousing. Available evidence suggests that the digital sector in most economies is still less than 10% when measured by value-added, income, or employment. (IMF, 2018)

An IMF staff paper (2018) identifies the five following components as the most visible in any Digital Economy. The aggregate of these five components represents the Digital Economy size.

o   ICT equipment, semiconductors industry;
o   Telecommunication and Internet access services;
o   Data processing, software and other information services;
o   Online platforms, including e-commerce platforms;
o   Platform-enabled services (e.g., the "sharing economy").

This method has been selected to calculate the Digital Economy size in Sri Lanka for its simplicity and straightforwardness. Table 1 provides the estimated sizes of each component with their corresponding magnitude with reference to GDP.

Table 1: Size of the Digital Economy in Sri Lanka					
	Component	**Size in LKR million**	**Size in USD millions (1 USD = 200 LKR)**	**Percentage of GDP**	**Original Source**
1	ICT equipment and semiconductors industry	162,800[1]	814	1.01%	SLEDB, 2019
2	Telecommunication and Internet access services	192,000[2]	960	1.19%	Central Bank of Sri Lanka, 2021
3	Data processing, software, and other information services	291,000[3]	1455	1.80%	Central Bank of Sri Lanka, 2021
4	Online platforms, including e-commerce platforms	60,000[4]	300	0.37%	Daily News, 2019
5	Platform-enabled services (e.g., the "sharing economy")[5]	-	-	-	-
	Total	693,800	3,469	4.37%	

Source: Author calculations based on information from SLEDB, Central Bank of Sri Lanka and Daily News

2.2.   Digital Economy workforce

The ICT workforce in Sri Lanka is undergoing deep structural changes. The overall strength of the workforce, according to the last ICT-BPM survey conducted in 2018, has grown from 82,854 in 2014 to 124,873 in 2018, which amounts to a growth of 51% for five years or annual growth of 11% for 2018. Assuming the same growth rate for the next three years by 2021 end total ICT-BPM workforce could be 170,000. This is a conservative estimate as this rate itself is expected to grow annually.

The most important characteristic seen over the last few years is the structural change that has taken place in respective shares of major employers in the total workforce. ICT companies have become the dominant employer with a share of 66% of the workforce, overtaking non-ICT companies (22%) by a wide margin. Government organizations and BPM companies have reported 7.1% and 4.2% shares, respectively. Parallel to this, the

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1 Sri Lanka's electronic industry is relatively small. Most electronic equipment including computers with peripherals and mobile phones are

        imported. As only the export figure was available, it was assumed the local market is just as large as the export market.

2 This figure is based on the aggregate monthly data usage of the month 2020 (all telcos) and the cost of data in the open market.

3 As only the export IT/BPO services figure was available assumed local market is half the size of the export market.

4 A reasonable extrapolation of the market figures from 2019

5 Sri Lanka's digital platforms (except in e-commerce, which has already been counted) are not too large; so this component is negligible.

BPM workforce in the country has increased from 17,427 in 2014 to 25,510, which indicates a growth of 46%. (Annual growth rate of 10%)

The composition of the ICT workforce, in terms of the share of workers in different job categories and gender distribution, has undergone significant changes from the previous workforce surveys. The dominance of the software engineering category has increased from 21% in 2013 to 36% in 2018. Its share has gone even higher (46%) in ICT companies, followed by software quality assurance (15%), jointly covering more than 60% of the workforce in ICT companies.

The main job categories in non-ICT companies are technical support (47%) and client support (16%). The gender composition of the workforce has improved from 29% women participation in 2013 to 34% in 2018. As in 2013, BPM companies maintained a situation of near gender balance in the BPM workforce with over 48% women participation.

The quality of the workforce as indicated by qualifications and experience has improved from the previous surveys. The share of employees with a Bachelor's degree or above has increased from 63% in 2013 to 85% in 2018. The highest share of graduates was reported from ICT companies (> 90%) while in other major employers it increased over 50%. Bachelor's degree has become the standard entry qualification for the majority of job categories in all major employer categories.

The survey found demand for graduates has increased from 6,246 in 2014 to 21,216 in 2019. The survey also reported an increase in the supply of the total number of graduates produced by training organizations from 6,611 in 2014 to 9,076 in 2019. The quality of the training staff in ICT training organizations has improved significantly in terms of academic qualifications and experience. Despite the growth in numbers of graduate output, however, the projections indicate a situation of a widening gap between demand and supply of ICT workforce in the country. This implies that the training system of ICT in the country is still not geared to cater for the market demand by producing sufficient numbers of graduates, a key challenge that calls for the urgent attention of policy makers, ICT industry stakeholders as well as educationists. (ICTA, 2019g)

2.2.1. Freelancers

Online freelancing is growing rapidly and gaining popularity within the younger generation in Sri Lanka as it providing avenues to make extra income with one's skills and knowledge while being at home. Typical "jobs" that are outsourced by Sri Lankans through platforms such as Fiver.com, Freelancer.com, Upwork.com etc., include graphic design, data entry, proofreading, translation, copyediting, market research, programming and data verification. (Galpaya et al., 2016) A survey conducted reveals 26% of the Sri Lankans between the ages group 16 to 40 are aware of online freelancing, and among those who are aware, 9% expressed interest in working on online freelancing jobs. Based on the responses received, Galpaya et al. estimate, there could be 17,000 to 22,000 freelancers in Sri Lanka in 2016. As no follow-up surveys were conducted, this is the latest figure available. It has been found those engaging in part-time freelancing work earn a monthly income of approximately LKR 20,000 - 30,000 (USD 100-150). In most cases, this amount is in addition to a salary because the majority of them earn this amount while engaging in a full-time job. This additional earning has assisted many freelancers to improve their living standards. The survey has also found online freelancing among youth is preferred due to the flexibility working where one chooses, being your own boss and being able to maximize their skills in an income-producing activity. Sri Lankan Freelancers say, English skills in not necessarily a prerequisite to

becoming successful in this field. Just the basics would be adequate to communicate the message to the client (Galpaya et al., 2016).

Sri Lankan freelancers face many issues for which they expect solutions from authorities. Some workers face difficulties in collecting their full payments, as intermediaries charge substantial transaction fees. Sri Lankan freelancers are also unable to receive payment because PayPal inward remittances are not allowed. Further, lower job security, lack of job recognition, inability to maintain a work-life balance are some of the negatives freelancers encounter while working on the platform.

2.3.   Data usage in Sri Lanka

Data is now being termed as the 'oil of new economy'. Aggregate data usage indicates the maturity of the Digital Economy. Figure 03 illustrates the total monthly data usage in Sri Lanka in 2020, in Peta Bytes, obtained from data operators and collated by the Central Bank of Sri Lanka. This shows a clear growth of data consumption for the period.

Figure 3: Monthly aggregate data consumption in Sri Lanka 2020 (Peta Bytes)
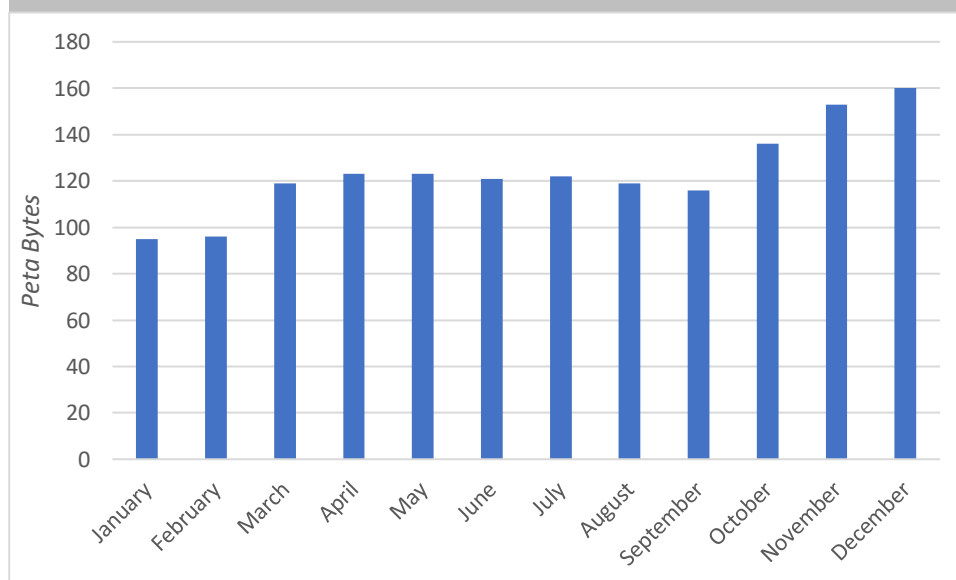
Source: Central Bank of Sri Lanka, 2021

2.4.   Digital Financial infrastructure

Sri Lankan's banking sector constitutes 32 banks with island-wide networks with 7,387 outlets and 5,571 ATMs. (Central Bank LK, 2020) The financial sector is perhaps the most automated sector, with most banks offering online facilities for conducting transactions. A well-banked society, Sri Lanka records more than 25 million debit cards for a population of 21.3 million (Echelon, 2020).

Sri Lanka also has a relatively well developed financial infrastructure that is utilized efficiently. Participants to Real Time Gross Settlement (RTGS) System, which functions as Sri Lanka's only large-value payment system, used an average value of Rs. 63 billion per business day in 2019. During the year under review, LankaClear, which operates the Cheque Clearing System of the country, cleared a total volume of 46.8 million cheques amounting to Rs. 9,863 billion, which accounted for 7.4 per cent of the total value of non-

cash payments. The Sri Lanka Interbank Payment System (SLIPS), which facilitates low-value retail bulk payments such as salaries and pensions, recorded 36.6 million transactions worth LKR 2,104 billion. Common Card and Payment Switch (CCAPS), which operates under the brand name 'LankaPay', recorded significant progress. A Common Point of Sale Switch (CPS) was launched in the same year, in addition to the other three switches launched so far, namely the Common ATM Switch (CAS), Common Electronic Fund Transfer Switch (CEFTS) and Shared ATM Switch (SAS). (Central Bank LK, 2020)

Figure 03 presents a summary of the transactions done through retail value payment systems in USD million. It appears that physical cheques still play an important role in transactions, while credit and debits cards are not that prevalent. On the other hand, Internet Banking is advancing.

Figure 4: Annual Aggregate Transactions through Retail Value Payment Systems 2019 in USD million
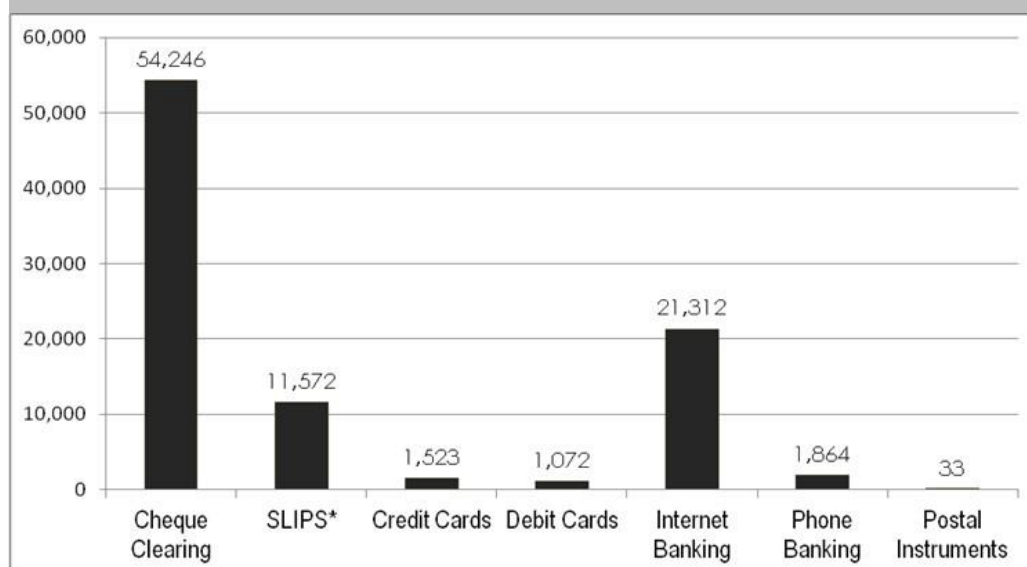
Source: Central Bank of Sri Lanka, 2020

*Sri Lanka Interbank Payment System

Sri Lanka Pay has made other advances. An application called JustPay eliminates the dominance of the one-bank-one-app system, allowing one to pay for goods and services to any bank account using a smart mobile device to transfer funds directly from one's bank account to the merchant. Both customers and merchants benefit from this easy-to-use, real-time money transfer system. It has boosted the FinTech perspective, with more than 15 payment applications that already use JustPay as a base. Lanka Pay further integrated its digital payments perspective with the recent introduction of PEN (Payment Exchange Name). This allows for hassle-free cash transfers via mobile phones. The bank assigns a nickname to the customer's bank account linked to that user's registered mobile number with PEN. This will ultimately transform Sri Lanka's peer-to-peer payments ecosystem (Echelon, 2020).

The National QR Code Specification branded as "LankaQR" has been launched to promote customer convenience and safety with no transaction cost, instant payment notification etc., while encouraging more merchants to join as acquirers due to zero maintenance cost, low set up and transaction cost. "LankaQR" also ensures the interoperability of different payment mechanisms and instruments. Several financial

institutions launched "LankaQR" based payment products during the year under review. (Central Bank LK, 2020)

To meet the business requirements arising, the Central Bank has appointed a Working Committee on Blockchain Technology to assess the possibility of adopting the same in the financial industry in Sri Lanka. As per the recommendations of the Committee, the Central Bank initiated the development of a Proof-of-Concept for the Blockchain Technology based Shared Know-Your-Customer (KYC) facility, which could facilitate streamlining KYC processes in financial institutions. It is expected that this would increase efficiencies in the financial sector and thereby enhance financial inclusion in Sri Lanka. (Central Bank LK, 2020)

2.4.1.   Fintech in Sri Lanka

Sri Lanka's Fintech industry has a long way to go before reaching its full potential, compared to some of its more developed neighbours such as Singapore and Malaysia. Startups.lk, which can be termed the digital 'meeting point' of Sri Lankan start-ups, offers information on only 31 start-ups offering fintech solutions among a total of 409 listed. Only a fraction of the fintech market is served by these firms. Many Sri Lanka based clients still select international solutions either continuing the tradition or in the absence of the nature of the solutions sought.

HatchX, Sri Lanka's first fintech accelerator, showcased seven selected fintech start-ups shortlisted out of 20 applicants. Hatch mentioned that the intention was not just to discover promising fintech start-ups, but rather it was also "to open a new door towards creating a transformation in the financial sector in Sri Lanka by bringing together all the stakeholders playing a key role in the financial ecosystem. The showcased start-ups are solving problems, including bridging the credit gap faced by the micro-SME sector, utilising machine learning and data analytics to help organisations make more accurate financial decisions, Sri Lanka's first peer-to-peer lending platform, cashless payments and offering micro-insurance to the Sri Lankans (FT, 2021).

One of the main barriers against the development of fintech solutions in Sri Lanka is regulatory. To overcome this hurdle Central Bank of Sri Lanka (CBSL) has introduced a "FinTech regulatory sandbox", a mechanism where the regulator is able to identify regulatory barriers that hinder innovations.   Both foreign and local players can utilise it. The applicants will be accepted to the sandbox continuously rather than on a group basis (cohorts). In order to enter the sandbox, an applicant should either be a CBSL licensed financial institution or a partner and have a solution that is tested in a lab and verified by an independent third party. CBSL may relax a regulation that hinders the product from being released to the market based on the progress and success of the product/solution while in the sandbox. In a situation where a product successfully exits the sandbox and enters an undefined area, new regulations can be introduced (Dissanayake, 2021).

2.5.   E-commerce Readiness

E-commerce appears to have already taken root in the country, with a number of companies already offering goods and services online, according to the Sri Lanka E-Commerce Readiness Assessment Report. E-commerce applications are primarily available for travel and hospitality services. Almost all of the companies surveyed indicated their intention to engage in E-Commerce, while many have been doing so for a long time. Almost half of the companies surveyed have either bought or sold products online. However, this is in a restricted product line, consisting mainly of consumer

electronics, fashion products and imported clothing. Despite this, with the business optimism on the use of e-commerce, the current state of e-commerce developments in the country can further advance. The potential for expansion, both for the domestic market and for cross-border trade, appears substantial (Commonwealth, 2020)
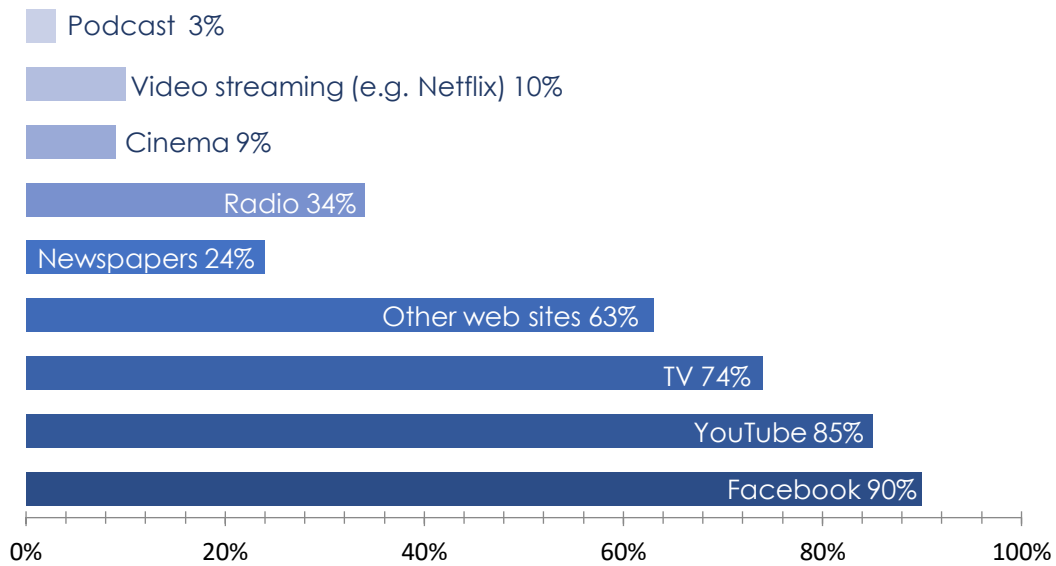
According to the above study, the maturity of citizens for e-commerce still remains low. Challenges appear in terms of low internet availability and low use of electronic payment due to lack of awareness, skill and trust. Business maturity for e-commerce in Sri Lanka is estimated at 34%. This indicates that companies have started using e-commerce, but the current level of maturity is still insufficient. On average, companies score poorly in terms of the availability of skills, know-how and technological infrastructure, as well as the estimation of technology for sale and purchase. The study also estimates the Internet penetration to be at 30%. This may be the figure at the time of the survey. Other sources, however, now present higher figures, some of which are as high as 50% (Hootsuite, 2021). Thus the arguments here may not necessarily be valid to the extent presented here at present.

Sri Lanka has extensive logistics and transport infrastructure in terms of railways, roads, waterways and air transport; meanwhile, a large number of logistics companies provide a range of logistics services. However, at present, the study finds, logistics companies may not be able to effectively support e-commerce companies. While some logistics companies are embracing information and communication technologies, this is not the case for the entire delivery chain. Lack of resources, skills, knowledge - the way and awareness, and indeed the lack of automation in material handling, is a major challenge facing businesses in effectively supporting e-commerce. Substantial investments are needed to transform existing logistics companies and create new logistics companies specifically designed for e-commerce IT infrastructure, and accessibility, as well as policy and logistics parameters, are assessed to be at a level of maturity higher than the other three parameters.

Sri Lankan firms sometimes use international platforms for e-commerce than their own ones. Amazon is the preferred international platform such used, accounting for nearly half of external platform usage. The main considerations in the choice of external platforms are security, search engine optimisation (SEO), search and guided navigation. These are also stated as the key factors for locally designed in-house platforms.

Sri Lanka has recently seen its media consumption patterns changed substantially. The use of traditional media has become less prominent, with more new media becoming popular. This has created the ideal environment for the emergence of a healthy E-Commerce market (Figure 05).

Figure 5: Daily media consumption of a randomly selected sample of Sri Lankans

Podcast 3%

Video streaming (e.g. Netflix) 10%

Cinema 9%

Radio 34%

Newspapers 24%

Other web sites 63%

TV 74%

YouTube 85%

Facebook 90%

| 0% | 20% | 40% | 60% | 80% | 100% |

Source: Asia Pacific Institute of Digital Marketing, 2021

Figure 6 represents the Baseline e-commerce maturity of Sri Lanka against the target maturity, and Figure 7 represents the most visible Sri Lankan brands on the Internet. The key shareholder of Daraz, the most visible Internet brand in the country, is Alibaba (Daraz, 2021).

Figure 5: E-Commerce maturity in Sri Lanka against target maturity

Base line maturity

Target maturity

Policies, Laws and Regulation

Business Readiness

Citizen Readiness

IT Infrastructure & accessibility

Logistics and delivery
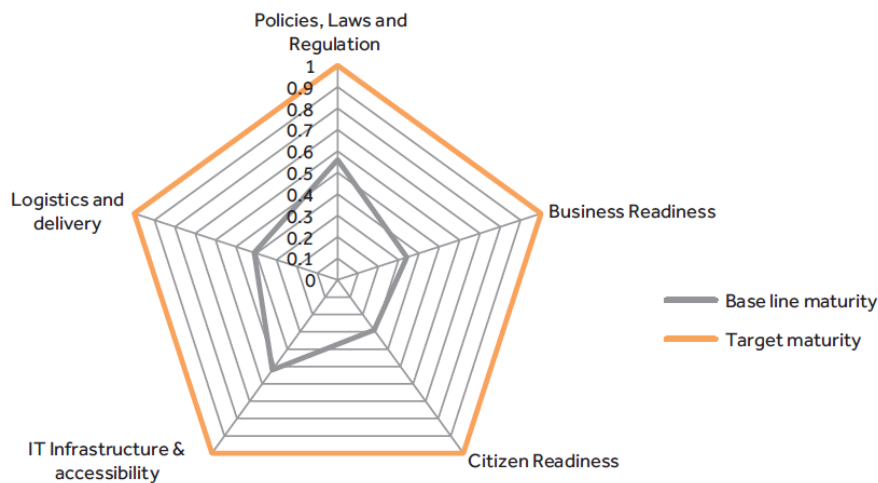
Source: Commonwealth, 2020

Figure 7: Most visible Sri Lankan brands on Internet

Source: Asia Pacific Institute of Digital Marketing, 2021

2.6.   Computer Literacy

A survey by the Department of Census and Statistics Sri Lanka using an island-wide distributed sample of 12,870 households creates a useful portrait of computer ownership, usage, and awareness. In 2020, at least 22% of the households in the country equipped with either a desktop or a laptop. That figure was as high as 36.3 %in urban areas but not lower in rural/estate sectors. Overall Computer Literary rate increased to 32% in 2020, with 43.5% in urban areas. As for computer literacy among those involved in different professions, Senior officials and Managers show a relatively higher ability while (77%), Professionals (90%), Technicians and Associate professionals (85%), Clerks and Clerical support workers (93%) have higher computer literacy rates. Even among the individuals engage in elementary occupations, 38% are computer literate. The survey results reveal that 13.1 %of the population aged 5 – 69 years has used the E-mail facility at least once in the 12 months at the time of the survey. For the same age group, Internet usage is 34% for the island, with the urban sector leading with 52%. Most users were seen to access the Internet and E-Mail with their smartphones against other devices like PCs/Laptops and feature phones. (Dept of Census and Statistics, 2020)

In terms of all computer ownership, computer literacy and SIM ownership, clear differences are seen between the Western Province and the rest of the island. Western Province (which includes the capital Colombo) is the only province that records percentages above the national average in all three indicators (Figure 08). The figure takes the national averages as zero level and shows the deviations either positively or negatively.

Figure 8: Provincial deviations from the national average of computer ownership, computer literacy and SIM ownership 2020
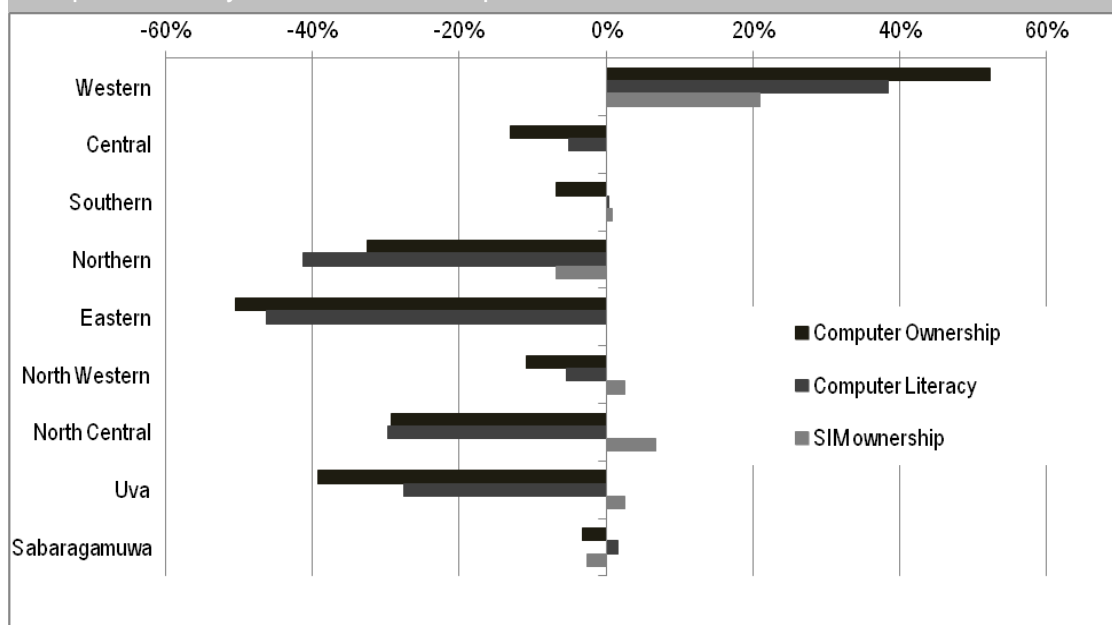
Sources: Calculated by authors using data from Dept of Census and Statistics, 2020

2.7.   Policy Initiatives for Building Digital Economy

2.7.1.   *Taxation relevant to Digital Economy*

Over the last two decades, the government of Sri Lanka frequently changed the tax policies relevant to the Digital Economy with both positive and negative consequences. The taxation landscape as of May 2021, with the most recent changes, is described below.

Corporate Income Tax

This is applicable to the ICT industry in the same way it applies to any other. The standard income tax rate is 24%, while a rate of 18% is applicable for the manufacturing industry, and 14% is for exports, tourism, education, healthcare, construction and agro-processing. The rate applicable for betting and gaming, liquor and tobacco is 40%. (Ministry of Finance, 2021)

A five-year tax exemption has been given to start-up businesses since January 2021. A 0.25 % commitment fee will be charged for follow up and extension of services. (Ministry of Finance, 2021)

Personal Income Tax

Historically Sri Lanka has maintained relatively low-income tax rates for IT professionals. The industry has accepted this as a positive initiative towards the development of the sector.

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Currently, earnings from both domestic and foreign sources by those engaged in businesses of Information Technology have been exempted from income taxes, enabling them to obtain packages at their market rates. Others, with few exceptions, are taxed on monthly earnings above LKR 500,000 (about USD 2,500). The rate starts at 4% and incrementally increases in 4% steps for each LKR 600,000 block. The highest income bracket is taxed at 24%. (Ministry of Finance, 2021)

Taxation on Telecommunication Internet Services

The most recent changes were made on December 01, 2019, and the following tax components are applicable on telecommunication and Internet services.

Table 2: Tax on Telecommunication and Internet services		
Item	**Internet Services**	**Telecommunication services (other than Internet)**
Cess	2.04%	2.04%
Telecommunication Levy (TL)	0%	11.48%
Value Added Tax (VAT)	8.16%	9.08%
Total	10.20%	22.60%

Source: TRCSL, 2019

Value-added Tax (VAT)

The previous standard rate of 15% has been reduced to 8% since January 2021. Information Technology and enabling services are exempted from VAT with effect from 1 January 2020. (Ministry of Finance, 2021)

The response from the industry to this move is mixed. While it appears favourable for the industry prima facie, a section finds the opposite, complaining they have no means getting the tax component their suppliers charge compensated.

Nation Building Tax

A 2% tax previously applicable to revenues from all industries (including Telecommunication and Internet) has been removed since January 2021. (Ministry of Finance, 2021)

2.7.2. Domestic Preference

The Cabinet of Ministers on July 15, 20 has approved the Cabinet memorandum on 'Amending the procurement guidelines to support Domestic Industries' establishing the policy for the software and hardware industries. This was followed by the Public Finance circular No 03/2020, which has provided specific guidelines for government entities in purchasing software, hardware and composite solutions. (MoF, 2020) The objective of this exercise is to encourage local and international firms to establish their presence in Sri Lanka, contributing to the industry. Specifically, a boost for local startups was also intended.

According to this circular, in calling for bids for the procurement of application software, where the estimated cost is less than Rs.02 million, bids shall be called exclusively from startups, registered with the Information Communication Technology Agency (ICTA) and published on the website ttps://startupsl.lk. For the purpose of this section, startups are

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those that have been registered as a business with a relevant authority for more than six months and less than five years and also registered on the https://startupsl.lk.

For the procurement of software or Information Communication Technology (1CT) solutions estimated to be more than Rs.02 million, says the circular, preference must be given to Domestic majority ownership firms' also offering software solutions with a minimum 25 %local value addition, which will include cloud solutions and contribution of Local Material, Local Expertise, and Local overheads Support/ Maintenance/Systems Integration. Bidders who satisfy the requirement for at least 25 % of local value addition will be awarded 30 % preference for the prices quoted by the respective bidder over the other bidders only in the financial evaluation and not in the technical evaluation. The same principles hold good for hardware and composite solutions as well.

3. National Policy Framework: Vistas of Prosperity and Splendor

Under the leadership of President Gotabaya Rajapaksa, the National Policy Framework (NPF) of the Government of Sri Lanka, "Vistas of Prosperity and Splendour" adopted in December 2019, constitutes of 10 key policies aimed at achieving the fourfold outcome of a productive citizenry, a contented family, a disciplined and just society and a prosperous nation. (Ministry of Finance, 2019)

Chapter 6 of the National Policy Framework outlines strategies and activities for establishing a Technology-Based Society (Smart Nation) as follows:

Establish Sri Lanka as a Global Innovation Hub:

- Maximize the use of innovative measures in;
- Internet of Things (IoT), Artificial Intelligence (AI), Biotechnology, Robotics, Augmented Reality, Cloud Computing, Nanotechnology, 3D printing.

Set up a Citizen-Centric Digital Government for the convenience of citizens:

- Establish nine Citizen Service Centres to adopt new technologies for public service delivery (ID cards, passports, driving license etc.);
- Introduce a digital and electronic payment system to pay traffic fines;
- Establish an e-procurement system to eliminate bribery and corruption.

Establish Digitally Inclusive Sri Lanka:

- Establish a countrywide high-speed optical data transmission system and a high speed 5G Mobile Broadband System to facilitate data transmission;
- Establish digital cities with digital administration and monitoring;
- Introduce a mobile and digital payment system to handle all financial transactions;
- Place a cross border e-commerce and International e-payment system;
- Introduce new legislation to ensure data protection, cyber security and Intellectual Property Rights.

Promote IT Entrepreneurship:

- Make USD 3 million worth export industry by 2025 by developing Business Process Outsourcing(BPO) and Knowledge Process Outsourcing (KPO);
- Set up IT centres and BPO centres in connecting cities;
- Increase no. of software engineers and programmers to 300,000 by 2025;
- Encourage local software engineers and IT designers to develop software locally instead of importing;
- Support local entrepreneurs to develop software for the international market;

The following components are identified as key building blocks of secure, prosperous and digitally inclusive Sri Lanka:

- A nation-wide high-speed Optical Transmission System and a high speed 5G Mobile Broadband System;
- Smart cities with digital monitoring and administrative centres;
- Mobile payment platforms for all financial transactions;
- Cross-border e-Commerce and International e-Payment system for the international trade;
- Cyber Security, Data Protection and Intellectual Property legislation;
- A new digitalized education system based on innovation and lifelong learning;
- Smart learning universities and higher education institutes;
- Global Innovation Hub to maximize the use of new technologies such as Internet of Things (IoT), Artificial Intelligence (AI), Biotechnology, Robotics, Augmented Reality, Cloud Computing, Nano Technology and 3D Printing;
- IT Centers and BPO centres in all key cities;
- An experienced IT workforce of 300,000 software engineers and programmers by 2025;
- BPO and KPO industries to be developed to deliver USD 3 billion foreign earnings by 2025;
- Ease of obtaining key citizen services through online systems for National ID, Passport, Birth, marriage and death certificates, Driving License, Land title deeds through provincial and district citizens service centres;
- A new e-procurement system to eliminate bribery and corruption;
- Modernized health services, including e-Health and Telemedicine for patient convenience;
- Modern Technology for combating the drug menace;
- A single transport e-ticket system and e-ticketing mechanism for all public and private transport services.

Large scale farming through a regional level cooperative farm produce methodology to maximize agri-gains.

Achievement of the above is the mandate of the Ministry of Technology, which comes under the direct purview of the President himself, through thirteen institutions overseas, including: Telecommunication Regulatory Commission of Sri Lanka, Information and Communication Technology Agency, Sri Lanka CERT, Sri Lanka Telecom, Industrial Training Institute, Sri Lanka Institute of Nanotechnology, National Science and Technology Commission, all IT parks, Sri Lanka Standards Institute and Department of Registration of Persons.

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3.1.   Information and Communication Technology Agency (ICTA)

The information and Communication Technology Agency (ICTA) of Sri Lanka is the apex ICT institution of the Government. In terms of the Information and Communication Technology Act No. 27 of 2003 (ICT Act) as amended by Act No. 33 of 2008, ICTA has been mandated to take all necessary measures to implement the Government's Policy and Action Plan in relation to ICT. In terms of Section 6 of the ICT Act, ICTA is required to assist the Cabinet of Ministers in the formulation of the National Policy on ICT and provide all information necessary for its formulation. ICTA is a wholly-owned institution by the Government of Sri Lanka, which was formulated and operationalized to implement the e-Sri Lanka Development Project funded by the World bank from 2004 to 2011. Through the e-Sri Lanka Development Project, ICT was to be used to develop the economy of Sri Lanka, reduce poverty and improve the quality of life of the people of Sri Lanka. However, due to the significant progress made in the nation and its society by ICTA, the Government understood its significance and need for ICTA's permanent existence. The sunset clause of the ICT Act of 2003 was amended in 2008. (ICTA, 2020i)

According to the Strategic Roadmap for ICTA, which has been presented to and approved by HE the President, ICTA's scope relies on three pillars, as illustrated below (Figure 09), with their sub-components and Digital Laws and Policies recognized as a cross-cutting component. (ICTA, 2020i)

Figure 9: Scope of the Information and Communication Technology Agency, Sri Lanka
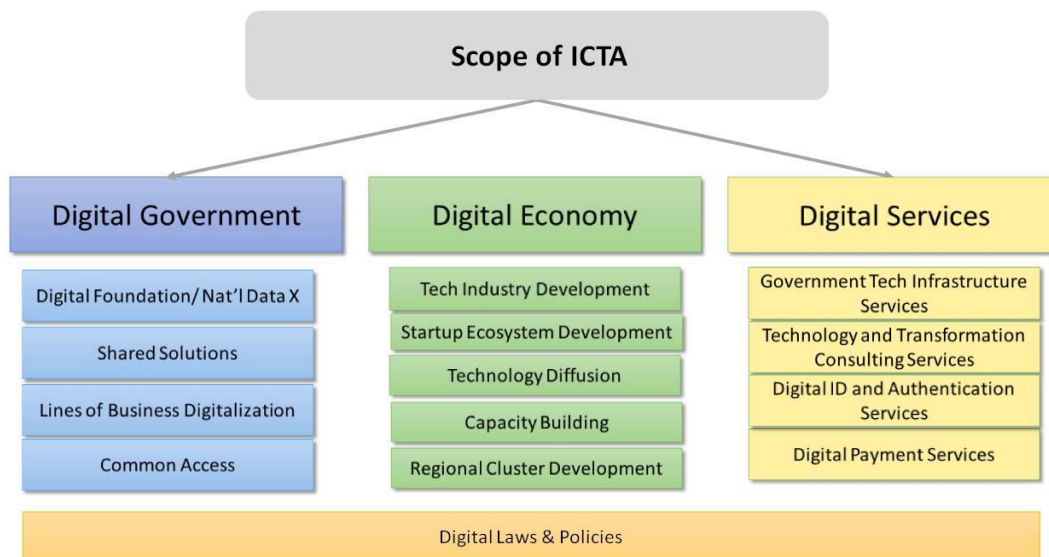
Source: ICTA, 2020i

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4. Digital Economy Strategy in Sri Lanka

Innovation plays a key role in a country's ability to resolve critical and complex problems, which in turn will directly contribute to Sri Lanka's economic growth, states ICTA in its Digital Economy Strategy. The current Digital Transformation Landscape of Sri Lanka is fertile for opportunities that can create a systemic transformation, consolidating and improving upon existing efforts undertaken by all sectors. The private sector has taken up the process of developing technological innovation for many industries such as but not limited to: agriculture, tourism, transport and manufacturing sectors. Further, the banking sector is also moving towards digital banking solutions with cash deposit machines, Internet and mobile banking solutions and digital payment apps. Building the capacity of citizens will enable their participation in the Digital Economy, resulting in economic benefits to the household and increase quality of life.

The Digital Industry of Sri Lanka, one of the fastest-growing sectors, employs more than 100,000 knowledge workers and earns nearly USD 1 billion of FOREX revenue. Mature economies in America, Europe, UK, Asia Pacific, as well as emerging economies in Africa, East Asia and South Asia, are already being served by the Industry and Digital transformation being imperative globally opens up an exponential growth opportunity. A fast-growing tech start-up ecosystem also exists in Sri Lanka, and a number of organisations have initiated interventions towards supporting start-ups. Co-working spaces (Hatch, ConceptNursery, Home Tree, Colombo Corporative, Hub9, etc.), investment organizations (Lanka Angel Network, Lanka Impact Investment Network, Crowd Island, etc.), funding programmes (Spiralation, Venture Engine, etc.), and other start-up events and programmes (Disrupt Asia, Start-up Weekend, Start-up Grind, Seedstars, HackaDev, ImagineIF, Entrepreneurship Caravan, etc.) occupy the current ecosystem.

However, due to the lack of a comprehensive strategy, these interventions have not resulted in system-wide changes or brought about scalable impact as one would have hoped. Therefore, ICTA's Digital Economy Strategy looks to utilize existing programs and all relevant partners in the eco-system to develop and implement an integrated Digital Economy transformation in Sri Lanka that will pave the way for a thriving and effective digital economy, with higher operational efficiency, lower costs and better services and outcomes for its citizens.

ICTA's vision is to see 300,000 IT professionals, 500 digitally empowered government CIOs contributing to and operating their digital infrastructure while high levels of public sector and citizen literacy rates are achieved. The agency targets significant usage of shared solutions and digital services by 2024, which would vastly benefit the citizens of Sri Lanka. From an industry perspective, Sri Lanka will enter the third wave of technology during the digital transformation, with 750 tech companies, 1000 IT and IT infused startups and 500 other technology startups in place by 2024. ICTA believes that this expansion and technology innovation would enable the industry to reach the USD 3 billion export revenue earner mark.

This Strategy is built on five key themes – namely, Technology Industry Development; Startup Ecosystem Development; Technology Diffusion; Capacity Building, and Regional Cluster Development – under which its unique goals and action points are listed, respectively.

4.1.   Technology Industry Development

Sri Lanka's Information and Communication Technology Industry are largely an export-oriented one. Earnings from telecommunication, computer and information services have been USD 1.05 billion in 2019. The telecommunications services sub-sector itself contributed USD 155 million. This growth mainly originated from increased usage of Internet-based voice and data services. Reduction of Telecommunication Levy (TL) has certainly been a boost for the industry. The data-driven growth will increase the 4G smartphone penetration. The key telecom players explore possibilities of launching a 5G too. (CBSL, 2019)

The influx of computer and information services was USD 899 million in 2019, with the sector being the fourth largest source of export revenue in the country. Sri Lanka's ICT sector currently comprises more than 300 companies in many industries, including communications, apparel and textiles, banking, financial services and insurance, healthcare, manufacturing, media, retail, transportation, travel and leisure. The industry is keen to comply with global labour and environmental standards. Sri Lanka's ICT industry has become one of the most profitable industries to date, with a highly skilled talent pool combined with cost-effective operational capabilities. (EDB, 2019)

Sri Lankan ICT industry offers software products and services to regions such as North America, the EU, Australia, East Asia, the Middle East, Africa and the Nordic region. Core competencies of Sri Lankan firms include automated application testing, infrastructure outsourcing, high-end R & D, Enterprise Resource Planning (ERP), cloud technology, mobile applications etc. Sri Lanka also functions as an offshore development centre for several Fortune 500 companies in the United States, Ireland, the United Kingdom, Australia and Sweden, as well as joint ventures in Sweden, Norway, the United States and Japan. (EDB, 2019)

Continued expansion of Business Process Outsourcing (BPO) and Knowledge Process Outsourcing (KPO) has contributed to the growth in this sector. Sri Lanka was awarded the Delivery Destination Award for 2019 by the Global Sourcing Association (GSA) of the United Kingdom, the industry association and professional body for the global sourcing industry. The Sri Lanka Association of Software and Services Companies (SLASSCOM), as the national chamber for the information technology (IT) based knowledge and information industry in Sri Lanka, continues its efforts in business facilitation, education, and employment enhancement as well as research and innovation in the sector. (CBSL, 2019)

The Industry Development Program (IDP) of ICTA has its primary role of being a catalyst of change in ensuring the future readiness of the technology ecosystem. The program has acted with foresight and has designed projects localized to Sri Lanka to align the tech ecosystem with global trends. Overall objectives are to improve competitiveness in the IT-BPM industry while creating IT-BPM related jobs across all sectors. IDP aims to improve export growth through innovation and entrepreneurship, improve the supply of skilled professionals to satisfy growing IT-BPM market growth, establish a strong start-up ecosystem in Sri Lanka and create awareness and Positioning Sri Lanka IT/BPM sector globally.

Technology Industry Development Goals:

- ICTA has identified the following as the development goals for the Technology Industry for the 2020-24 period.

- Reach USD 3 billion of annual foreign exchange revenue generated via the knowledge services sector and electronics sector by the end of 2024
- 1000 tech and tech-enabled start-ups in operation by the end of 2024
- A total of 700 technology companies (IT + BPM + Electrical and Electronics) in operation by the end of 2024

Figure 10: Technology Industry Development Goals framework
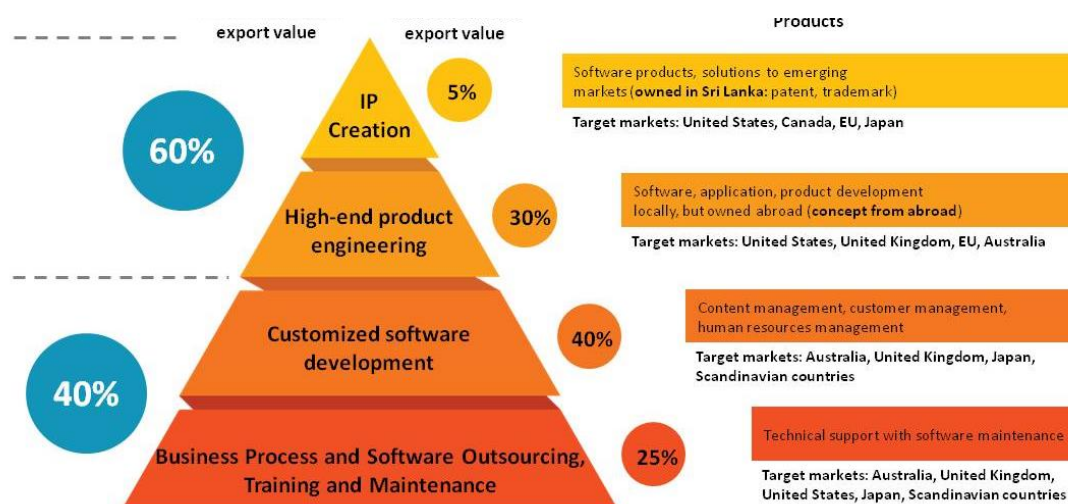
Source: ICTA, 2020c

ICTA has also identified the following to be the specific objectives of Technology Industry growth:

- Increase in Foreign Direct Investment (FDI) and new tech companies via FDI promotion and facilitation
- Increase in Direct Exports of Existing Tech Companies
- Increasing Competitiveness
- Provide overseas market opportunities
- Promotion and Enhancement of the Start-up Ecosystem

4.2.   Startup Eco-System Development

Sri Lanka provides a relatively healthy environment for the nurture of the startups, though the numbers are not as high as in some nations like Israel. Sri Lanka's startup ecosystem value has more than quadrupled from LKR 5.4 billion to LKR 21.8 billion from 2018 to 2020. The country ranks #1 for Affordable Talent in the Asia-Pacific region. (GSER, 2020)

Startup Eco-System Development Program of the Information and Communication Technology Agency of Sri Lanka provides various types of support for technology entrepreneurs, early-stage technology-related companies for developing their startups and for other programs that support and promote startups. The program includes but is not limited to seed funding, training, networking sessions, business promotion opportunities locally and internationally, encouragement programs, hackathons, etc. The aim of Spiralation is to promote, encourage and support technology-related entrepreneurship and innovation within Sri Lanka. (ICTA, 2020b)

Startup Eco-System Development Objectives:

To create awareness among students and undergraduates on innovation leading to entrepreneurship

- To facilitate engagement between private and public stakeholders in the startup ecosystem;
- To support other initiatives which enable a conducive ecosystem for technology-based companies.

Seed Funding Program:

Spiralation Seed Funding Support Program focuses on providing seed funding for technology entrepreneurs. Business enterprises forming new or in very early stages of development are targeted (Small enterprises with less than two years in operation). The primary focus would be to encourage entrepreneurs to launch their business ideas in creating new products and/or services that would serve in creating new businesses, breech market gaps, assist new ICT related innovations etc.

The grant subsidizes infrastructure, training, business development mentoring, including both technical and managerial competencies, which are essential for the growth and sustainability of the company and all third-party costs.

Overseas and local business promotion:

The need for market access is high among startups. Since startups rarely are able to break into markets on their own, ICTA, through business promotion activities, provides startups to showcase their products to the world. Startups are given affordable opportunities at various platforms, and intern, they gain customers by speaking to the top-level management directly rather than going through different channels.

Overseas and Local Startup Conferences:

The number of technology-related start-ups in Sri Lanka has grown over the last several years. While a considerable number have succeeded, quite a number of start-ups have also failed due to several reasons. One of the major reasons for the failures of startups is not having the proper exposure and knowledge in running a startup and other business aspects. Under this program, ICTA organizes startup conferences with the aim of sharing knowledge through thought leaders to entrepreneurs and also provide support for startups to attend startup conferences internationally to gain much needed exposure and knowledge.

University visits:

University visits and Hackathons are carried out to promote entrepreneurship and identify budding entrepreneurs with innovative ideas. The cost covers transportation, venue, refreshment, payments to experts, multimedia, tokens of appreciation and other stationery which are required.

Expert Engagement Events:

Experts who have specific domain knowledge are engaged in addressing more technical and critical elements of a startup such as software patenting, information system and web security, API integration etc. ICTA evaluates and engages with consultants to facilitate these sessions. The cost covers venue, refreshment, payments to experts, multimedia and other stationery.

Training Workshops:

Workshops are organized on different subject matters which are essential to run a company, such as marketing, accounting, legal and administrative, software architecture etc. The workshops are designed in an interactive manner so that the companies can discuss their individual company issues. The workshops are not longer than 5 hours. The cost covers venue, refreshments, multimedia and stationary, which are be required.

Startup Ecosystem Branding and in-Depth Assessments:

ICTA has been working with Startup Genome since 2017, and Sri Lanka was included in the Global Startup Ecosystem Report (GSER) in 2017. Apart from the global report, the member assessment report, which covered startup success and ecosystem performance against other startup ecosystems, has become really helpful to identify the lacking areas of the ecosystem of Sri Lanka.

Directory for Sri Lanka Technology Startup Ecosystem:

StartupSL was an initiative by the then Ministry of Digital Infrastructure and Information Technology and is currently being operated under ICTA and the volunteers of the startup community. The aim is to collectively lobby on behalf of the technology startups in the country, and registered startups are given priority when considering the proposed benefits extended by the government.

It is the single largest online platform for startups and freelancers in Sri Lanka, and it connects startups as well as other key stakeholders such as investors, mentors and incubators.

ICTA Spiralation Hackathons:

Hackathon's and University visits are carried out to promote entrepreneurship and identify budding entrepreneurs with innovative ideas.

Supporting startup initiatives and other organizations:

Sri Lanka being a young ecosystem in the world, it is important that initiatives for startups and entrepreneurs are conducted in a manner that would help the startups. It is a well-known fact that many initiatives fail due to financial issues; therefore, for startup initiatives that create an impact in the startup ecosystem, ICTA would support the initiative by financially contributing up to 50% of the costs of the event. This is done with the intention that initiatives organized do not fail due to financial reasons.

Impediments for startups:

White Paper on the Startup Ecosystem by ICTA and PwC (2021) presents multiple impediments to the development of startups in Sri Lanka. The study, which surveyed 110 startups, identifies obstacles in twelve areas, including insufficient digitalization of administrative tasks and requirements related to foreign exchange, regulatory impediments that discourage foreign investors from investing in Sri Lankan startups, related to intellectual property (IP), taxation, immigration, Research and Development (R&D) and Government support for cross border activity, Lack of regulations in data privacy and cyber security, related to digital payments regulations, debt financing and Telecommunications regulations.

4.3.   Capacity Building

Capacity building is key in achieving this goal, and the ICT agency is taking steps to build an empowered workforce who can join the industry at multiple levels. The capacity building division of the agency will ensure the competency and employability of the workforce through programs such as vocational training, foundation and conversion programs and social education, apart from the traditional tertiary, higher, professional and postgraduate education. Social education will also play a key role in developing intelligent citizens with the skills to use citizen services. (ICTA, 2020b)

The specific goals of the capacity building are creating a 300,000 ICT workforce employed in the multiple sectors, with a supply of an additional 150,000 skilled individuals; 500 Government CIOs deployed to various Government organizations; Building small IT divisions and teams in all the government organizations; 75% citizens digitally literate to effectively consume the benefits of digital technologies and tools and achievement of 100% IT Literacy in public. (ICTA, 2020b)

These goals will be achieved through the following specific activities:

(a)   Increase Output of Employable Recruits to Technology Sector
   (i)   Capacitating youth to be more employ-ready via short term, professional, diploma and conversion level programs;
   (ii)   Create and support to scale alternative IT education programs targeted at direct employment through initiatives, e.g. UKI, Re:startSL etc;
   (iii) Utilize multiple uses of resources, and facilitate summer terms, weekends and evenings in order to facilitate effective and accessible blended programmes;
   (iv)   New programs to be deployed at tertiary and vocational institutes like ITUM, SLIATE etc;
   (v)   Re-skilling and up-skilling ICT programs were developed to be offered to all youth populations around the country through repurposing the existing infrastructure networks located around Sri Lanka (i.e.: Nenasala, Vidatha Centres, CRCs etc..). A special focus to be on providing these programs to youth from marginalized communities, such as the estate sector, who pursue other careers after their A/Levels or students who drop out of school;
   (vi)   Loans to be provided to students who study at vocational and non-state universities;
   (vii) New international level state and non-state institutions to be established at regional clusters;

(viii) Build on the existing technology curriculum developed for students, and repurpose this to provide a compulsory curriculum for primary school children so they are aware of and exposed to ICT from a very young age, which will increase their curiosity and interest as they grow older;

(ix) Development of a National Skills Platform;

   i. Develop an online platform for mentoring and developing essential skills (a self-guided approach);
   ii. Get all students to maintain their login in the national skills platform and enhance their personal capacities through the courses offered.

(x) Encourage tech companies, through tax deduction or incentives, to provide and/or support scholarship programs, training, internships, and other ICT focused opportunities for young individuals;

(xi) Make tech one of the most preferred career choices through a mass media advocacy campaign highlighting the opportunities in the industry along with the skills needed to excel and accessible paths in terms of education;

(xii) Continuous engagement with career guidance officers in the tech industry and creating awareness of opportunities;

(xiii) Facilitate increased engagement of the private Tech sector with the TVET sector through existing entities (i.e., Skills Council, YouLead etc.…);

(xiv) Promote and encourage tech companies to have engineering and research internships for interested students;

(xv) Promote world-class postgraduate education programs based on the market trends and demands;

(xvi) Create a conducive environment in educational institutes to onboard people with disabilities by promoting and utilizing Assistive Technology, which is any item, piece of equipment, software programme, or product system that is used to increase, maintain, or improve the functional capabilities of persons with disabilities. This growing and dynamic field will provide greater independence to people with disabilities and empower them to engage in more economic activities through digital means.

(b) Increase percentage of women selecting the tech sector as a career choice

(i) Use of unique role models to feature in mass media expressing how they did it and what made them be up on the ladder and explain why the country needs more females in tech and why tech is a better industry for females;

(ii) Mass media campaign targeted at parents to encourage girls to choose the technology Industry as a career choice;

(iii) Positioning tech as one of the best career choices for girls among teachers and career guidance officers;

(iv) Short courses/camps for girls in order to develop the basic tech skills and specialized skills (Eg: Digital Marketing, Website development, Animations and Graphics, 3D visuals, Game Development, App making, Micro Controllers, Automation etc.);

(v) Roll-out unique tech employer brand for females;

(vi) Build on the work and create strong relationships with the Presidential Task Force on Sri Lanka's Education Affairs to further strengthen and create a comprehensive skill building offer aimed at encouraging young women in technology.

(c)   Attracting Diaspora for key strategic roles in the tech sector;

(i)   Identify key strategic roles which require these skill sets;

(ii)   Formulate a special package to attract the Diaspora to work in Sri Lanka under Mode 4 guidelines with national treatment

(d)   Increase in Usage of Technology by Citizens

   (i)   Ensure provision and facilitation of necessary infrastructure for engagement in tech solutions for the most vulnerable communities in Sri Lanka in order to minimize the 'Digital Divide.'
   (ii)   Collaborate with regional Technology Diffusion cells on technology adoption programs for citizens
   (iii)   Develop and roll out a mass media campaign for citizens on the digital government solutions and ways to use them
   (iv)   Facilitate awareness/training on digital marketing/freelancing/digital content etc.
   (v)   Selection of established technology lifestyle/productivity applications to be encouraged for use by citizens
   (vi)   The use of existing programmes kills development and learning to convene and execute efforts to build know-how, increase access to technology, affordability and develop trust among citizens to ensure technology adoption via numerous fronts. This will include interventions such as comprehensive skills offered on digital literacy, digital adoption, taking your business digital, telecommuting, online media literacy, digital finance ecosystem and so forth, available as workshops and modulated programmes to further develop these aspects. The community networks such as Social Circles, HackaDev Academy, etc.… are to be used in implementing such.
   (vii)   Mass and digital media campaigns on new innovations to be used by the general public (this may be at a subsidised cost)

(e) Strengthening Government organization for better public service

   (i)   Establishing Teams in Government Organisations for IT Governance

        i.   Appoint/reinstate/groom CIOs who will lead the technology strategy of the entity in collaboration with the other C-level executives.
        ii.   Define IT roles and job titles for the Government cadre by institutionalizing the technology role into the public service
        iii. Establishing IT roles in Government organizations as an attractive career choice for IT professionals
        iv.   Suitable compensation packages for the IT roles coming with expertise

   (f)   Government CIO Development
   (i)   Assess capacity building requirements of CIOs according to CIO skills framework and facilitate training programmes to cater to their requirements. Such as;

        i.   Design thinking and social innovation exposure with the goal of each CIO being able to design an IT Strategy and Roadmap for their specific LOB
        ii.   CIO grooming camps for selected officers representing multiple LOBs

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      iii.   Design and deliver tailor-made workshops on innovation and human-centred design approaches to innovation, utilizing existing programmes;

      iv.   Design and deliver 'Train the Trainer' programmes for the CIOs on innovation tools and human-centred design approaches;

      v.   CIOs to be responsible for the IT skills of the respective Government Department and take the lead in the Department's innovation approaches.

(g)   Increase in usage of Technology by Government Staff;
   (i)   Skill-building of Government staff to be conducted through CIO's;
  (ii)   Shared solutions and LOB services adoption facilitation for Government staff;
 (iii)   Adopt Gov HRCB competency framework in all the government organizations;
 (iv)   Deploy Government eLearning Platform (GeLP) in all government organizations;
  (v)   Initiate E-governance training for all the government staff.

4.4. Technology Diffusion

A key aspect of ICTA's digital economic strategy is technology diffusion. The development of any industry, even non-tech ones such as farming, agriculture, rubber tapping or any other, depends predominantly on modern methods and technology. Old systems usually lead to inefficiency and waste, while the competitiveness of these industries can be increased through technology. ICTA identifies actual problems within the regions and brings in the right technology to solve them via the cluster cells. If the technology is not locally available, ICTA plan for international collaborations. (ICTA, 2020b)

"Technology Diffusion will be our priority in future", expresses Jayantha De Silva, then ICTA chairman. (Mirror Business, 2020). With the new mandate, ICTA has been given new responsibilities too. "We will not be doing the same old things we always did", he says, "Technology Diffusion is taking the technology to the people. We are an agrarian society. We also have specific industries, like, example clay industry. We have clay utensils at every home. The room to digitally develop that inducts is massive. Sri Lanka President realized the importance of this industry as a result of his continuous interactions with people. The same is true for the Batik industry, which now has an international spread. A large population depends on making Batik products. There are many such small scale industries that can benefit from ICTs. Women in Jaffna make baskets for Rs. 150 that sells for Rs. 1,500 in Colombo. Sadly the profit does not reach the manufacturer. We direct ICTs to develop these industries with the intention of helping both the producer and the buyer." (Mirror Business, 2020)

Once technology is developed, it will be up to local industries to commercialize it. ICTA will ensure that the firms have the right technology to be on a level to compete in the international market, i.e. have the electronic trading capability, integrated supply chains, etc. The agency plans to provide 750 SMEs with the necessary technology by the target date. (ICTA, 2020b)

The key goals for Technology Diffusion include Technology adoption in core business which increases efficiency and productivity for a total of 750 SMEs by the end of 2024; 500 new technology Start-ups in operation as a result of Technology Diffusion strategy by the end of 2024 and Sri Lanka's World Economic Forum competitiveness ranking to be increased by 30 compared to the baseline in 2019.

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The specific objectives and action items for the 2020-24 period are as follows:

(a) Creation of New Technology Products via Research and Development;

(i)	Setting up of ICTA GovTech labs for co-creation to solve government and societal issues;
(ii)	Setting up of physical infrastructure for ICTA Innovation Labs in different verticals in universities specializing in these verticals with prototyping facilities (AgriTech, Nanotechnology, IoT, AI etc.), and a coordination team at ICTA ;
(iii)	Promote large MNCs, such as Intel and IT companies, to invest in research and development (R&D) labs in universities, with a vertical focus;
(iv)	Through public-private partnerships, bring in top foreign universities to set up satellite campuses in Sri Lanka to enhance advanced skill levels and local R&D capability;
(v)	Formulate advisory groups comprising of industry experts in verticals such as Agriculture, Tourism, Health, Education, Manufacturing via UBL's
(vi)	Establish a mechanism for university and industry collaboration to prototype technology via UBL's;
(vii)	Collaboration with the local and foreign Innovation Ecosystem and multiple research institutes to use already existing research in order to be adapted for use by local industries.

(b) Technology Diffusion to Local Businesses and Packaging for Export

(i)	Facilitation of monetization through start-up spin-offs or technology transfer via University business linkages unit;
(ii)	Facilitate tech transfer to local industry to scale production;
(iii)	Setting up regional Tech Diffusion (TD) cells to liaise with University cells and ICTA to provide technology products to SMEs, and work in close coordination with a dedicated team at ICTA;
(iv)	Gather data to benchmark current technology adoption among SME's for core business efficiency and productivity;
(v)	Collaborate with industry to provide access to existing technology products for core business improvement (coupled with business incubation, accelerations and grants) for SMEs to use via TD cells;
(vi)	Coordinate with technology industry development to provide market access to products with successful technology diffusion;
(vii)	Promotion of digital payment avenues and digital financial economy.

(c) Business Transformation through Technology Adoption;

(i)	Programs to increase know-how, access to technology, affordability and trust among businesses to ensure technology adoption via regional TD cells;
(ii)	Leverage on ground-level stakeholders (regional/sector-specific) to carry out awareness-building programs and hands-on technology adoption workshops for businesses;
(iii)	Facilitate access to local/international digital platform/s (e.g. Alibaba's e-World Trade Platform etc.), and establish online marketplaces and shared service platforms that would give local businesses a direct channel to market(s) in and outside Sri Lanka;

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4.5.   Regional Cluster Development

It is planned to set up five regional clusters, namely in Western, Central, Southern, Northern and Eastern, in close proximity to an existing university. Each cluster includes a cohort of Technology education institutes, Technology companies, shared working space with incubation facilities, a government arm and a technology diffusion cell. ICTA will establish a liaison office within the cluster.

All the objectives and action items will directly aid to ensure that each cluster has an active eco-system that will support the implementation of the strategy. The regional development unit will be the managing arm of all the regional clusters and will be closely liaising with Technology Industry Development, Startup Ecosystems Development, Technology Diffusion and Capacity Building divisions wherever necessary. As the infrastructure development for regional clusters would take some time, existing infrastructure, possibly from an existing university or other government organization, could be used to establish the key components of each cluster. (ICTA, 2020b)

The goals are to build 5 Regional Tech/Edu Hubs, which consist of a Technology Diffusion cell; facilitate the setting up of regional arms of a minimum of 8 main local/international Tech/BPM companies in the clusters; facilitate setting up of 5 start-up hubs with necessary infrastructure for start-ups and innovation; facilitate 750 selected Non-tech SMEs to use technology in their core business; facilitate setting up 5 Technology education institutes with international standards (1 per cluster) and facilitate the implementation of basic digital literacy programs for the age group 15-60 years. (ICTA, 2020b)

The objectives and action items for these goals would be as follows:

(a)   Assessing the readiness of each region to determine the requirements for each cluster;

  (i)   Most of the building blocks that are needed for a cluster in the Western region is already in place, and the entities within this region are already collaborating with each other as a cluster. However, the collaboration has to be elevated to promote more research and innovation to increase the competitiveness of the products and services developed;

  (ii)   Available resources and their locations will have to be identified in order to locate the other regional clusters initially;

(b)   Regional infrastructure development

  (i)   Acquiring necessary infrastructure to establish regional cluster offices (business/ meeting/conference/shared workspaces etc.);

  (ii)   Acquiring suitable human resources to man the hubs;

  (iii)   Set related IT infrastructure within the cluster (connectivity, devices etc.)

  (iv)   Development of regional Technology Parks and innovation centres (production facility);

(c)   Decentralization of main tech companies;

  (i)   Concessions and grants for large tech companies who opt to set up in regions;

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(ii)   Concessions and other benefits for tech experts who want to go into regions;

(iii)   Part-funding for internships for the students in the same cluster.

(d)   Creation of education hubs;

(i)   Grants/Tax concessions for the tech institutes expanding to regions (other clusters) or new affiliated tech universities setup;

(ii)   Special perks for Sri Lankan tech expats coming into Sri Lanka as lecturers;

(iii)   Special facilities/ perks for trainers and visiting tech lecturers from the industry;

(iv)   Organizing student exchange programmes (international)

(v)   Partnering/engaging with international events (i.e., Google I/O, Imagine Cup etc...);

(vi)   Specific interest-free loan schemes for students attending technology institutes in a cluster.

(e)   Technology diffusion cells;

(i)   Facilitate setting up of Technology Diffusion cells - Help the clusters to build collaboration with the tech companies, SMEs and government entities within the cluster for a smoother diffusion of technology.

(ii)   Building a knowledge and support hub for the diffusion of technology to develop solutions for the regional economy and civil society.

(iii)   Funding/grants schemes for technology transformation of the core businesses.

(iv)   Specialized resource allocation for training programmes of the above;

(f)   Building a knowledge and support hub for all business /tech-related needs;

(i)   Support programs for investor attraction for SMEs or diversifying businesses;

(ii)   Export market-ready programs (coaching and mentoring);

(iii)   Policy level reforms to help the regional tech suppliers (prioritizing, tax concessions etc.);

(iv)   Funding/ grants for training on social media marketing and digital marketing;

(g)   Instilling entrepreneurship and innovation;

(i)   Facilitate mini start-up conferences and events (e.g., design sprints and boot camps, start-up boot camps, and idea auditions at the grassroots level);

(ii)   Promote entrepreneurship via funding and implementation;

(iii)   Build five main incubators/accelerators with R&D spaces in universities (maybe ICTA innovation lab and/or vertical based innovation labs by the industry) and connect them with global incubator networks as satellite setups;

(iv)   Organize entrepreneurship programs inside schools, universities and tertiary education institutes within the region and recognize those entities with the best entrepreneurship culture;

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(v)   Start-up Clinics to take place around the country on different aspects where people can bring their questions and get solutions and mentorships;

(vi)   Mass media campaigns to promote entrepreneurship and innovation ecosystem and to reach out to a larger audience in every region of the country.

(h)   Technology adoption of citizens;

(i)   Mass media campaigns on the e-gov solutions & product/e-services campaigns through smaller groups;

(ii)   Provide necessary infrastructure facilities (public Wi-Fi, Kiosk machines to make payments, industry-specific information centres, etc.);

(iii)   Appointment of a dedicated person to guide, promote, consult on the use of e-gov services.

(i)   Increasing digital literacy in the country;

(i)   Development of Edu-Tech platforms for schools;

(ii)   Introduce technologies that are easy to use and useful to the general public, i.e., digital marketing/ Digital Content/ Freelancing etc.);

(iii)   Implement All citizen workshops (Age: 16-60 including school leavers, housewives, differently-abled people, senior citizens etc.).

(j)   Career guidance for students;

(i)   Aid to connect with associations for career guidance on both tech as a business and tech as a career stream;

(ii)   Creation of the online platform (National Skills Platform) to build the soft skills required.

(k)   Capacity building for Government staff;

(i)   TOT programs;

(ii)   Building design thinking/social entrepreneurial skills of the government staff/CIOs;

(iii)   Include tech/digitalization related modules for the corporate exams;

(l)   Recognition;

(i)   Platform to recognize the high impact regional clusters (e.g., e-Swabhimani).

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5. Enablers for the Digital Economy

Digital Economy does not grow in a Vacuum. Other enablers are required for the digital economy to sustain itself. Two such enablers identified are Digital Government and the ICT legal framework in Sri Lanka.

5.1.   Digital Government

Sri Lanka's Digital Government Architecture addresses the needs of multiple layers of customers (horizontal) with shared solutions and Line of Business (LoB) solutions built upon the foundation that consists of a National Data Exchange (NDX) (to be built), Lanka Government Network (LGN) and Lanka Government Cloud (LGC).

Lanka Government Network and Lanka Government Cloud (LGN/LGC) use secure and reliable infrastructure facilities to the government to host any type of application/ system and ensure government organizations, offices and buildings are connected with appropriate bandwidth to support the use of e-Government services by public servants as well as visitors to these offices.

The "Lanka Government Network" (LGN) project is a strategic project of ICTA. The government of Sri Lanka has recognized the need for a digital economy and has taken measures to digitalize the administration in order to successfully face future economic and social challenges.

The main objective of the LGN is to build a highly available, high speed, secure, reliable and centrally managed dedicated government network to link all government institutions to a single digital infrastructure. Lanka Government Network version 2.0 (LGN 2.0) backbone will connect all the government organizations of GOSL in a cost-effective and secure manner to provide centralized Internet, Email and video conferencing services, enabled access to Lanka Government Cloud (LGC) services from any government organization. Also, it provided a number of government e-services and trusted and secured connectivity to all government organizations to exchange government data and information.

As the first phase of the project, LGN main VPN core and 860 government organizations have been connected. That includes 331 Divisional Secretariats, 25 District Secretariats, 50 Ministries, 87 Departments, 46 Hospitals, 321 Other Government organizations island-wide.

The proposed LGN 2.0 initiative offers up to 100 Mbps last-mile connectivity for all government locations through fibre optic media. Also, from this network, ICTA intends to build their Local area network by providing Wi-Fi facilities with enabling cross-government dedicated network in Sri Lanka.

To make this reality, ICTA has planned to connect 3,500 government organizations and buildings with a minimum bandwidth of 100Mbps, and this will be further expanded up to 7,500 locations by connecting the country's post office network. All of these locations will be facilitated with Wi-Fi zones, which will create a conducive environment for the citizens to use government services conveniently.

The benefits of this project lie in a wide range as this project remove physical boundaries of the government institutions and offer effective and efficient government service to the

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public. Through this project, people in rural areas of the country will be able to access government services even from rural areas of the country. Therefore it will open new business opportunities at the grassroots level people due to the availability of information and technology. Further, it will reduce travelling costs and expenditure on obtaining government services due to the accessibility of government services in every part of the country. Added to that government will get the capacity to perform efficiently and effectively with the improved connectivity and availability of common digital platforms.
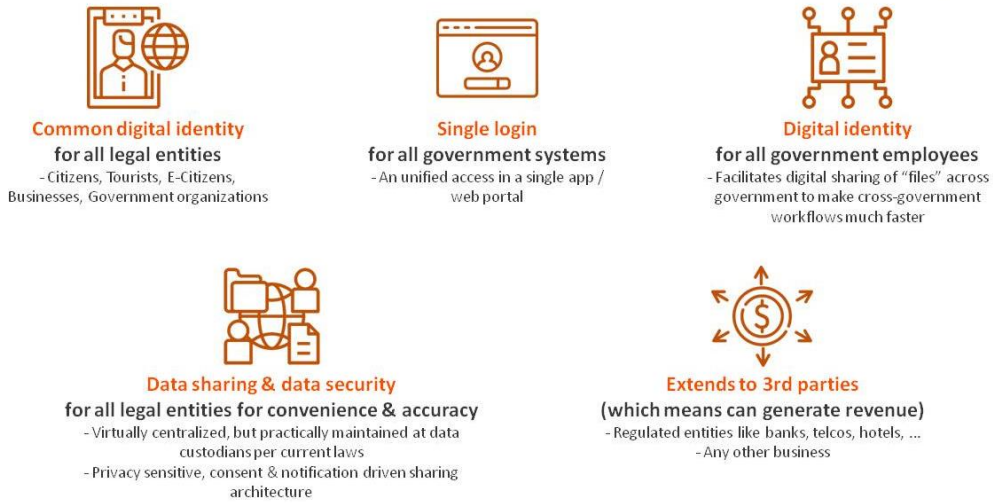
It is also expected to achieve significant cost reduction in the government sector by avoiding paper-based communication and documentation by moving into digital communication and documentation by using the available government network. Ultimately it will positively contribute to improved citizen satisfaction and employee satisfaction due to the efficient service delivery and improved job satisfaction as well.

The next version of the LGC will facilitate any requirement of the government with industry-standard cloud services. By eliminating barriers to cloud adoption, government organizations will be able to leverage LGC to use ICT for delivering services efficiently and effectively. Moreover, the next version of the LGC will consist of a big data cluster that will store government data belong to any category. Big data analytics, which can be effectively used for the economic growth of the country, and open data portal, which will be aligned with the national priorities, are two key outputs of the big data cluster.

Sustainability of this project Lanka Government Information Infrastructure (LGII) has established as a subsidiary of ICTA in order to manage, operation and development of the LGN/LGC. LGII will provide technical help desk facilities and also provide technical assistance for both government employees and citizens who use the LGN/LGC services.

A National Data Exchange (NDX) (Figure 08) is an essential precondition for the success of these strategic initiatives in that it will permit the various digital-governmental systems to leverage internal synergies. A majority of systems are functioning independently at present and do not facilitate sharing of information, services and digital documents across organizational boundaries. A common shared digital architecture and platform will enable various digital systems of the government to interoperate on the basis of a unique digital identifier for citizens and other users to prove their identity without compromising personal information and for the government and businesses to conduct checks in a safe and secure way. All digital government systems will be compatible with the digital architecture and platform.

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Figure 11: National Data Exchange (NDX)

Common digital identity
for all legal entities
- Citizens, Tourists, E-Citizens, Businesses, Government organizations

Single login
for all government systems
- An unified access in a single app / web portal

Digital identity
for all government employees
- Facilitates digital sharing of "files" across government to make cross-government workflows much faster

Data sharing & data security
for all legal entities for convenience & accuracy
- Virtually centralized, but practically maintained at data custodians per current laws
- Privacy sensitive, consent & notification driven sharing architecture

Extends to 3rd parties
(which means can generate revenue)
- Regulated entities like banks, telcos, hotels, ...
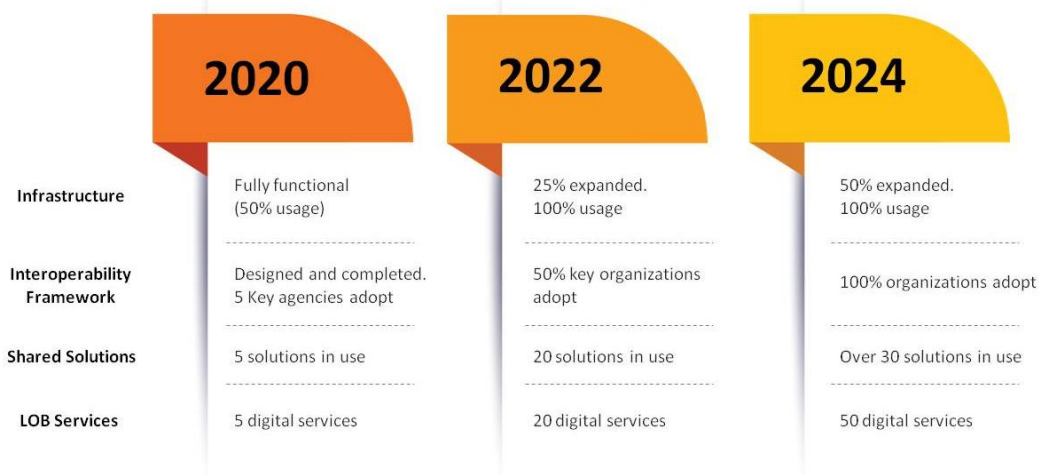- Any other business

Source: ICTA, 2020d

5.1.1.   Unique Digital Identity

Sri Lanka is on the verge of introducing a new Digital Identity for all its citizens facilitating digital transactions as well as providing easy coordination among state organizations. The new unique Digital Identity Card will have accurate details of every citizen as expected by different Government departments, which are governed by different legal provisions. These departments can have access to these details online. Biometric details of every citizen required for obtaining a passport, driving license, pension, Samurdhi benefits and paying taxes will be fed to this unique Digital Identity Card, which can be read by scanning machines and online by the relevant agencies. In addition, this card will have information that is required when casting a vote at elections (ICTA, 2020d).

Figure 12: Roadmap for Digital Government

	2020	2022	2024
Infrastructure	Fully functional (50% usage)	25% expanded. 100% usage	50% expanded. 100% usage
Interoperability Framework	Designed and completed. 5 Key agencies adopt	50% key organizations adopt	100% organizations adopt
Shared Solutions	5 solutions in use	20 solutions in use	Over 30 solutions in use
LOB Services	5 digital services	20 digital services	50 digital services

Source: ICTA, 2020d

National Policy Framework (NPF) of the Government of Sri Lanka "Vistas of Prosperity and Splendour", adopted in December 2019, constitutes of 10 key policies aimed at achieving the fourfold outcome of a productive citizenry, a contented family, a disciplined and just society and a prosperous nation, the Digital Government initiative envisages achieving ambitious goals in the near future.

5.2.   Enabling Legal Environment

Digital Laws play a key role in the use of ICT, as it provides the necessary legal environment for using electronic data and digital documents for official as well as personnel purposes and carrying out electronic transactions. Moreover, the activities that are detrimental to the use of Digital transactions should be regulated by Computer Crime laws. This page provides information and links related to Digital Laws which have been adopted in Sri Lanka.

5.2.1.   Electronic Transactions Act

The most relevant legislation for the use of ICT in government and the establishment of e-government services is the Electronic Transactions Act No. 19 of 2006. The drafting of Electronic Transactions legislation was enabled through a joint Cabinet Memorandum of the Prime Minister, the Minister of Trade and Commerce and the Minister of Science and Technology. Consequently, on September 22, 2004, the Cabinet of Ministers decided that legislation on Electronic Transactions should be prepared through the Legal Draftsman's Department in conjunction with ICTA. The legislation was prepared by the Legal Draftsman with legal and policy inputs from ICTA and presented to Parliament on March 7, 2006. The Electronic Transactions Act was brought into operation with effect from October 1, 2007 (vide Gazette Extraordinary No. 1516/25 of September 27, 2007).

The Electronic Transactions Act No. 19 of 2006 is based on the standards established by United Nations Commission on International Trade Law (UNCITRAL) Model Law on Electronic Commerce (1996) and Model Law on Electronic Signatures (2001).

The act was amended in 2017 to harmonize the Sri Lankan Electronic Transactions Legislation in line with the UN Electronic Communication Convention (UN ECC), the only international standard for e-Commerce legislation. Sri Lanka became the first country in South Asia and the second country in Asia (after Singapore) to become a state party to UN ECC. During the drafting of the UN ECC, Sri Lanka was represented by ICTA and Legal Draftsman's Dept.

The Amending Act No. 25 of 2017 ensures greater legal certainty for e-Commerce and e-Business providers who wish to use Sri Lankan law as the applicable law and ensure international validity for electronic contracts. This will create greater trading opportunities for Sri Lankan SME's with state parties to UN ECC. In addition, it would also bring clarity and predictability to the legal value of the use of electronic communications in cross-border trade with the other Contracting States.

It also ensures legal validity for other international legal instruments as well as cross border funds transfers, including the enforceability of Foreign Arbitration Awards, enhancing the ability of Sri Lanka to fast track its move towards paperless trade facilitation through a single-window platform. In the future, Arbitration awards can be enforced in paperless form with the ratification of UN ECC, creating an opportunity for Sri Lanka to be a hub for electronic commerce and business dispute resolutions and arbitrations. In addition, the new Legislation will improve trust and confidence and legal

certainty for all types of business transactions using electronic means, thus improving competitiveness and ability to do business with greater efficiency.

Sri Lanka also has an advanced inter-bank payment and settlement system facilitating immediate bank to bank transfers carried out in a secure manner using electronic signatures. This is supplemented by two mobile payment licensed operators (Dialog's "Ez-cash" and Mobitel's M-cash), which facilitate mobile commerce and peer-to-peer payment options (person-to-person transactions). Recently, the Central Bank of Sri Lanka formulated a mechanism for e-Commerce payment providers to use multiple payment options for e-Commerce/ Business transactions within the current regulatory framework (e.g.:- recent approval for "Pay-Here"). These payment options can be used to enhance trade, commerce and business using the new Electronic Transactions Amendment.

Based on UN ECC, the Amendment Law defines the time and place of dispatch and receipt of electronic communications between contracting parties, tailoring traditional contract rules to transform into the digital era. The Amendment also allows for the enforceability of contracts entered into by automated message systems formed without human interventions.

The amendment has also improved processes for the delivery of Services by Government entities and Courts. For instance, Section 8 of the Electronic Transaction Act has facilitated many Electronic Government Transactions and helped improve efficiency (Eg: eVisa at Department of Immigration and Emigration, e-Revenue Licenses at Department of Motor Traffic, payment of rates and taxes online at Municipal Councils etc.).

The new amendment will strengthen the existing provisions to move government transactions to the digital era through the use of stronger and more secure electronic-based authentication methods for all categories of Government transactions, including electronic tax filings, e-procurement and other revenue-based transactions. These transformations could be done by formulating Regulations under the Electronic Transactions Act, based on the cross-cutting provisions in the new Amendment.

The 2017 Amendment will also facilitate the use of biometrics-based authentication technologies to ensure the effectiveness of digital certificates and other forms of Digital IDs. The new definition of "Electronic Signatures" in the amending law is broad and futuristic enough to cover all new forms of authentication methods in the digital era. The Amendment also provides a liberalized regime for the use of Electronic Signatures and a governance framework to ensure inter-operability between authentication technologies.

Another unique feature of the Amendment is that it facilitates electronic filing of any application, petition, plaint, answer, written submission or any other document in any court. This would enhance the ability to adopt e-filing in original Courts, which are not governed by Supreme Court and Appellate procedure Rules.

Based on this Act, steps could now be taken by government organizations to provide services by electronic means as well as to retain data and information in electronic form.

The Convention aims to enhance legal certainty and commercial predictability where electronic communications are used in relation to international contracts. It addresses the determination of a party's location in an electronic environment; the time and place

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of dispatch and receipt of electronic communications; the use of automated message systems for contract formation; and the criteria to be used for establishing a functional equivalence between electronic communications and paper documents – including "original" paper documents – as well as between electronic authentication methods and hand-written signatures.

The use of Electronic Signatures through technologies such as "Digital Certificates" enables users to achieve confidentiality and integrity using the public key cryptosystem and hash function. The issuing of digital certificates is done through duly recognized certificate service providers (or Certifications Service Providers – "CSP"s), as per the provisions of the Electronic Transactions Act No. 19 of 2006 (as Amended).

The National Certification Authority (NCA) is the overall governance as well as the standard-setting body functioning under the aforesaid Act, which is required for the smooth and effective functioning of Certification Service Providers (CSPs). Chapter IV of the Electronic Transactions Act No. 19 of 2006 provides for the establishment of a nationally recognized body to perform the function of the NCA.

By Order published in the Gazette on September 24, 2013, the ICT Agency of Sri Lanka was designated as the NCA. ICTA is primarily responsible for the implementation of the Act, and the Sri Lanka CERT (which functioned earlier as a subsidiary of ICTA) was authorized by ICTA to carry out the operational functions of NCA. Equipment and software for the establishment of NCA were purchased by ICTA under the "e-Sri Lanka Development Program".

The NCA Task Force was established in 2011 jointly by ICTA and the Central Bank of Sri Lanka and was Co-chaired by Director/ Legal Advisor ICTA and an Assistant Governor Central Bank.

On August 1, 2018, Sri Lanka CERT was established as a separate Legal entity under the Ministry. Thereafter the operations NCA was transferred from ICTA to Sri Lanka CERT. Consequently, by Gazette Extraordinary, 2147/58, dated October 30, 2019, Sri Lanka Computer Emergency Readiness Team (Sri Lanka CERT) has been designated as the Certification Authority under section 18 of the above Act to perform the functions of the NCA.

Under Electronics Transactions (Amendment) Act, No. 25 of 2017 – the Task Force is required to established to manage and administer the National Certification Authority (NCA), having regard to the qualifications and experience as well as the need to represent relevant stakeholders, with the objective of ensuring its proper administration. This Task Force is independent of the Operations of NCA.

5.2.2.   Computer Crimes Act

The Computer Crimes Act No. 24 of 2007 provides for the identification of computer crimes and stipulates the procedure for the investigation and enforcement of such crimes. The Bill was presented in Parliament and debated on August 23, 2005, and thereafter extensively revised by the Parliamentary Standing Committee "B". It was enacted as legislation in May 2007 and certified by the Speaker of Parliament on July 9, 2007.

The basis of the Computer Crimes Act No. 24 of 2007 is to criminalize attempts at unauthorized access to a computer, computer program, data or information. It also

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contains a provision to deal with unauthorized use of computers regardless of whether the offender had the authority to access the computer.

The Act creates offences for unauthorized modification, alteration or deletion of information and denial of access, which makes it an offence for any person to program the computer in such a manner so as to prevent authorized persons from obtaining access. Other offences sought to be created under the proposed Act include causing damage or harm to the computer by the introduction of viruses and logic bombs etc., unauthorized copying of information, unauthorized use of computer service and interception of a computer program, data or information while it is being transmitted from one computer to another.

The Act introduces a new regime for the investigation of offences. Provisions have been made in the Act to designate a panel of 'Experts' to assist the Police in the investigation of computer crime offences.

On September 1, 2015, the Council of Europe Convention on Cybercrime (ETS 185 of 2001), often referred to as the "Budapest Cybercrime Convention", or "Cybercrime Convention", in short, entered into force in Sri Lanka. This is a historic achievement because Sri Lanka becomes the first country in South Asia (and only the second Asian country, after Japan) to become a state party to this Convention. Philippines and Singapore are yet to complete the accession procedure, although they attend the Convention Committee as an observer and ad-hoc observers, respectively.

Budapest Cybercrime Convention is the only International Treaty that facilitates international cooperation and gives countries the ability to obtain electronic evidence stored on computer systems and networks in another country. The Convention greatly enhances the gathering of electronic evidence, as well as the investigation of cyber laundering and other serious crimes. Accession to this Convention significantly enhances the ability of Sri Lanka to carry out successful investigations of cybercrime offences by gathering electronic evidence from state parties to the Convention. It will also help in law enforcement and judicial cooperation at the international level while ensuring adherence to human rights safeguards in the investigation process, a hallmark of this convention, made applicable amongst all parties to this Treaty.

Sri Lanka's accession to this Convention was the fastest in the Council of Europe. This was possible due to the provisions contained in the Computer Crimes Act No. 24 of 2007 and several policies adopted in recent times aligned with the Convention. Prior to Sri Lanka's accession, there was an assessment of our country's cybercrime legislative framework. The assessments carried out by the Council of Europe focused on the manner in which Computer Crimes offences were investigated (especially under the Computer Crimes Act and applicable procedural law). One key assessment was the adequacy of safeguards to match the Council of Europe standards. Sri Lanka was found to have safeguards consistent with the Convention standards, and the "unanimous approval" of all state parties was obtained before Sri Lanka could be invited to Accede to the Convention.

5.2.3.   Data Protection Act

Data protection rules have become an increasingly important legal regime in an information age where personal data has become a significant asset of many companies, especially those operating over the Internet. However, in a connected global economy, national data protection rules can be easily circumvented, and protections granted to the

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citizens are lost as data is transferred out of the jurisdiction. In an attempt to prevent such circumvention, the EU data protection regime contains provisions controlling the transfer of personal data to non-EU countries, such as Sri Lanka.

The urgent need for Data Protection legislation was first mooted by the Central Bank of Sri Lanka in September 2018. At the request of the Central Bank, the then Ministry of Telecommunications and Digital Infrastructure (MTDI) started the drafting process with ICTA, Central Bank and other stakeholders. The Drafting Committee, Chaired by ICTA Legal Advisor, included representatives from Government Agencies and Private Sector with expertise in privacy practices. The Draft Bill prepared by this Committee was submitted to 6 rounds of stakeholder consultations. The Draft Bill was also reviewed from time to time by an Independent Advisory Panel, comprising an eminent group of professionals, which was Chaired by a former Justice of the Supreme Court.

The Legislation will be implemented in stages. The entire Bill will come into operation within a specified period from the date the Speaker certifies the Bill. This would provide sufficient time for Government and private sector to take adequate steps to implement this legislation. The Data Protection Authority is required to be also established within a specified period. However, the implementation time frame may be brought forward in view of the Digital ID and shared KYC initiatives. A high-level Task Force is likely to facilitate the establishment of the Data Protection Authority.

Several obligations have been imposed by this legislation on those who collect and process personal data ("Controllers" and "Processors"), and a whole new set of rights have been given to citizens under this new legislation, which is known as "Rights of data subjects". For instance, personal data could be collected only for a specified purpose and not for any other purpose that is incompatible with the said purposes. However, processing data in public interest, scientific or historical research will not be considered incompatible. Personal Data has to be processed in a manner to ensure appropriate security, including protection against accidental loss, destruction or damage. The data subject (individuals) will have the right to withdraw his or her consent given to Controllers and will also have the right to rectify the data without undue delay.

Further, the Data Subjects have been given the right to object to the processing of their data. These rights of the data subject can be exercised directly by the individuals with the Controller, who are required to respond within a defined time period and is obliged to give reasons for refusing to meet the requestor reasons why the Controller would refrain from further processing the said data. The individual has a right of appeal against the decision of the Controller to the Data Protection Authority.

The Draft Bill has also introduced specific and comprehensive transparency and accountability obligations on Controllers, which will be a prerequisite to comply with. The accountability obligations would require the Controllers to implement internal controls and procedures, known as a "Data Protection management Program", in order to demonstrate how it implements the data protection obligations imposed under the Act.

Although the original Framework had provisions for the mandatory registration of Controllers, this requirement has been removed in the latest version. Instead, the Drafting Committee has deliberated and introduced specific and comprehensive transparency and accountability obligations on Controllers. The accountability obligations would require the Controllers to implement internal controls and procedures, known as a "Data Protection management Program", in order to demonstrate how it implements the data protection obligations imposed under the Act.

The Legislation also prohibits Controllers who process personal data from sending unsolicited messages unless the individuals have given express consent. Provisions have also been included to deal with relationships between controllers and third parties who process personal data on their behalf.

Importantly, administrative penalties have been introduced with a ceiling instead of fines calculated on the global turnover of the controllers.

The Drafting Committee had also taken into account international best practices, such as the OECD Privacy Guidelines, APEC Privacy Framework, Council of Europe Data Protection Convention, EU General Data Protection Regulation and laws enacted in other jurisdictions such as the United Kingdom, Singapore, Australia and Mauritius, Laws enacted in the State of California as well as the Indian Bill, when formulating the said draft Legislation.

5.2.4.   Cyber Security Act

The objectives of the proposed Cyber Security Act is to ensure the effective implementation of the National Cyber Security Strategy in Sri Lanka, prevent, mitigate and respond to cyber security threats and incidents effectively and efficiently, set up the Cyber Security Agency of Sri Lanka and empower the institutional framework to provide a safe and secure cyber security environment; and protect the Critical Information Infrastructure.

The Act has provision for the setting up of a Cyber Security Agency, which shall be the apex and executive body for all matters relating to cyber security policy in Sri Lanka and shall be responsible for the implementation of the National Cyber Security Strategy of Sri Lanka.

The Agency will take steps to implement the National Cyber Security Strategy of Sri Lanka, including preparation and execution of operational strategies, policies, action plans, programs and projects, develop security standards for the government, facilitate the adoption of the policies and standards in government institutions and other sectors and prescribe an assessment framework and criteria to assess cyber security policies and standards, identify and designate Critical Information Infrastructure (CII) in the government and other sectors.

The Act also provides provisions to develop strategies and plans for the protection of CII in consultation with the owners of CII in consultation with stakeholders, act as the central point of contact for cyber security in Sri Lanka, and provide advice to government institutions and other sectors in respect of cyber security matters, act as the interface for the multi-directional and cross-sector sharing of information related to cyber threat indicators, defensive measures, cyber security risks, incidents, analysis and warnings in relation to cyber security for government institutions.

To assist in curricular and skills development relating to cyber security, including the development of cyber security industry standards, ensure the availability of competent and highly skilled professionals in the cyber security domain, coordinate the conduct of sectoral cyber security drills from time to time to improve overall cyber security readiness, establish or designate institutions, units or any other entity to assist the Agency in the performance and discharge of its duties, set up and authorise sectoral computer emergency readiness teams in various sectors based on the critical importance of a particular sector, request the submission of reports or returns from the owners of the

designated CIIs and other government institutions which includes information relating to compliance with the cyber security assessment and information relating to the steps taken to protect their CIIs.

6. Lessons from South for developing Sri Lanka's Digital Economy

With that background, this section explores whether Sri Lanka could mutually learn from other nations in the South in its Digital Economy journey. The particular economy with which the comparison is made is the People's Republic of China (China), known to be one of the two global powerhouses for Digital Economy.

After years of robust development, the digital economy has become an important part of the Chinese economy. According to the 2017 Report on China's Digital Economy, China's Digital Economy reached USD 3.4 trillion in 2016, going by the broad definition, accounting for 30.3% of the GDP. This made China the second-largest Digital Economy after the USA. While China's Digital Economy is still only one-third of that of the USA, it grows at a significant rate, nearly 19% annually, while the USA records only 6.1% (Yubo, 2020).

Parallel to the growth of the Digital Economy, the development of Digital skills is also seen in China. While more than 50% of the digital talents in China today come from the traditional sectors such as manufacturing, finance and consumer goods, digital talents from ICTs per se are on the rise. (Yubo, 2020)

China's Digital Economy is the direct result of the favourable policies followed by the Chinese government. They include policies in building network infrastructure, deep acceleration integration of the Internet with the real economy, and enhancing information technology capabilities in all aspects. Digital transformation in China was also possible because of a comprehensive strategy that focused not only on the supply side but created the environment to expand digital infrastructure. Data was also recognized as a key resource for the development of the Digital Economy, which was followed by the implementation of data governance policies. (He and Sun, 2020)

The analysis is for ten technologies/fields PRC has already set its footprint. Sri Lanka's readiness to embrace each of these technologies/fields are evaluated for five different aspects, market, technical, legal/policy, community (social) and capacity (HR). Finally, it is concluded the replication be Already Happening, Immediate (within six months), Short Term (6 months – 2 years), Long Term (2-5 years) or Very Long Term (More than five years).

6.1.   5G Digital Infrastructure

Perhaps PRC has one of the best built 5G National Digital Infrastructures. China Mobile, the world's largest mobile operator by the number of subscribers, added 3.97 million 5G subscribers in January 2021, according to statistics published on its website. It is said to have connected 169 million 5G subscribers in the first month of 2021, compared to 6.7 million 5G subscribers in January 2020. According to a recent report, the operator has deployed more than 385,000 5G base stations nationwide. The Chairman of China Mobile reportedly said the telco completed its annual 5G network construction goal earlier than planned and built the world's largest 5G SA network. Meanwhile, its rival operator China Telecom is said to have added 10.67 million 5G subscribers in January 2021, increasing the number of 5G subscribers to 97.17 million. (RCRWN, 2021).

**Figure 13:** Sri Lanka's Readiness for 5G Digital Infrastructure
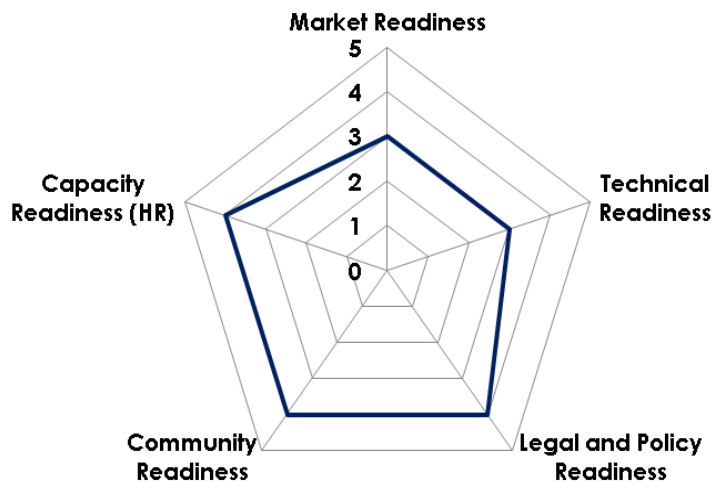
Source: Authors

Replicability: Long Term. While the community is ready, capacity is available both in terms of technical and human resources and little legal and policy amendments to happen. Sri Lanka may not have fully pledged 5G connectivity too recently. The issue is demand. With the limited market, it is difficult to think the volume that justifies the investment will be ready immediately. Island-wide coverage will come even later. (Many parts of the island did not even have 4G connectivity by the end of 2020).

6.2.   Artificial Intelligence

Forbes calls PRC the Artificial Intelligence Superpower. In 2017, the State Council of PRC announced plans for the expansion of artificial intelligence. This strategy is part of the larger ''Made in China 2025' program and will also be linked to the new (digital) Silk Road. Through this plan, PRC aims to become the largest economy in the world and provide adequate prosperity to its people guaranteed by a politically stable system. In addition, PRC guarantees that economic and diplomatic interests are protected. AI aims to connect and enhance PRC's entire industry by 2025. Artificial intelligence produces goods and manages the business while balancing supply and demand. In addition, AI helps the central government monitor and control its own population. Artificial intelligence is used to protect digital interests but also enable residents to live safe and good lives. (Forbes, 2020)

**Figure 14:** Sri Lanka's Readiness for Artificial Intelligence
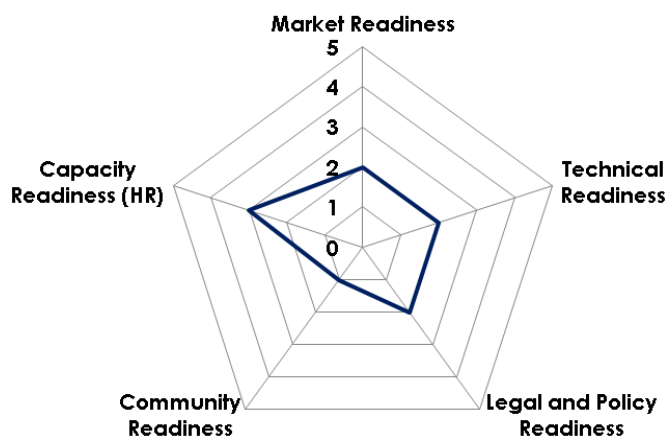
Source: Authors

Replicability: Long Term to Very Long Term (depending upon the type of applications) AI in some of the Machine Learning applications will happen relatively soon. (For example, medical applications) General AI applications will take longer than Narrow AI applications and require many other pre-requisites to be fulfilled.

6.3. Autonomous Electric Vehicles

PRC has grown to become the world's largest automobile market, producing tens of millions of cars annually. However, domestic vehicle manufacturers have not fully mastered the core technology of internal combustion engine vehicles, which still remains a field led by other countries. The most popular cars in PRC are often produced through joint ventures with major foreign carmakers such as Volkswagen, General Motors and Toyota. Still, PRC plans to change the landscape with autonomous driving technology. That transformation will also transform taxis, buses, trucks and delivery vehicles. According to a blueprint released by a government research agency, PRC's goal is for vehicles with the self-driving capability to at least partially account for 50% of new vehicle sales in five years. The Alibaba -backed AutoX company is already testing the latest innovations on the road. In addition to AutoX, search engine operators Baidu, Sequoia Capital Toyota-backed Pony.ai, and Renault-Nissan-Mitsubishi Alliance-backed WeRide each use pilot robot-taxi testing in major cities. Didi Chuxing is testing autonomous vehicles in Shanghai. PRC government announced a comprehensive development plan a year ago, including achieving mass production of self-driving vehicles under certain conditions by 2025. (Nikki, 2021)

Figure 15: Sri Lanka's Readiness for Autonomous Electric Vehicles
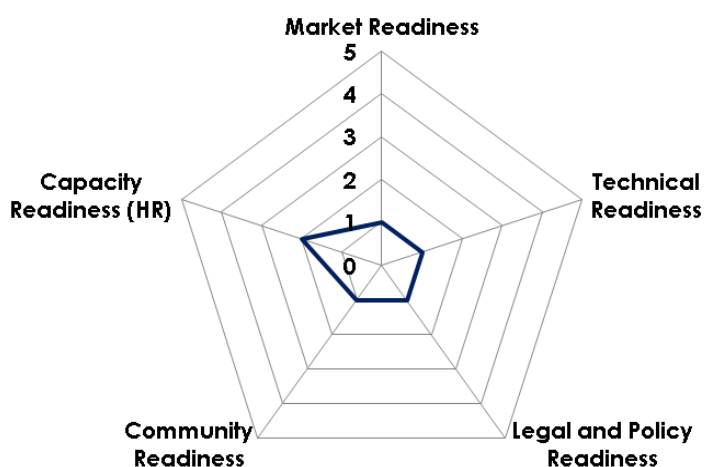
Source: Authors

Replicability: Very Long Term. Sri Lanka has so far never been into mass production of vehicles. The tiny market has prevented it from building a local automotive industry. However, the economies of scale might change with electric vehicles, followed by autonomous vehicles, and it may be viable to build vehicles in small volumes. Still, it would be too optimistic to think this happened too soon. This is one occasion where the differences in sizes between the markets of the two countries make a visible gap.

6.4. Data Centers

PRC has become the second-largest data centre market in the world after the USA, with about 1.6 million square meters of floor space for third-party data centres available throughout the country. PRC's third-party data centre market is projected to grow to more than 2.5 million square meters with a space of more than 1 million square meters in five years to the end of 2025. There are more than 360 facilities and around 200 data centre providers. However, China is growing faster than other large data centre markets, with data centre prices projected to increase 72.5% by 2025. In addition, the Chinese government plans to bring data centres nationwide into strategic investment sectors — in addition to cutting-edge technologies such as cloud computing, artificial intelligence (AI), and big data that will enable the deployment of government-supported data centres. This comes as a part of a policy that encourages investment. (R&M, 2020)

Figure 16: Sri Lanka's Readiness for Data Centres

Source: Authors

Replicability: Immediate. Sri Lanka, like most countries, has its own data centres, though they may not be as massive as the ones the industrialized world offers. Economies of scale still place serious constraints on low pricing. Despite these, this is one area the country that is relatively ready. Market and Technical readiness may not be too high, but with Data Protection Act passed, as planned in mid-2021, the legal and policy foundation will be laid. With high-speed direct links to neighbouring states, Sri Lanka must focus on serving its data storage and processing requirements.

6.5.   E-Commerce

PRC is the world's largest e-commerce market, driven by Alibaba Group with its subsidiaries Taobao and Tmall, as well as competitors JD.com and Pinduoduo. Research firm eMarketer predicts that JD.com and Pinduoduo, in addition to all Alibaba Markets, will account for 83.6% of the retail e-commerce market by 2020. Statista reports that China has the largest online e-commerce population, with 710 million people doing digital shopping. Out of this, 76% of digital shoppers are between 18 and 44 years. According to Statista, 64% of China-based Internet users are involved in e-commerce, with purchases of clothing, accessories, toys and hobby items being the most popular. Statista estimates that Chinese consumers spent USD 1.1 trillion online in 2020. That amount has doubled from USD 826.6 billion in 2019. Following are the USA with USD 360 billion and European Union with USD 351.9 billion (Kaplan, 2021).

A unique characteristic of the Chinese e-Commerce market is its growth parallel to the process of industrialization, while in the west, e-Commerce has followed industrialization. This presented a historical opportunity for China to leverage digitalization for industrialization. On the other hand, it also brought challenges, such as building trust in the market. Alibaba is an excellent case study of how China has balanced its strengths and challenges in developing a powerful brand. (Yubo, 2020)

In 1999, Alibaba first started as an online B2B marketplace to assist Chinese SMEs to find overseas trade partners. It gradually expanded to cover C2C and B2C online retail markets. Taobao, Alibaba's C2C platform, began operations in 2003. Its B2C platform Taobao Mall (later Tmall), was introduced in 2008, facilitating small vendors to provide quality products for their consumers. With 617 million active users, Alibaba's sales revenue has reached USD 750 billion in 2018. Alibaba, now one of the most valued firms at the international level, offer cloud computing and big data consultancy solutions too. (Yubo, 2020)

While innovative business models adopted by local entrepreneurs like Jack Ma of Alibaba are the key drivers behind the success of the e-Commerce models in China, the conducive policy environment has created an ecosystem that fostered such models. That includes inclusive and prudent regulation, building digital infrastructure, developing the logistics infrastructure and national mass entrepreneurship and innovation campaign. (Yubo, 2020)

The development of e-Commerce in China presents important policy lessons for decision-makers in other emerging markets. Firstly, an inclusive and prudent regulation is a must to build a culture of entrepreneurship and innovation. Secondly, considering 'data' is the new oil in the economy, the digital infrastructure should be strong enough to take the challenge. Finally, e-Commerce needs a good logistics infrastructure too. Emerging market decision-makers should keep these points in mind when devising policies for their own countries. (Yubo, 2020)

Figure 17: Sri Lanka's Readiness for E-Commerce

Source: Authors

Replicability: Immediate. Sri Lanka's E-Commerce Readiness has been widely discussed in this paper as well as in other sources. (Commonwealth, 2020) Sri Lanka is ready with most aspects for the replication, restricted only by its relatively small market size. The challenge faced by Sri Lankan E-Commerce firms is to find business models to overcome this barrier. One possible way to expand the markets is to cover neighbouring South Asian markets in India, Bangladesh and Pakistan. If not, the Sri Lanka market must be built for its full potential, building an E-Commerce culture in the same way that is built-in PRC.

6.6.   EdTech (Education Technology)

With more than 400 million students, PRC is the world's largest educational technology market. While there is still room for improvement in the Chinese education market, especially in the formal integration of technology into the classroom environment, many firms are taking advantage of the opportunity to digitize education. PRC's EdTech landscape primarily focuses on virtual coaching. However, there are many other EdTech startups that have successfully penetrated China's EdTech landscape with other approaches. PRC's EdTech sector is estimated to reach USD 70 billion in 2020, according to a report from iiMedia Research. In response to the coronavirus outbreak, many EdTech startup companies have seized the opportunity to increase their presence in PRC and compete to gain popularity among students with attractive courses and discounts. (Daxueconsulting, 2020)

Figure 18: Sri Lanka's Readiness for Ed-Tech
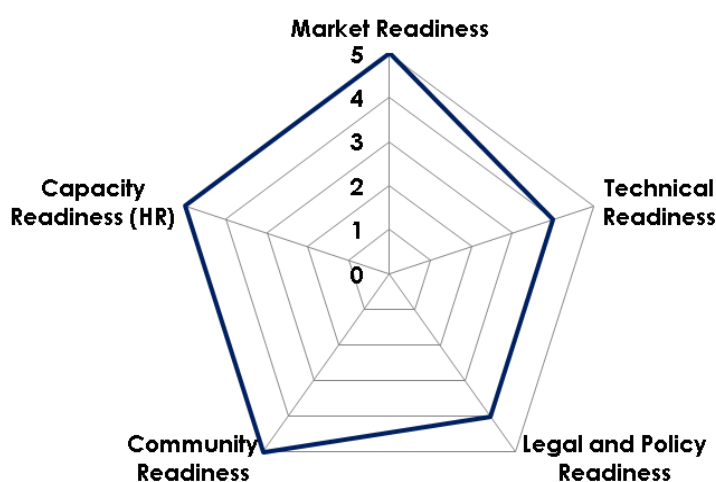
Source: Authors

Replicability: Immediate. While it is hardly as big as that of PRC's, the Sri Lankan education market is matured and advance enough for the EduTech products. Community is ready, and capacity is available. So this is another area where replication should immediately happen.

6.7.   Electronics Industry

Given its many advantages, PRC has been a leading choice of electronics manufacturing for decades. The shorter the supply chain, minimal turnover and shortening the length of the supply chain reduce the risk of costly delays. In PRC, most suppliers are able to run several manufacturing processes, minimizing shipping and customs clearance, so a manufacturer can build it all with just a few suppliers. (Shedletsky, 2019) PRC's electronic contracting services market occupies an important position in the global market. In 2017, the market value of PRC's electronic contract manufacturing services reached about USD 300 billion. It is currently estimated to be worth USD 1 trillion. PRC has three centres for complete and complete electronic contract manufacturing services, including the Pearl River Delta, Yangtze River Delta, and Bohai Bay province. And they are expected to be major investment areas in the future. (CPRN, 2018)

**Figure 19:** Sri Lanka's Readiness for Electronics Industry

Source: Authors

Replicability: Long Term. This could have been a short term goal if Sri Lanka already had an advanced electronics industry. Perhaps, again because of the relatively small market and economies of scale, this has not happened. Given the changes in economies in scale, this is now an area worth revisiting. However, given the investments and prerequisites, it will be a long term goal rather than short term.

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6.8. Fintech

Fintech's transformation is widespread in the PRC. Leading FinTech businesses of PRC, such as mobile payment services and online loans from large databases, are at the forefront of global development. For example, both Alipay and WeChat Pay, the two leading mobile payment service providers in China, have around one billion active users each. A sizable section of the Chinese population organizes their daily lives around the payment ecosystem, from making doctor's appointments to buying air tickets and from paying electricity bills to investing in financial products. WeBank, MyBank, and XWBank, the three major online banks in China, provide around 10 million loans annually to individuals and small and medium enterprises (SMEs). The most striking feature of the PRC FinTech industry is its 'inclusion' - increasing access to financial services by small and medium enterprises (SMEs) and low-income households on a scale unprecedented in human history. (ADB, 2020)

**Figure 20:** Sri Lanka's Readiness for Fintech
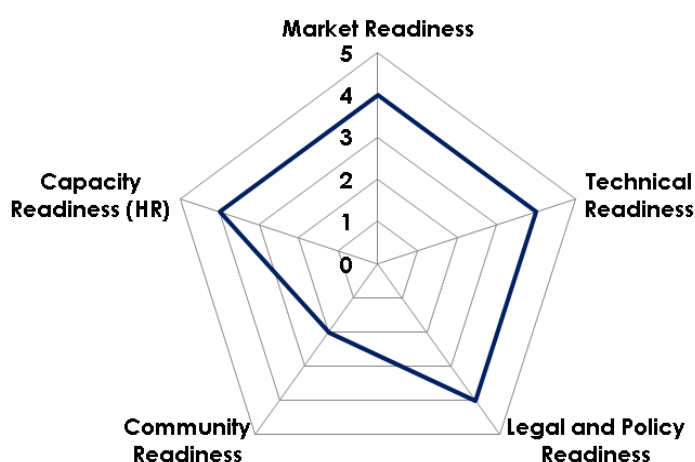
Source: Authors

Replicability: Short Term. As described in the paper, Sri Lanka has already moved ahead in the Fintech front, though these developments are nowhere close to what happens in PRC. Still, this is an area in the country that has true potential. One challenge, though, could be creating the right culture, as the community is not too financially literate. Regulatory aspects could be the next most important challenge.

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6.9.   Robotics

PRC is in a unique position to lead in the automation economy. Although the country has a large workforce, labour costs have increased tenfold in the last two decades and are now more than double that of Vietnam. As a global workshop, there are incentives to automate manufacturing departments that lead high -quality products. PRC is currently the world's largest and fastest-growing industrial robot market, reaching USD 5.4 billion in 2018, up 21%. That's a third of global sales. The industry has now spread to fields other than manufacturing. For example, at the beginning of the COVID-19 pandemic in Wuhan in February 2020, when the large Huoshenshan Clinic was built in 10 days, a fleet of robots was used for disinfection and drug delivery. Other than that, these machines are used in schools, hospitals and commercial buildings throughout PRC. (The Economist, 2020)

Figure 21: Sri Lanka's Readiness for Robotics
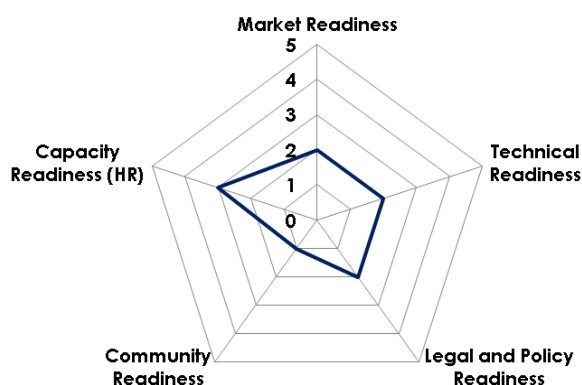
Source: Authors

Replicability: Short Term to Long Term. Sri Lanka's ICT firms at present are more interested in developing software than hardware. That does not necessarily mean there is a lack of skilled HR. Robotics is a subject taught at many ICT courses, undergraduate and postgraduate, with a sizable number of trained engineers annually joining the workforce. Perhaps it may take a bit more time for the industry to catch up. With the right ecosystem developed in collaboration with universities, it may not take as long as it normally seems.

6.10. Startups

Blank (2021) identifies startups are crucial to PRC's long-term economic ambitions. PRC has overtaken the United States and become the world's largest unicorn hub, a sector worth billions of dollars. Venture capitalists pay special attention to technology companies that can help strengthen Beijing's goal of becoming a global leader in artificial intelligence, electric vehicles and other fields. Technology Parks is a viable source of support for new ventures. Within these zones, there are business incubators with start-up companies licensed by the local government. By placing them in these zones, the district government financially supports the start-ups as new ventures are considered to contribute to the development of the local economy. This helps startups qualify for funding from banks and venture capitals.

Figure 22: Sri Lanka's Readiness for Startups
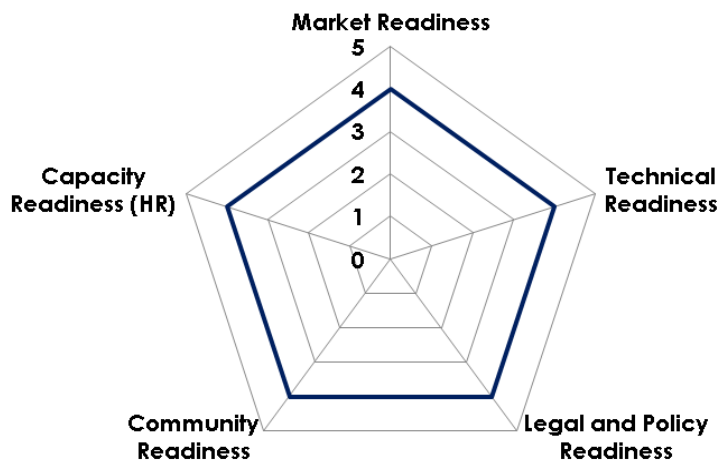
Source: Authors

Replicability: Immediate. With the developments that have taken place already, this might be the most promising area out of all. The readiness is well balanced among market, technical, community, capacity and legal/policy. Sri Lanka needs to learn from PRC how to nurture startups till at least a few of them become unicorns. There are standards approaches, out of which some are already followed. What is essential is more energy.

7. Conclusion

Discussed above in detail were two themes with significant overlap, the nexus of which will be essential for the Digital Economy developments of Sri Lanka. On one side, there is the plan – the blueprint of the Digital Economy strategy Roadmap with its clearly articulated goals and objectives. On the other side, the global developments, in this case with the South, focus that one cannot ignore as they determine the future of the technological nation. The challenge is to make these two ends meet.

As discussed at the beginning of the paper, maybe Sri Lanka economy is not in its best shape. The recovery from COVID-19 has been relatively quickly compared to most other countries, but that per se does not make the economic situation too healthy. However, that itself is a good reason for a transformation of traditional policies. An off-the-beaten-track approach may be the call of the hour. In that case, instead of reinventing the wheel, it is worthwhile to study the successful approaches taken by the other countries to replicate them domestically. Understanding other countries' experiences, in particular, China's, was the objective of this text.

Some countries consciously changed their direction from a consumer to an innovator. PRC, for example, has remained a consumer for relatively a long period before shifting the roles. From 1949 till the 1980s, PRC's electronics industry developed slowly due to limited demand and a closed market. Since 1980, spurred by economic reforms, PRC has entered a stage of rapid development, driven by strong demand for consumer electronics. By the 1990s, the PRC government adopted more favourable policies towards the computer hardware market, making it the leading force in developing the electronics industry. By the dawn of the millennium PRC has become the second-largest consumer and producer of computer equipment, second only to Japan. Today, while this fact is challenged, PRC remains an international leader in 'Intelligent innovations'. Presented were some of its achievements and how exactly following PRC would, in each case, suit Sri Lanka at this juncture.

Disruptive technologies, some of which are discussed, e-commerce and start-ups offer viable opportunities. Startups, 'innovators of technology adoption lifecycle', have no other way than taking the risk of banking on disruptive technology potentials to target new markets and find ways to incorporate it into their business processes. Established firms normally take a more risk-averse position and adopt an innovation only after seeing how it performs with a broader audience. In the end, they, failing to account for the effects of new, disruptive technology, may find themselves losing market share to competitors that have discovered ways to integrate technology into managing resources. So 'disruptive technologies' are always for young and tiny startups. Sri Lanka, in recent years, has demonstrated itself to be a promising ground for tech startups. They now generate a sizable part of nearly USD 1 billion export revenue from telecommunication, computer and information services. Sri Lanka's start-up ecosystem is expanding, having created almost half of all new companies in the computer science area. Sri Lanka has a growing number of start-ups in the IT industry, it continues, and various programs support their development allowing young entrepreneurs and developers to find affordable workspaces, access international and local investment and overcome barriers to future growth. Today's industry offers professional services in different areas and a full range of IT products, from IT development and maintenance to innovative solutions and IP creation. Sri Lankan IT companies have been providing services to global clients for customized and outsourced software development.

Then it would be essential to build the right workforce. Skilled human capital is difficult to find, and that costs. This again should go hand in hand with the industry developments. Instead of generally qualified professionals, the need is for professionals trained in specific skills matching industry needs. There are two approaches to follow.

Firstly, it is necessary to develop the HR capacity locally. Secondly, if local capacity is not adequate, Sri Lanka may have to attract foreign IT professionals. A key source may be India. This may not be a politically popular decision in Sri Lanka. However, it is essential for the development of the local IT industry.

Another essential requirement is expanding R&D capacity. R&D plays perhaps the most important role in capturing the market with innovations. All international firms so far successful in the innovation game are masters in R&D. This requires close coordination between the universities, state or non-state, and industry. Not that Sri Lanka lacks it today, but it certainly needs to be strengthened to a level that almost all pass-outs are immediately absorbed by the industry with no further orientation or training. For this, both institutions and industries must clearly understand each other's needs.

As discussed under section 6 of the paper, the replication does not depend only on demand. The other important factor is country readiness. While some approaches could be taken immediately backing on the developments so far happened, others have to wait. For example, Sri Lanka may not be immediately prepared for supplying AI products or Autonomous Electrical Vehicles to the global market. That may require environment readiness. On the other hand, for E-Commerce or Education Technology, or maybe even for Fintech, there exist a mature market. It is essential that the successful international approaches are correctly identified and integrated into the Digital Economy Strategy of Sri Lanka for achieving the stipulated targets.

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