SMART BANGLADESH

ICT MASTER PLAN 2041

ICT DIVISION

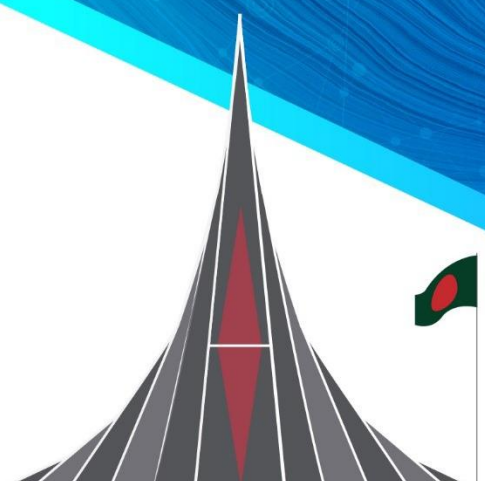


Table of Contents

List of Tables

Table of Figures

List of Abbreviations

Abbreviation	Meaning
4IR	Fourth Industrial Revolution
a2i	Aspire to Innovate
ADB	Asian Development Bank
AGC	Automatic Generation Control
AI	Artificial Intelligence
APAC	Asia Pacific
API	Application Programming Interface
APSCL	Ashuganj Power Station Company Limited
ASOCIO	Asian-Oceanian Computing Industry Organization
B2B	Business-to-Business
BACCO	Bangladesh Association of Contact Center and Outsourcing
BADC	Bangladesh Agricultural Development Corporation
BARC	Bangladesh Agricultural Research Council
BARI	Bangladesh Agricultural Research Institute
BASIS	Bangladesh Association of Software and Information Services
BBS	Bangladesh Bureau of Statistics
BCC	Bangladesh Computer Council
BCCT	Bangladesh Climate Change Trust
BCSAA	Bangladesh Civil Service Administration Academy
BDCCL	Bangladesh Data Center Company Limited
BHTPA	Bangladesh Hi-Tech Park Authority
BIDA	Bangladesh Investment Development Authority
BIN	Book Identification Number
BNDA	Bangladesh National Digital Architecture
BPDB	Bangladesh Power Development Board
BPTAC	Bangladesh Public Administration Training Centre
BRRI	Bangladesh Rice Research Institute
BSCCL	Bangladesh Submarine Cable Company Limited
BUET	Bangladesh University of Engineering and Technology
CAGR	Compound Annual Growth Rate
CCTV	Closed-Circuit Television
CDM	Continuous Diagnostics and Mitigation
CIT	Corporate Income Tax
CMO	Cloud Management Office
CoE	Center of Excellence
CPGCBL	Coal Power Generation Company Bangladesh Limited
CPTU	Central Procurement Technical Unit
CRM	Customer Relationship Management
CSP	Cloud Service Provider
DAM	Dhaka Ahsania Mission

Abbreviation	Meaning
DERMS	Distributed Energy Resource Management System
DILRMP	Digital India Land Record Modernization Program
DLA	Digital Leadership Academy
DNCC	Dhaka North City Corporation
DoICT	Department of Information and Communication Technology
DSA	Digital Security Agency
DSDL	Digital Service Design Lab
DTA	Digital Transformation Agency
E2E	End-to-End
EAMS	Enterprise Asset Management System
eCAB	e-Commerce Association of Bangladesh
EDB	Economic Development Board
EGCB	Electricity Generation Company of Bangladesh
e-GP	e-Government Procurement
ERP	Enterprise Resource Planning
ETP	Effluent Treatment Plants
EWS	Early Warning System
FDI	Foreign Direct Investment
G2B	Government to Business
G2B2C	Government to Business to Consumer
G2C	Government to Citizen
GDP	Gross Domestic Product
GIS	Geographical Information System
GMV	Gross Merchandise Value
GSTN	Goods and Services Tax Network
HIC	High-Income Country
HPSU	High Potential Startup
ICTD	Information and Communication Technology Division
iDEA	Innovation Design and Entrepreneurship Academy
IDM	Integrated Device Manufacturers
IDTP	Interoperable Digital Transaction Platform
ILO	International Labor Organization
IMED	Implementation Monitoring and Evaluation Division
IMS	International Monitoring System
IoT	Internet of Things
IPP	Independent Power Producer
IPR	Intellectual Property Rights
IRD	Internal Resources Division
ITes	Information Technology Enabled Services
ITU	International Telecommunication Union
KOICA	Korea International Cooperation Agency
LFS	Load forecast system

Abbreviation	Meaning
METI	Ministry of Economy, Trade, and Industry
MFS	Mobile Financial Services
ML	Machine Learning
MNC	Multinational Corporation
MOEFCC	Ministry of Environment, Forest and Climate Change
MoFA	Ministry of Foreign Affairs
MoPA	Ministry of Public Administration
MOSIP	Modular Open-Source Identity Platform
MoU	Memorandum of Understanding
NAP	National Adaptation Plan
NASSCOM	National Association of Software and Services Companies
NBN	National Broadband Network
NDI	National Digital Identity Initiative
NGO	Non-Governmental Organization
NID	National Identity
NISE	National Intelligence for Skills, Education, Employment and Entrepreneurship
NPO	Nonprofit Organization
NRB	Non-Resident Bangladeshi
NSDA	National Skills Development Authority
NWPGCL	North-West Power Generation Company Limited
OEM	Original Equipment Manufacturer
P2M	Person-to-Merchant
P2P	Person-to-Person
PPP	Public–Private Partnership
PPP	Purchasing Power Parity
RMG	Readymade Garment
RPCL	Rural Power Company Limited
SBL	Startup Bangladesh limited
SG	Singapore Digital
SHIFT	Shaping Inclusive Finance Transformations
SID	Statistics and Informatics Division
SIPP	Small Independent Power Producers
SME	Small & Medium Enterprise
SPV	Special Purpose Vehicle
STEM	Science, Technology, Engineering and Mathematics
TDS	Tax Deducted at Source
TIN	Tax Identification Number
TVET	Technical-Vocational Education and Training
UDC	Union Digital Center
UDF	Upazila Development Facilitator
UMIC	Upper Middle-Income Country

Abbreviation	Meaning
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
VAT	Value Added Tax
VC	Venture Capital
WCIT	World Congress on Information Technology
WEF	World Economic Forum

1 Executive Summary

1.1 Smart Bangladesh vision and mission – objectives & background

The ambitious socio-economic plan laid out by Bangladesh in the 2021-41 perspective plan implies that Bangladesh will need to make the journey from 'Digital" to 'Smart" which essentially means becoming focused on data centric design and human centric experience rather than automation & digitization. ICT will play a key role in achieving the Smart Bangladesh Vision and will straddle 4 key pillars: **Smart Citizen, Smart Government, Smart Society & Smart Economy**.

- **Smart Citizen**: This pillar will aim at empowering the citizens of Bangladesh with a digital first mindset through driving campaigns and implementing widespread digital literacy programs. Smart citizens of 2041 will not only have digital embedded in their way of life but will also collaborate with the govt and industry for co-creation of services and policy making.
- **Smart Government** of 2041 should be able to bring to life the concept of "invisible governance" through implementation of 100% paperless offices and hyper personalized service platforms across priority areas like healthcare, education, agriculture, revenue management, public security etc. It will engage in proactive and collaborative policymaking to catalyze Bangladesh's evolution on frontier technologies
- **Smart Society** will essentially be characterized by inclusive communities and sustainable living. Digital tolerance, ethics, and values will be embedded among citizens. High degree of inclusivity will be enabled through interoperable cashless payment ecosystem, easy access to credit etc. and life will be sustainable & resilient in smart cities, energized by smart grids and boosted by an integrated technology platform.
- **Smart Economy** will be about creating an innovation economy to enable Bangladesh to be on the fore front of ever evolving industrial technology revolution, especially across priority segments like RMG & Textiles, Light Engineering, Agriculture etc. This will go hand in hand with creating a $50 Bn ICT industry, creating a robust startup ecosystem. These combined, will position Bangladesh to build on its current industrial strengths & become technology fore-runners in the same.

Action across these 4 pillars will ensure that Bangladesh collectively achieves the objective of creating an innovation economy for Bangladesh through fostering ICT and scientific research.

1.2 Crafting the Master Plan

When translating the vision to an actual Master Plan, a 3-pronged approach was adopted

- Landscaping of current progress and plans
- Listening to the voice of Bangladesh's stakeholders
- Taking learnings from global benchmarks

1.2.1 Landscaping of Current Progress and Plans

Detailed study of marquee initiatives across the 4 pillars of Digital Bangladesh has indicated that significant tangible value has been delivered through these programs till date. Only a few examples are as below:

- 2000+ government services have been digitized under the ambitious National e-Government Master Plan
- Mobile internet penetration grew 6x over the last 10 years. Over half the population has access to mobile phones
- National mega-projects like info-Sarker, Union Digital Centers, multimedia classrooms, etc. have connected the nation's citizens to digital technologies. At 90%, Bangladesh has one of the highest 4G penetration in South Asia
- Investor friendly policies have attracted investments from majors like Oracle, Samsung, Huawei, Nokia, etc.
- Startup Bangladesh Ltd. has set the foundation for an emerging startup ecosystem
- Bangladesh had over 65,000 IT/ITES graduates as of 2018. Approximately 2 Lakh teachers have been trained on multimedia content development.

However, there are emerging areas of concern to be addressed in the journey to Smart Bangladesh 2041. Quality of services, lack of end-to-end digital experience, limited standardization across ministries, and limited interoperability of data are areas of concern. Also, the ICT industry growth itself needs to be turbocharged to achieve targets of $5 Bn domestic ICT spend and $5 Bn ICT gross exports by 2025. Limited scale in semiconductor and electronic devices manufacturing hinders ability to drive nation-wide affordable smart device penetration. Low smart phone penetration, lack of smart device affordability, limited awareness of benefits from digital, and lack of cloud-first mindset need to be addressed. Bangladesh needs to firm up existing policies on cybersecurity and emerging technologies (e.g., AI, Robotics, Blockchain, IoT, Microprocessor design). Ambitious programs like Sheikh Hasina Institute of Frontier Technologies, and planning of new education curriculum are underway. However, lack of STEM focus in universities, disjointed digital skilling efforts with limited quality assurance, and lack of organized inclusion of gig workers and marginalized sections in skilling initiatives are key concerns. 4IR technologies present a great opportunity to automate and modernize traditional industries like RMG, but this also poses the risk of job losses and hence, needs to be looked at from an angle of re-skilling the workforce and moving up the innovation value chain across priority industries.

1.2.2 Listening to the Voice of Bangladesh's Stakeholders

Key themes emerged from consultations, surveys and interviews across Government, citizens, and key industries of Bangladesh.

Voice of Citizen: Bangladeshis clearly emerged as heavier users of digital government services, however critical mass of users is unsatisfied with their experience. Unlike developed digital nations, most Bangladeshi users lack end-to-end digital experience during service consumption. Over 70% users are keen on using personalized government services. Laptops and tablets will lead adoption of smart devices over the next two years; however, affordability will be a barrier to adoption.

Voice of Government: Multiple themes and concerns emerged across 4 key dimensions, from extensive interviews and consultations with Government stakeholders:

1. Transformation governance needs to be shaped through interventions like nation-wide digital awareness program, a common governing taskforce for the Master Plan, cross-ministerial integration, and embedding agile ways of working in public sector.
2. Investments and policy agenda should be shaped through synergistic investments in public service digitalization and trust on areas like citizen data safety, cybersecurity, proactive policy upgradation and review.
3. Technology agenda should be led by common guidelines and standards, integrated service delivery architecture, data interoperability and fungibility, affordable devices and internet, and scalable digital infrastructure.
4. Skilling and talent development programs should ensure emerging technologies are embedded in university curricula. Skills competency framework should guide skilling interventions. Quality control and outcome orientation of skilling programs should be elevated from current levels. Current demographic dividend is a national advantage but for a limited window – skilling of critical mass should be achieved before it ends.

Voice of Business: Five key themes emerged from engagements with business leaders:

1. Smart Government and Smart Economy emerged as top priority change pillars for business leaders
2. Regulatory support is required in areas like repatriation by startups, FinTech, and exit support
3. Review of data hosting & management policies and technology IP valuation support will be critical allow flexibility and growth opportunities to local IT/IT-ES firms
4. Limited digitally skilled talent is one of the most critical barriers to digital transformation
5. Collaboration among Government, Industry and Academia will be critical for digital curricula development and digital skilling of society.

1.2.3 Learnings from Global Benchmarks

Global exemplars have been studied for each change pillar and programs within each pillar. Learnings from relevant benchmarks have been distilled and their best practices, contextualized to Bangladesh, have been embedded in the design of each program in the Master Plan.

Select global benchmarks studied across 4 change pillars are as follows (non-exhaustive):

- **Smart Citizen:** Estonia (eID), Vietnam (Universal smartphone program), Australia (ICT in curriculum), India (Adhaar, FutureSkills Program, etc.)
- **Smart Government:** Estonia (e-Estonia paperless Government), Japan (Kumon learning model), India (Gov't e Marketplace, Goods & Services Tax Network, Open Network for Digital Commerce, Digital India land records management system, etc.), Australia (Digital health agency)
- **Smart Society:** UK (Interoperable payments), Nigeria (FinTech Accelerator), India (UPI), South Korea (Smart cities), Spain (Smart grid), Singapore (Media Literacy Council), Estonia (X-Road)
- **Smart Economy:** South Korea (4IR), Japan (4IR), Vietnam (High-tech manufacturing export promotion), Israel (Cybersecurity CoE, Startup ecosystem), India (Gov't cloud Meghraj, Startup India), Australia (National broadband network), Singapore (Economic Development Board)

1.3 Smart Bangladesh: ICT Master Plan 2041 – Realizing the Vision

The Smart Bangladesh: ICT Master Plan 2041, shaped by the above 3-pronged approach, will unleash 40+ mega programs to thrust Bangladesh on the journey to 2041.

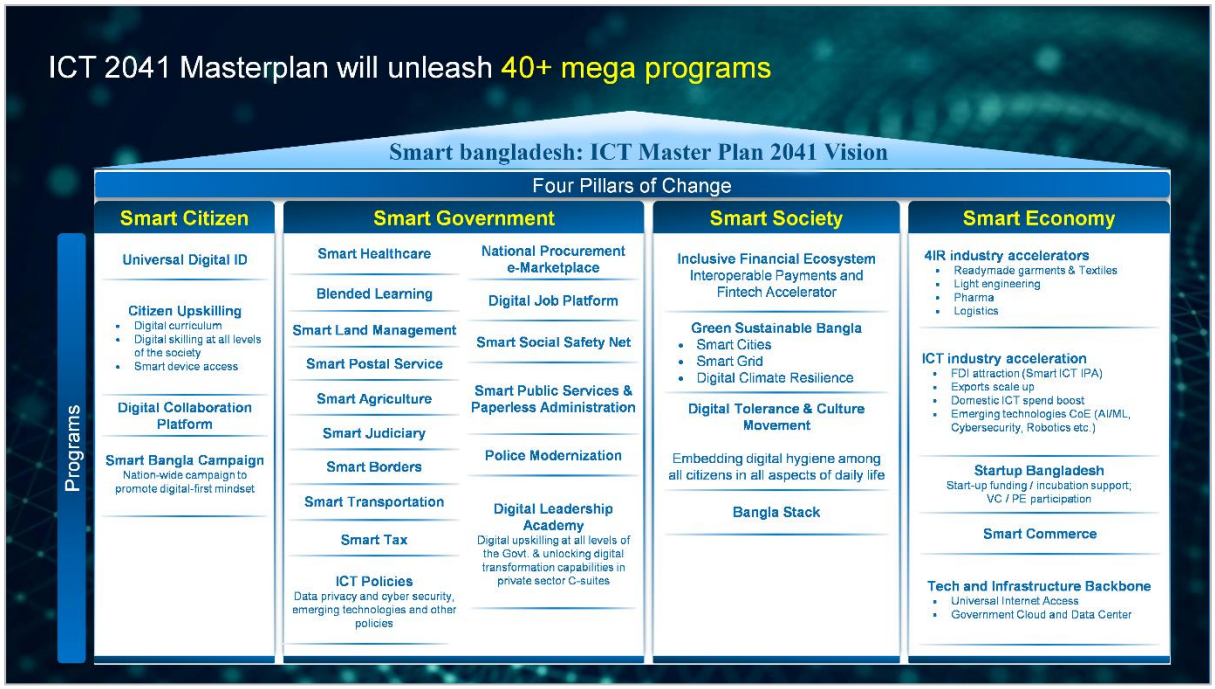


Figure 1: Programs for achieving Smart Bangladesh ICT 2041 Vision

The Master Plan will contribute to achieving Smart Bangladesh 2041 Vision through milestones identified for each program across 2025, 2031 and 2041. The program overviews have been described in Section 4 of this document and detailed deep dives for each program have been included in Appendix A. It must be kept in mind that this report is about strategic direction setting across multiple dimensions, and individual program owners will need to perform a detailed blueprinting exercise during the initiation of these programs.

1.4 Implementation and Program Governance Roadmap

Each of the 40+ mega programs will go through 4 phases of evolution, leading to the goals of 2041 – these stages are **Launch, Stabilize, Scale**, and **Excel**. Each program is important, and their sequence of launch has been designed on 3 key factors – Impact, Readiness and Control.

Three groups of programs have emerged from a time to launch perspective:

- Group 1: Immediate launch (by 2023)
- Group 2: Short to mid-term launch (between 2023-24)
- Group 3: Mid to long-term launch (post 2023-24)

Programs for immediate launch (by 2023) include Bangla Digital Skilling, ICT Policies (Data privacy & Cybersecurity, Ease of doing business), National Procurement e-Marketplace, Digital Job Platform, Smart Public Services & Paperless Administration, Inclusive Financial Ecosystem (Interoperable Payments Ecosystem), ICT Industry Acceleration (IT/IT-ES Export Promotion), Startup Bangladesh, Tech. & Infrastructure Backbone. Detailed list of all 3 groups of programs is enclosed in Section 5 of this document.

The need for a central governing body for nation-wide digital transformation has emerged as a repetitive theme from multiple consultations with Government stakeholders. With learnings from best-in-class digital units from the likes of Japan (Japan Digital Agency), Australia (DTA), and Singapore (GovTech), Bangladesh can potentially look to walk in the same direction and set up a statutory body to play the role of the nation's central governance agency for digital transformation. Each Ministry/Division may prepare own action plan for detailing of the initiatives mentioned in the Smart Bangladesh: ICT Master Plan 2041 related to the Allocation of Business of concern Ministry/Division.

2 Introduction

2.1 Background and Objectives of the Project

The dream of Father of the Nation, Bangabandhu Sheikh Mujibur Rahman, was to have a country that is free of poverty, where economic and social justice prevails, and where there is shared prosperity. Continuing from the original Digital Bangladesh Vision 2021, the Bangladesh government has adopted Vision 2041 specifically seeking to eliminate extreme poverty and reach Upper Middle-Income Country (UMIC) status by 2031, and High-Income Country (HIC) status by 2041. Creating an Innovative economy is one of the key tenets of success towards achieving the Vision 2041, focus primarily being on:

- **Digital opportunities and innovation –** (i) Developing human resources ready for the 21st century, (ii) Connecting citizens in ways most meaningful to them, (iii) Taking services to citizens' doorsteps, (iv) Making the private sector and market more productive and competitive using digital technology and (v) Leveraging digitization to increase transparency, efficiency, and effectiveness of G2C, G2B and G2G service delivery
- **Driving inclusivity & coverage -** Systematically pushing digital adoption among SMEs and in high priority industry sectors which suffer from low productivity / highly manual operations
- **Leveraging the Fourth industrial revolution** – Developing an education / skilling ecosystem that can equip people at all levels in public and private sector to make the full use of digital and 4IR technologies
- **Moving to an innovation-based economy –** Develop centers of innovation leveraging existing academic infrastructure and in partnership with global academia – to build a virtuous cycle of innovation that can enable a truly digital economy

Bangladesh has a great starting point towards achieving the ICT requirements necessary to enable vision 2041. Digital Bangladesh has set a good foundation across 4 major dimensions as described below:

- **Connecting Citizens -** 90%+ mobile penetration; 50%+ internet penetration 2,100 Gbps backbone installed with Union level connectivity, 5G planned to be launched by 2022
- **Digital Government -** Shared Infrastructure, e-Gov services, Computer Incident Response Team, NEA & Interoperability Framework
- **Human Resource Development -** Training 65,000+ professionals / students across topics in the IT industry (traditional tech, emerging tech, mid-level managers, ITes professionals)
- **ICT Industry promotion -** Policy support including tax waiver, duty reduction, etc.; Branding and promotion including the CEO Outreach Program

Bangladesh has also seen **good investment and job growth** recently, as evident from the investments done by large players like Hyundai, Samsung, Nokia, Vivo, Walton, Oppo, Symphony etc. with 21000+ employment being created in **Bangladesh Hi-Tech Park Authority** facilities. Fintech startups have also seen rapid growth in Bangladesh; for instance, bKash has been a spectacular success, and multiple other players have come up with innovative offerings in the digital payments space, including Nagad and Upay. There have been notable moves in the last decade around setting up of **a2i and Startup Bangladesh,** re-drafting of the **National ICT Policy in 2018** and the **e-Government Master Plan for Digital Bangladesh** formulated in 2019.

All these and many more initiatives have created a solid foundation for Bangladesh to build on and there are multiple indicators, which emphasize the need to attain further levels of maturity in digital and technology to be able to move from a Digital Bangladesh to a Smart Bangladesh. For example,

- The ICT sector supply side still needs to further accelerate. There is significant potential in the IT/ITes firms to scale faster than their average current numbers of 500 employees and <5M USD revenues after 20+ years of operations.
- Bangladesh needs to build credential as a center of excellence for frontier technologies, thus necessitating further large ICT players to invest in the country.
- Bangladeshi business entities and citizens have adopted digital technology to a reasonably high experience, but the untapped potential is still high. For example, Industries like Financial Services and Telecommunications have been spending comparatively less on digitalization compared to global standards.
- Research and development around smart technologies need to be emphasized upon & accelerated to address potential job losses through future industry automation by creating an innovation export based economy and re-skilling of workforce to move up the value chain of industries like RMG and textiles, light engineering etc.

Sustained progress towards achieving the vision 2041 will require a long-term structured approach towards ICT development.

2.2 Methodology for Master Plan Creation

Smart Bangladesh: ICT Master Plan 2041 has been formulated holistically keeping in view 6 key design principles -

- **Be ambitious and bold –** Aimed at taking aspirational, bold leaps versus incremental steps.
- **Be anchored in Bangladesh's 2041 vision** to become a zero poverty, high income nation.
  - Bangladesh will be a developed country by 2041, with per capita income of over USD 12,500 in today's prices, and fully in tune with the digital world
  - Poverty will become a thing of the past in Sonar Bangla
- **Take learnings from the global benchmarks** in their journey across citizen, government, and economy dimensions.
- **Be cognizant of our cultural values** and with an attempt to how digitization can uphold it continually.
- **Be grounded to reality–** being pragmatic, realistic with strong pulse check on voice of stakeholders, and having robust consultative approach.
- **Bring innovative approaches and focus on critical gaps -** recommendations should be additive to previous and ongoing efforts (avoiding duplication), focused on augmenting innovation achieved in Digital Bangladesh and boosting further.

Based on these principles, this plan has been developed over a period of 5 months following the below approach as aligned between JICA and ICT Division:

1. **Detailed study of current initiative documentation –** Major ones being e-Government Master Plan for Digital Bangladesh, latest National ICT Policy, 2018, National Perspective Plan 2041, and a long list of other documents (Appendix B)

2. **Deep engagement with government stakeholders in Bangladesh** – We engaged with government stakeholders in Bangladesh across multiple formats
    a. **Focused one on one interviews –** Topic specific interviews with 50+ stakeholders across Ministries, Divisions, Agencies etc., e.g., Ministry of Health, Ministry of Education, Ministry of Planning, Ministry of Public Administration, Ministry of Land, a2i program, BASIS, BACCO, etc.
    b. **Group consultation sessions** – A series of 9 group discussion sessions on specific topics with government stakeholders across the Ministries (Appendix C). These sessions also included business and academia stakeholders as necessary
3. **Deep engagement with business stakeholders in Bangladesh**
    a. **Focused one on one interviews –** Topic specific interviews with multiple stakeholders across businesses like start-ups, ICT companies, financial institutions
    b. **Survey with 200+ business leaders –** Widespread survey with 200+ leaders on vision, mission, and challenges of Smart Bangladesh 2041
    c. **Group consultation sessions –** Consultation sessions with leading industry persona and startup founders/owners across topics like application of 4IR in priority industries, startup ecosystem facilitation etc.
4. **9 cross-participant consultation sessions with stakeholders across Ministries, Industries, Start-ups, and Academia –** A series of long consultation sessions on vision and current challenges were held amongst senior operational experts to get an understanding and inputs based on on-ground realities.

Session	Topic	Participants
Session 1	Implementation challenges from current initiatives	• Senior representatives from MoPA, IRD, MoA, Ministry of Commerce, MoFA, a2i
Session 2	Understanding of current and planned initiatives by development partners including key learnings, challenges identified etc.	• Senior representatives from KOICA, ADB and JICA
Session 3	National e-Procurement Marketplace Digital Job Platform	• Representatives from CPTU, a2i, BCC
Session 4	Startup Bangladesh Inclusive Financial Ecosystem	• Co-founders/ CEO of Chal Dal, iFarmer, Swap.com, Shadhinbd.com • Representatives from Startup Bangladesh, BD Angels
Session 5	Bangla Stack Universal Digital ID ICT Policies	• Representatives from BNDA, Porichoy • Senior representative from ICTD
Session 6	Data and Digital Infra Backbone ICT Industry Accelerator ICT Policies	• Senior Industry representatives • Senior BASIS representative • Representative from ICTD

Session	Topic	Participants
Session 7	4IR Accelerators (RMG, Pharma, Light Engineering, Logistics)	• Senior industry representatives
Session 8	Blended Learning Talent & Skill Development (Digital skilling at all levels of society, Digital in curriculum)	• Senior Academia representatives • Representatives from ICT Division and a2i
Session 9	Smart Cities	• Senior representatives from City Corporation, Municipality of Local Govt Division, ICT Division and Department of Police

Table 1: Stakeholder consultation sessions

5. **Citizen survey –** A digital government citizen survey 2022, covered a wide range of Bangladeshi citizens (500+ citizens of Bangladesh) across different segments in terms of age, urbanity, income groups. This is a global survey conducted annually by BCG across 40+ countries and 30,000+ citizens across different demographic cuts around age, gender, urbanity, income group, occupation etc.
6. **Engagement with other Development partners –** A group consultation session was done with multiple Development partners like KOICA, USAID, UNDP, World Bank, ADB etc. to discuss their vision for Bangladesh 2041, challenges, and learnings from ongoing or past programs.
7. **Benchmarking with global best practices –** Extensive benchmarking has been carried out at initiative level drawing in experience of 100+ global topic experts. Global experts were engaged across a variety of topics like national technology stack and ID, smart government strategy, telecommunications and internet infrastructure, cyber security, Artificial Intelligence, Industry 4.0, financial inclusiveness, urban infrastructure etc.
8. **Recommendations and prioritizations –** Based on all the above inputs, recommendations have been crafted and 40+ Flagship/ Lighthouse programs have been identified and segmented into immediate, short term, mid-term and long-term time horizons based on their impact on 2025-31-41 goals, current readiness, and degree of control.

3 Overview of Study

3.1 Overview of Current State of Digitization and ICT in Bangladesh

Understanding of current state of ICT in Bangladesh was developed through a multi-pronged approach majorly consisting of study of current initiatives undertaken by Bangladesh, Citizen and Business fraternity surveys and Stakeholder interactions through one-on-one interviews, group consultations.

3.1.1 Study of Recent Initiatives Undertaken by Bangladesh

Detailed study of existing documentation and stakeholder interviews were carried out to understand the current landscape of the different initiatives undertaken by Bangladesh till now. Below is a broad overview of the initiatives carried out by Bangladesh.

Topic	Marquee initiatives studied	Tangible value delivered	Emerging areas of concern
Digital Government	• a2i – Think tank set up to accelerate digitalization of government institutions • e-Government Master Plan for Digital Bangladesh with 7000+ services digitalization – 2000+ completed • Sector wise e-governance plans for health care, education, agriculture etc. • Programs like DSDL to enable other Ministries and Agencies to achieve digitalization	• 400 e-services delivered via myGov portal • 40 rank leaps in UN E-Government Index • 2000+ public services digitalized	• Quality of services and end to end online service availability remain a concern • Different standards being followed across Ministries • Lack of interoperability and integration of service delivery
ICT industry	• 29 Hi-tech and soft-ware parks planned, 6+ already set up • Policies geared to attract investments (e.g., tax exemptions, export revenue discounts, 100% repatriation of capital and dividend, etc.) • MoUs and investments by	• Global technology majors invested / considering entry • Emerging technology CoE agreements/MoUs done with IBM, Oracle • $1.5 B local ICT spend	• Much faster growth needed to reach targets set for 2025 (e.g., $5Bn export, $5Bn domestic spend etc.) • Lack of scale in manufacturing of semiconductors and devices

Topic	Marquee initiatives studied	Tangible value delivered	Emerging areas of concern
	multiple organizations like Oracle, Tech Mahindra, Samsung, Huawei, Nokia etc. • Startup ecosystem development through initiatives like “Startup Bangladesh”, iDEA etc.	• Market specific strategies set for targeting countries like US, Middle East etc. for FDI and export	• Yet to firm up on cyber policies, emerging technology policies • Global perception of brand Digital Bangladesh
Connecting citizen	• info-Sarker: National infra backbone to establish country wide Broadband connectivity • Over 82k educational institutions equipped with multi-media classrooms • 4,500+ UDCs launched for last mile digital services delivery • Set up of Tier 4 National Data Center and preliminary cloud services	• Amongst the highest 4G accessibility in South Asia with >90% population coverage • 6x increase in mobile internet penetration over 10 years; 54% mobile penetration • 278 digital services across 112 types delivered at last mile UDCs	• Low smart phone penetration • Lack of awareness around available services and benefits from digital • Cloud first mindset yet to be seeded • Device affordability continues to be a concern
Talent Development	• Multiple training programs like mid management ICT training under LICT, programs by BASIS, BCC, Sheikh Russell training labs etc. • Teacher Portal to build digital capacity of teachers Top-up IT training program, IT/ITES foundation skills program, Mid-management training program, Industry association skills training program • Ambitious programs like SHIFT • Initiation of planning of new education curriculum	• 65k+ IT/ITES trained graduates as of 2018 • 1.8L teachers trained on multimedia content development • 6,000 trained on ICT troubleshooting • 1,000 trained on advanced ICT	• Universities still focused on non-STEM courses; Computer Science study not mandated • Training and re-skilling efforts disjointed and quality assurance low • Large gig workforce still not organized and properly enabled

Table 2: Overview of initiatives undertaken by Bangladesh

3.1.2 On-ground Feedback Through Surveys

There were 2 sets of surveys with businesses and citizens which were carried out along with a whole set of consultation sessions & one-on-one interviews. Inputs from these engagements formed one of the key bases for the Master Plan. Below are some of the key findings from these different channels

Findings from Citizen Survey

The citizen survey consisted of a sample set of 500+ citizens with even distribution across different segments of age, urbanity, profession, and income levels. Some of the key findings from the survey are as below:

1. **Bangladeshis are more frequent users of digital govt. services, but a critical mass is less satisfied with experience**
    a. Over 70% Bangladeshis used digital government services at least once a week
    b. Most frequent users (students and rural citizens) are least satisfied (18% and 33% respectively)
2. **Only 35% users experienced end-to-end online process, compared to over 70% in developed nations**
    a. >70% users experiencing E2E govt process through digital channels in digital champion economies viz-a-viz 35% in Bangladesh
3. **~70% users keen on AI-driven personalized experiences while accessing digital government services**
    a. >70% users comfortable with AI based personalization basis what is already known about them or can be obtained with consent
4. **Laptops and tablets will lead adoption of smart devices in 2 years, but affordability will be a barrier**
    a. ~30% more users than today expect to use laptops/tablets in 2 years
    b. ~Only 50% low-income (<$3k) users expect to be able to afford

Findings from Business Survey

200 business leaders were surveyed distributed across MNCs, Conglomerates, priority industries like Ready-made garment, pharmaceuticals, ICT industry, Startups, Small and Medium enterprises, Telecomm, Financial services etc. Some key themes emerged as priorities and across the board, perception seen is that maturity of nationwide digital transformation initiatives is between low to medium across most dimensions. Some key snippets are as below

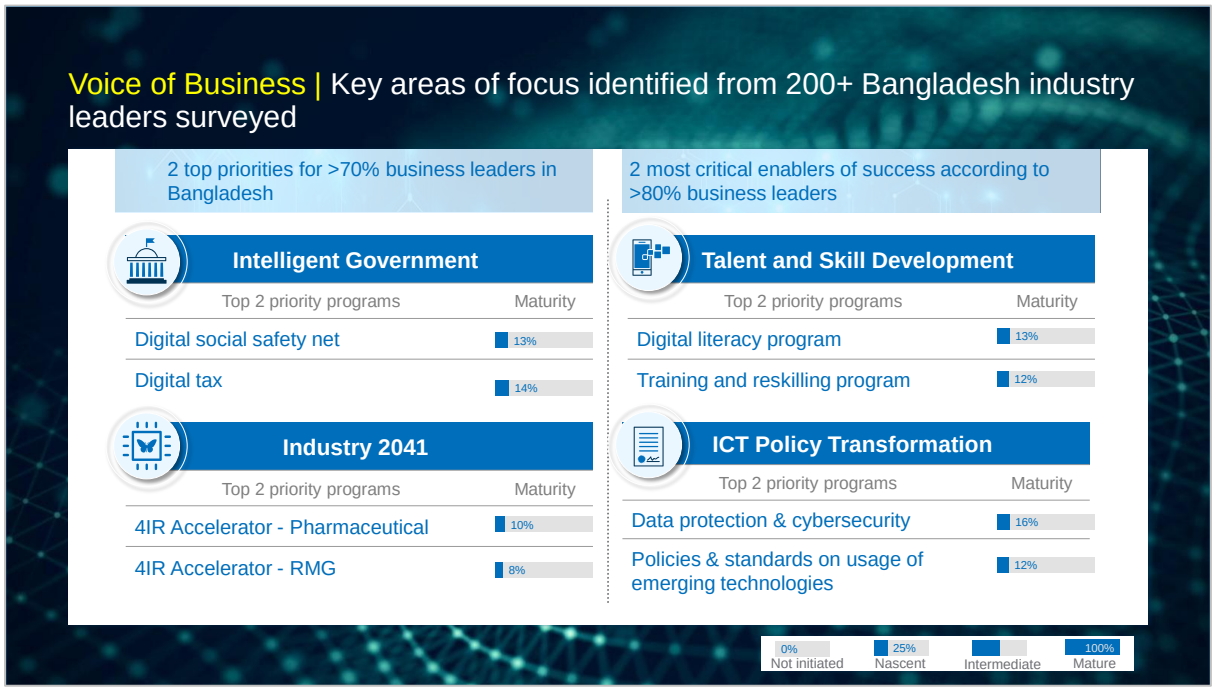


Figure 2: Feedback from business leaders

3.1.3 Key Emerging Themes Through Stakeholder Interactions

Multiple themes emerged through the stakeholder interactions - one on one interviews and consultation sessions. A non-exhaustive list of the same is provided below across 4 key dimensions of Transformation governance, Policies and investments, Technology and Skilling & talent development.

Dimensions	Key themes and concerns
Transformation governance	It will be critical to have a nation-wide digital awareness program
	Creation of a common governing taskforce is going to be the most critical success factor for Master Plan execution.
	After launch, necessary to integrate Master Plans into cross-ministerial agenda
	Agile way of working in public sector departments is a necessary need of the hour.
	Alliance with partners and vendor governance need to be centrally managed.
	Departments need help with definition of "What Success looks like".
Investments and policies	Critical to ensure citizen data safety and cyber security as digitalization scales
	Regulatory frameworks need to be updated quickly to enable new technologies
	Regulatory support needed by startups for fund repatriation, FinTech regulations, exit support

Dimensions	Key themes and concerns
	Technology IP valuation support and protection polices need to be in place
	Data hosting polices to be reviewed and revised to allow more flexibility
	Massive investment in public service digitalization but E2E high quality experience missing
Technology	Guidelines on development standards and methodologies, infrastructure utmost necessary
	Integrated service delivery architecture connected to BNDA critical, standardization across Ministries critical
	Interoperability and fungibility of data critical for success of large-scale projects
	Need to emphasize on low-cost smartphones and data
	Sanity and quality of underlying registration data, ID date etc. not sufficient to run advanced use cases Scalability of infrastructure to host large scale solutions is limited
Skilling and talent development	Universities have not been able to embed emerging tech in curriculum and Academia digital upskilling is a key concern
	Limited demographic dividend window is a key factor to be kept in mind while planning for upskilling
	There is lack of a unified version of skills competency framework
	Quality control and outcome orientation of current skilling programs need to be elevated further
	Special emphasis needs to be put on digital ethics and online behavior within digital or training curriculum
	Definition of "outcomes" in outcome-oriented curriculum need to be standardized

Table 3: Emerging themes through stakeholder interactions

3.2 Vision and Mission of Smart Bangladesh: ICT Master Plan 2041

The Perspective Plan 2041 of Bangladesh is underpinned by 2 principal visions in the National Perspective Plan 2021-2041

- Bangladesh will be a developed country by 2041, with per capita income of over USD 12,500 in today's prices, and fully in tune with the digital world
- Poverty will become a thing of the past in **Sonar Bangla**

There are multiple other ambitious objectives embedded in the Perspective Plan, a non-exhaustive summary of which is as below. These objectives form the foundation for arriving at a vision for the Smart Bangladesh 2041.

Figure 3: Summary of Bangladesh's Vision 2041

To achieve these objectives, the vision for Smart Bangladesh 2041 will need to be anchored in 4 key aspects - **Smart Citizens, Smart Government, Smart Society and Smart Economy**

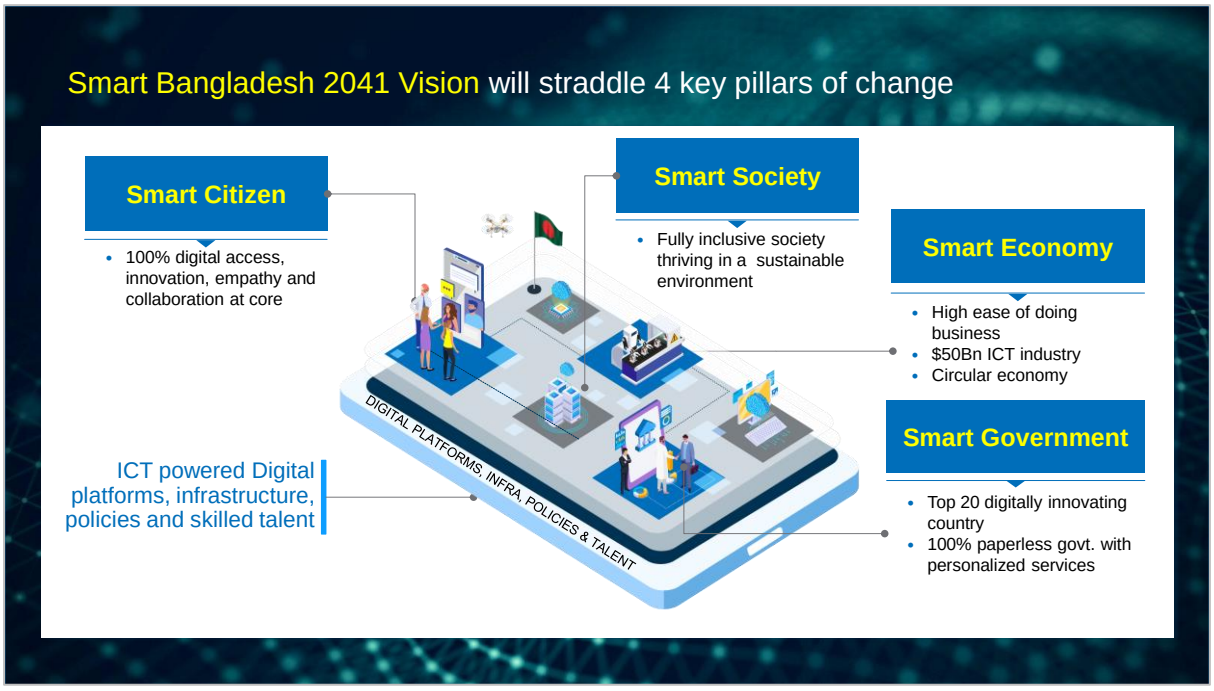


Figure 4: Four key pillars to achieving Vision 2041

Fulfilling these objectives will change the lives fundamentally across citizens, businesses, society, and government. For example, digital technology will have varied implications across the daily lifestyle of different persona of citizens, businesses society, and government as depicted below:

Citizens:

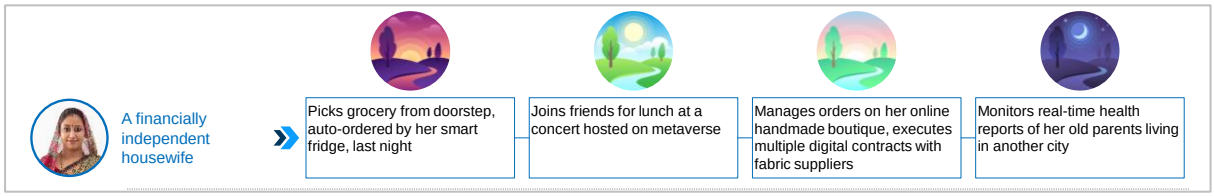


Figure 5: Day in the life of an independent housewife in Smart Bangladesh

Businesses:

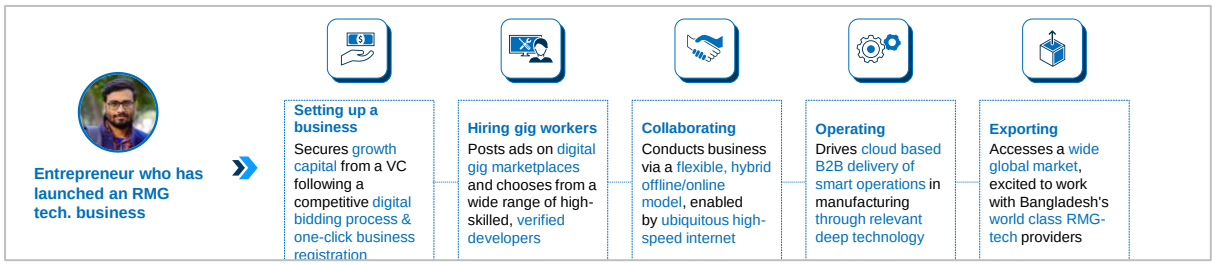


Figure 6: Day in the life of an entrepreneur in Smart Bangladesh

Society:

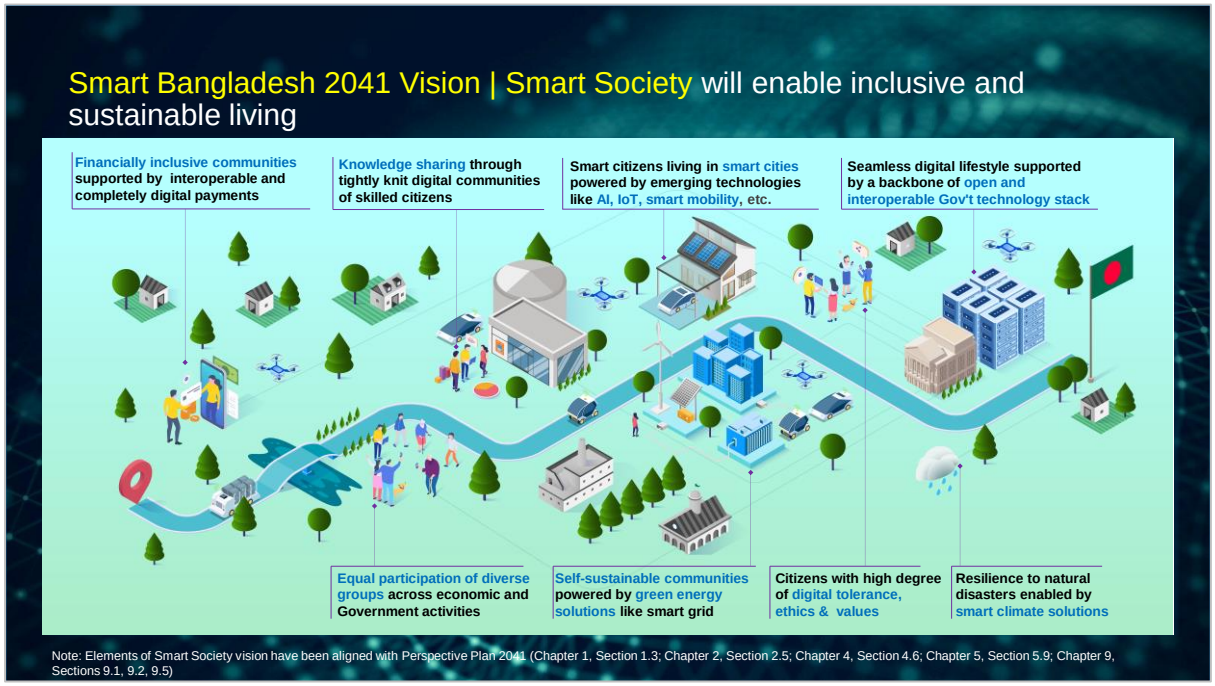


Figure 7: Day in the journey of a Smart Society

Government:

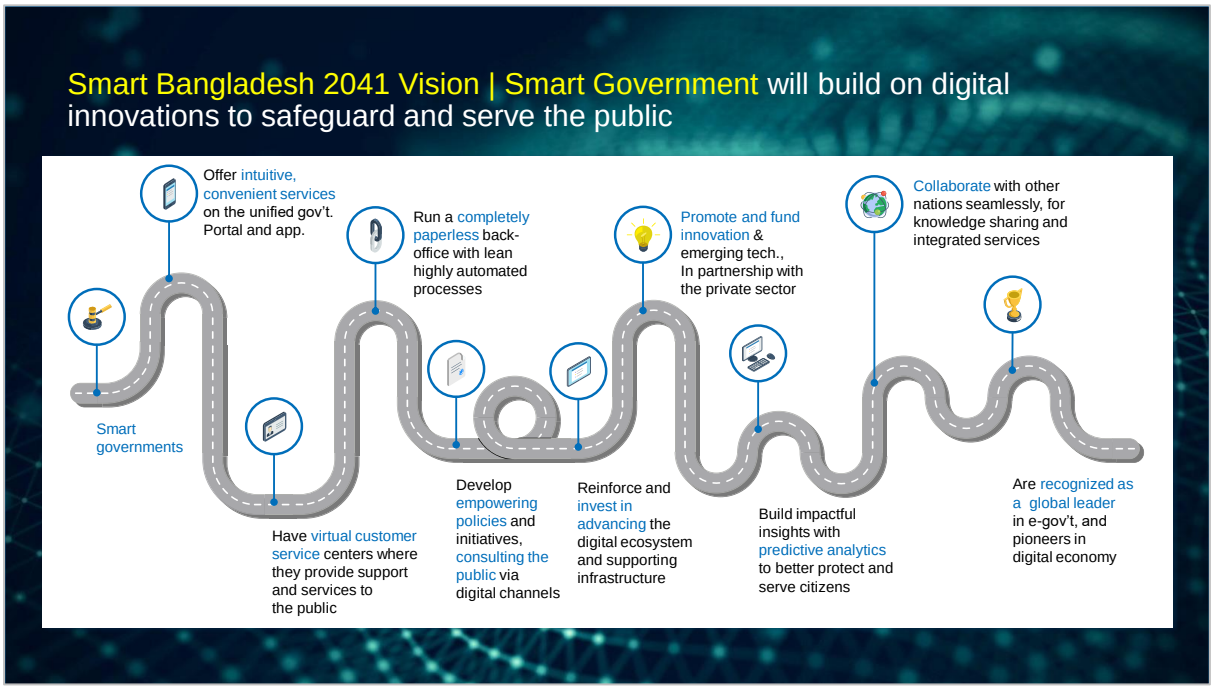


Figure 8: Day in the journey of a Smart Government

3.3 Benchmarks and Best-in-Class Practices

Benchmarking has been done across a variety of peer set to bring out best in class practices across the globe. Below is a non-exhaustive set of benchmark countries that has considered across the 4 different aspects of Smart Bangladesh. Deep dives and benchmarks for each topic have been included in Section 4 and Appendix A of this document.

Figure 9: International benchmarks across change pillars

Below are some key highlights from some of the benchmarks that has been considered:

Smart Citizens	
Estonia 	**Estonia eID** - Digital ID streamlines access to e-commerce, banking, govt services etc. **People's Assembly policy crowdsourcing** - Crowdsourcing process allowing the Estonian people to make recommendations and deliberate on democratic reform and policy change
Australia 	**Digital transformation agency (DTA)** – Central Governance body for national citizen centric digitalization agenda **ICT focused primary and secondary curriculum** – 10 years of awareness and usage training embedded in education
Vietnam 	**Universal smartphone program** - Program launched in 2020 aiming to achieve 100% smartphone penetration
Singapore 	**Skills Future Singapore** - defines sectoral skills framework, national open skilling portal SG Digital Campaign – Optimism centered campaign with target groups like Hawkers Go Digital, Seniors Go Digital
India 	**Aadhaar** - world's most advanced biometric authentication ID **NASSCOM Future Skills Prime** - Accelerated industry-led skilling for 10 emerging and futuristic technologies for citizens
Smart Government	
Estonia 	**Tiger Leap digital infra program -** Tiger Leap program was set up in the '90s to leverage modern digital technology in learning, teaching and research **e-Estonia paperless govt.** - 99% of state services can be accessed online with the goals of reducing bureaucracy, increasing transparency, and boosting growth
Japan 	**Kumon learning model -** Out-of-school Math and English tuition method for blended learning **Public-Private Partnership Program -** Jointly established by the Cabinet Office, Ministry of Internal Affairs and Communications, Ministry of Economy, Trade and Industry, and Ministry of Land, Infrastructure, Transport and Tourism with more than 900 member organizations such as Local Governments, private companies, universities, and research institutes.
India 	**Digital India land records management system -** Computerization of Land Records & Strengthening of Revenue Administration **Goods and Services Tax Network (GSTN) -** Single interface between the government and taxpayers

	Government e-marketplace – National e-procurement marketplace **ONDC (Open Network for Digital Commerce)** – National framework for E-commerce
Australia 	**Digital health agency -** Agency driving an accessible and connected healthcare system through patient and clinician-facing digital tools
Smart Society	
United Kingdom 	**Consolidated interoperable payment -** Consolidated all interoperable payment schemes (P2M, P2P, A2M, G2B, B2B, etc.) into single operator – Pay.UK **Established FinTech bridges** with 5 countries, offering access to networks, referrals to streamline regulatory approval, discounted soft landing pads, grants, etc.
India 	**Built unified payments infrastructure (UPI)** over the digital identity layer to boost P2P/P2M payments
South Korea 	**Smart cities -** Built a special smart city sub-committee, leveraging domain experts
Spain 	**Basque country's smart grid project -** The scope of the project was to modernize the grid through a variety of digital channels
Estonia 	**X-road –** Data exchange platform for interoperable citizen and society services
Smart Economy	
South Korea 	**4IR policy and initiatives -** Variety of institutes and committees established to drive robotics, AI, and 4IR tech
Vietnam 	**Hi-tech manufacture export promotion -** Successfully pivoted into higher skilled, electronics manufacture and export **Vietnam's proactive positioning as an Asian technology hub** attracted investments from global technology giants
Japan 	**Global Collaboration and focus sector 4IR strategies -** METI 'Connected Industries' initiative promotes R&D and venture acceleration in key sectors and 4IR technologies **Loans for Enhancing Corporate Vitality -** ~$3 Mn loan to SMEs planning IT-related investments to cope with changes in business environment

Israel 	**Cybersecurity CoE -** Legacy of adverse geopolitical conditions leading to forced Government to invest heavily in defense **Startup ecosystem** - Govt. Incubator programs to support innovation & support business development
India 	**Government cloud Meghraj -** consists of a set of discrete cloud computing environments spread across multiple locations **Startup India** - launched by the Govt of India in 2016 to help with handholding, fundings and incentives and incubation
Australia 	**National Broadband network -** established a new company, National Broadband Network (NBN Co Ltd,) in April 2009 to build a wholesale network for 100% of the population
Singapore 	**EDB Singapore's investment promotion agency -** spearheaded economic growth since 1960s

Table 4: International benchmarks across each change pillar

3.4 ICT Master Plan 2041 Programs

Based on the on-ground feedback, the benchmarks and current ambitions & progress, a comprehensive set of initiatives have been laid out which constitute the holistic ICT Master Plan 2041.

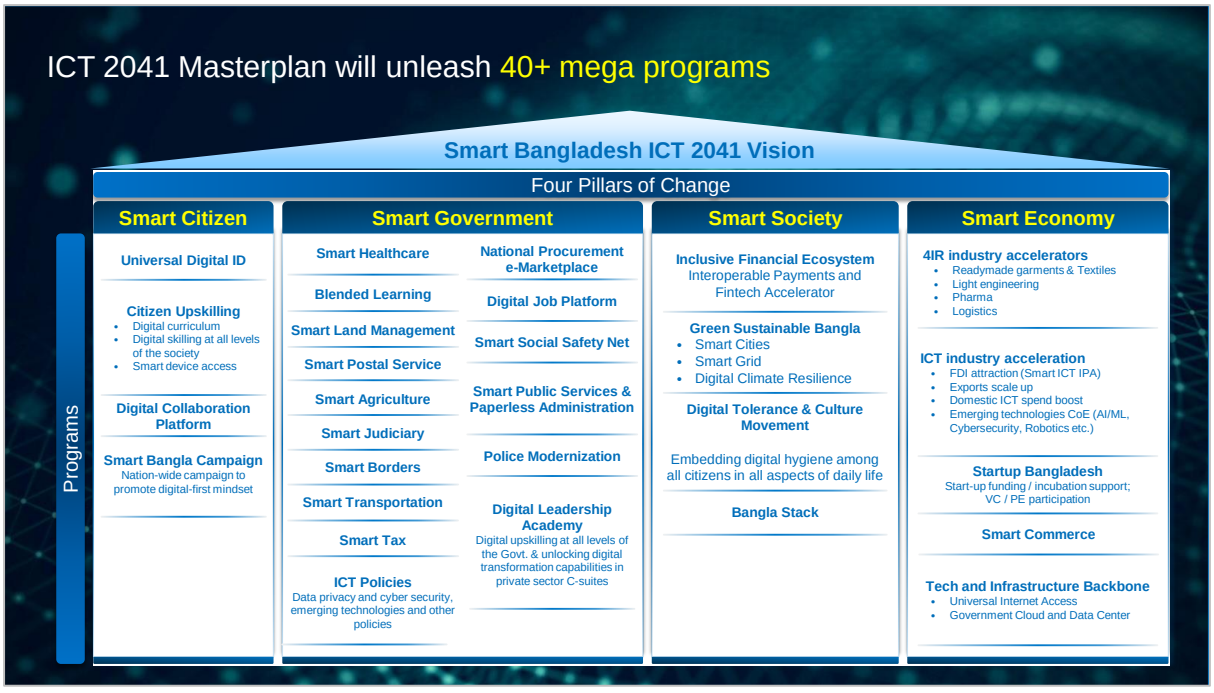


Figure 10: Programs for achieving Smart Bangladesh: ICT Master Plan 2041 Vision

These program overviews have been described in Section 4 of this document and detailed deep dives for each program have been included in Appendix A.

Overview of the target state which can be potentially achieved through these programs

Across all the 4 change pillars mentioned in Figure 10, Smart Bangladesh vision can be reached through some target states which are as below.

Smart Citizens

- Invisible government services through universal digital ID
- Bionic citizens co-existing with AI powered frontier technology platforms

Smart Government

- Completely paperless administration
- Invisible Gov't services built on hyper-personalization platforms
- >95% citizen satisfaction with services

Smart Society

- 100% cashless economy
- Equal participation across diverse groups in economic and government activities
- Tightly knit communities enabling a knowledge-sharing centric society
- 100% tolerant, collaborative, and empathetic digital culture

Smart Economy

- A primarily circular economy
- $50Bn ICT economy
- 50+ Unicorn startups
- Bangladesh as hub of industry specific technology export (e.g., exporting specific RMG tech solutions to rest of the world)

There is a multi-year journey to all these targets and Bangladesh will need to achieve short term, mid-term, and long-term goals across the 4 change pillars for reaching the vision of Smart Bangladesh 2041.

Change Pillar	2025	2031	2041
Smart Citizens	• >80% citizens accessing digital skilling programs across the society • >30% citizens with universal digital ID • Active citizen contribution to service creation	• >95% digital literacy amongst citizens • >80% citizens with universal digital ID • Citizens co-creating policies and innovating citizen services	• Invisible government services through universal digital ID • Bionic citizens co-existing with AI powered frontier technology platforms
Smart Government	• Paperless office across priority departments • Priority public service smartification improvement programs in place • 500+ services on Gov't technology stack	• First wave of public service smartification completed • AI embedded in Government's ways of working • >80% services being delivered through common interoperable technology stack • >80% citizen satisfaction score	• Completely paperless administration • Invisible Gov't services built on hyper-personalization platforms • >95% citizen satisfaction with services
Smart Society	• Systematic inclusion drives in place and being implemented • Digital culture and tolerance build programs underway • "Born digital" city pilot	• 100% accessible digital platform for credit and payments • Energy efficient smart cities • AI powered digital social safety net • Predictive and pre-emptive climate resilience	• 100% cashless economy • Equal participation across diverse groups in economic and government activities • Tightly knit communities enabling a knowledge-sharing centric society • 100% tolerant, collaborative, and empathetic digital culture

Change Pillar	2025	2031	2041
Smart Economy	• $5Bn ICT economy • 5 Unicorn startups • 4IR enabled priority Industry operations • Deep capability builds across technologies like AI/ML, Cyber Security, Microprocessor Design, Robotics	• $20Bn ICT economy • 15-20 Unicorn startups • Bangladesh becoming hub for 4IR driven product innovation (e.g., nanotechnology driven innovation in RMG) • Scaled CoEs on priority frontier technologies	• A primarily circular economy • $50Bn ICT economy • 50+ Unicorn startups • Bangladesh as hub of industry specific technology export (e.g., exporting specific RMG tech solutions to rest of the world)

Table 5: Smart Bangladesh Vision 2041 Objectives

There will be multiple of the programs which will have a cumulative effect to help Bangladesh achieve these objectives and in Section 3 of this document, the 2025, 2031 and 2041 objectives for each of the programs have been detailed. However, further detailed blueprinting of these programs before they start getting implemented, will enable the Government of Bangladesh to come up with specific metrics.

3.5 Program Implementation Roadmap Overview

All the programs are going to be long term mega initiatives, which shall go through 4 different phases of evolution.

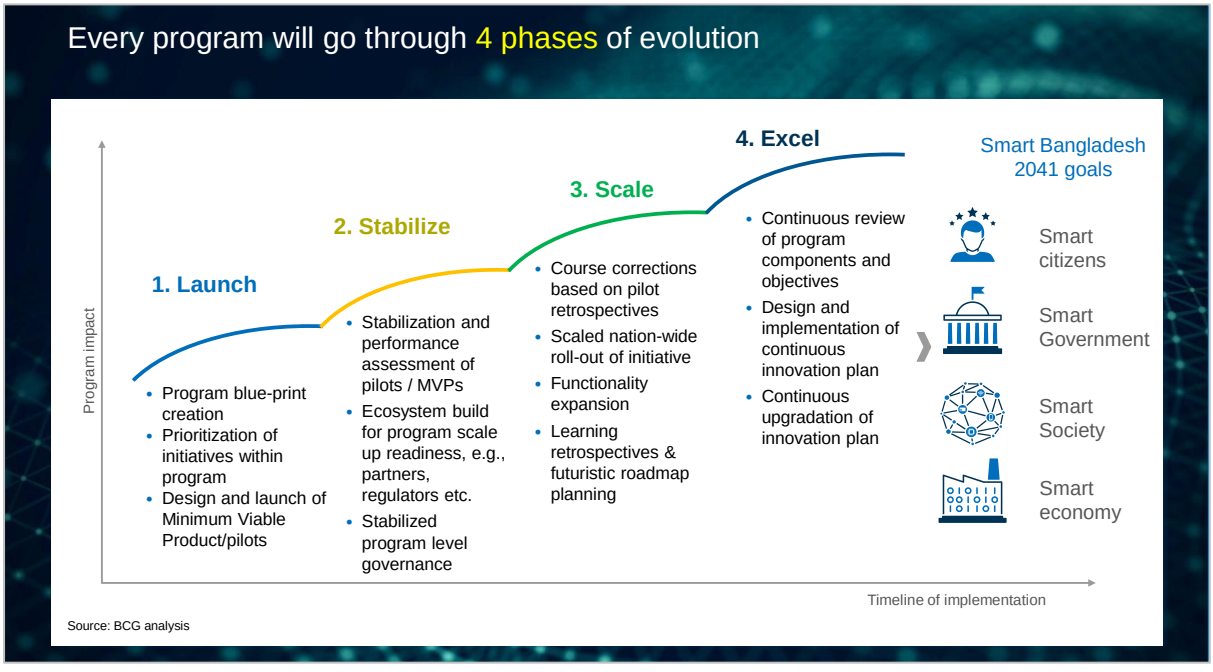


Figure 11: Evolution phases for each program

To achieve the phase wise goals as explained in Table 5, there are a set of programs which should “launch” immediately, while there are a few which will launch in the short to mid-term (between mid-2023 to 2025) & a few which will launch slightly later than mid-term (post 2023-24). However, the duration required for “Stabilize” and “Scale” will be different for different programs. The high level and indicative timeline view for each of the programs is given in Section 4 of this document.

The below guiding principles have been followed for the Master Plan implementation roadmap design

1. **Every program is important:** Each program helps to achieve one or more goals of Smart Bangladesh 2041; hence, no specific guard-rail-based prioritization
2. **Capacity constraints currently not considered:** Programs spread across multiple divisions / agencies
3. **Sequence of “launch” to be based on 3 key factors:**
    I. **Impact:**
        - GDP / Exchequer savings impact: Impact on national GDP or national exchequer savings
        - Societal impact: Benefits accrued to all levels of the society
        - Enablement impact: Extent to which the program is a key enabler of other programs
        - Speed to impact: Speed to delivery of values aligned to key Smart Bangladesh objectives

    II. **Readiness:**
        - Starting point: Maturity of existing initiatives or planning to be built on
        - Funding: Ease or availability of funding for the program, e.g., through initiatives like EDGE

    III. **Control:**
        - Degree of control of ICT Division on the program

Based on the above guiding principles, the initiatives have been categorized into the following 3 segments

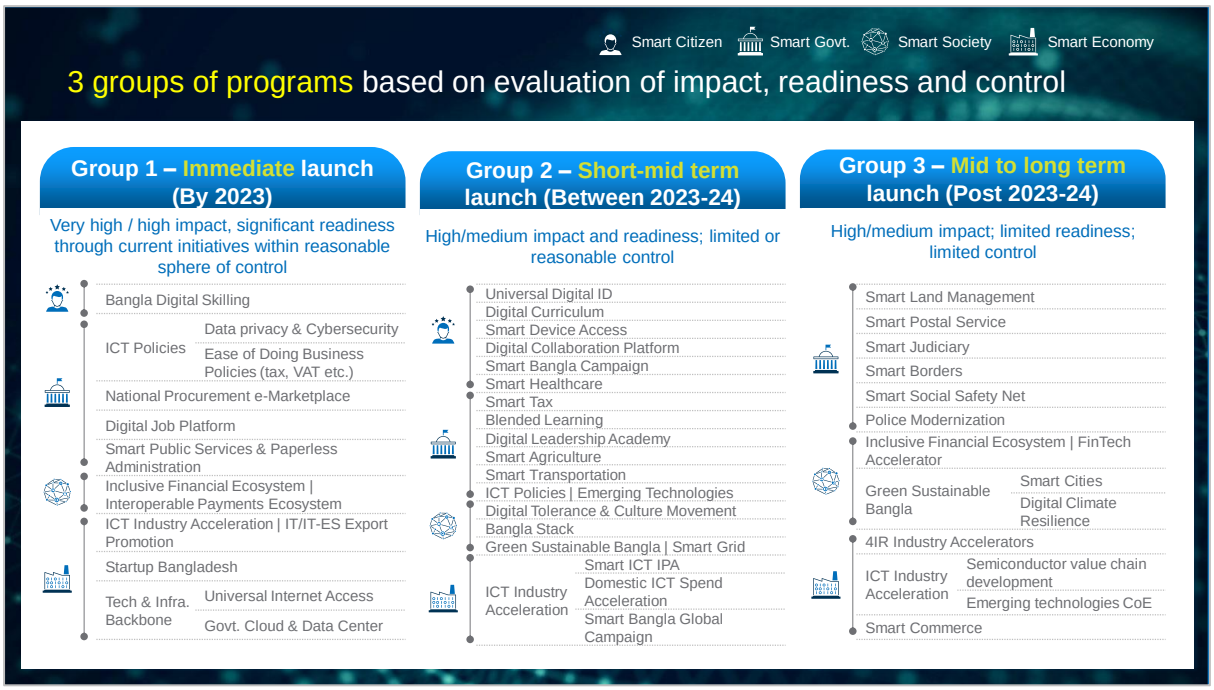


Figure 12: Grouping of programs based on time to launch

3.6 Program Governance Considerations

Absence of a central governing body for digital transformation have been highlighted repeatedly as one of the key concerns by multiple stakeholders. Bangladesh should adopt a central governance agency driven management of this holistic transformation. The Digital Security Act (DSA) can potentially be the law under which a statutory body can be appointed to play the role of the central governance agency. Multiple countries have adopted this approach and Bangladesh can take inspiration from the likes of Japan, Australia and Singapore.

Description	Japan – Japan Digital agency	Australia – DTA	Singapore – GovTech
Statutory body under which Ministry	Minister of Digital	Minister for Government Services	Minister of Communications and Information
Led by	CEO	CEO	CEO
Board of Directors	Yes	Yes	Yes
Type	Statutory Board (central)	Executive Agency (central)	Statutory Board (central)
FTEs	Recently started	500+	2000+

Description	Japan – Japan Digital agency	Australia – DTA	Singapore – GovTech
Key role	• Digital & ICT strategy • Digital awareness • Standards and guidelines definition • Shared platforms delivery • Digital skills and capabilities • Further evolving since this is at a nascent stage	• Digital & ICT strategy • Architecture • Standards and guidelines definition • Investment management • Procurement • Shared platforms delivery • Digital skills and capabilities	• Digital & ICT strategy • Cyber strategy • Architecture • Standards and guidelines definition • Investment management • Procurement • Shared platforms delivery • Data and analytics capability • Digital skills and capabilities

Table 6: Program Governance Considerations

Further details on central governance can be found in Section 5 of this document, however, they should, in general, play roles which include but are not limited to the below

- Facilitate implementation of smart Government by various Ministries and State Governments
- Provide consultancy services to government organizations for the smart transformation
- Develop maturity assessments and indices, strategies and roadmaps for central governments, local governments, specific sectors, and organizations as well as providing implementation support for strategies and roadmaps
- Provide strategic leadership on whole-of-government and shared ICT and smart digital services, including sourcing and capability development
- Set the over-arching direction for the use of data and digital and smart technologies in the public sector
- Develop technology frameworks and architecture, own implementation of technological solutions related to interoperability
- Provide technical project management, requirement analysis, gap analysis, project management, vendor management, technology management, UAT services etc. related to implementation of digital solutions for smart government implementations

4 Program Recommendations

This section provides an overview of all programs recommended in the framework above. Further detailed deep dive (current state, challenges, vision, benchmarks, initiatives, charter) on each of the programs can be found in Appendix A

4.1 Smart Citizen

The Smart Citizen Pillar consists of 4 key programs around Universal Digital ID, Citizen up-skilling, Digital Collaboration Platforms and Smart Bangla Campaign.

4.1.1 Universal Digital ID

Context: A universal digital ID will enable powerful use-cases across multiple aspects of the Bangladeshi's life. As per benchmarks, Bangladesh can aspire to target economic value impact of up to 6% of GDP by 2030 through implementation of a universal digital ID. Unique digital ID will be fundamental to important strategic objectives like social safety net, financial inclusiveness, revenue collection etc.

Current state: Bangladesh has a robust National Smart ID system in place, with over 70% of the population being identified through it. The NID system is used to identify users in the delivery of multiple public services like driving license, passport application, property land transactions, opening and transacting on bank accounts, marriage registration, utility connections, mobile connections, health cards, etc.

Learnings from other countries: Bangladesh can draw significant learnings from digital identity systems of Estonia, Singapore, and India.

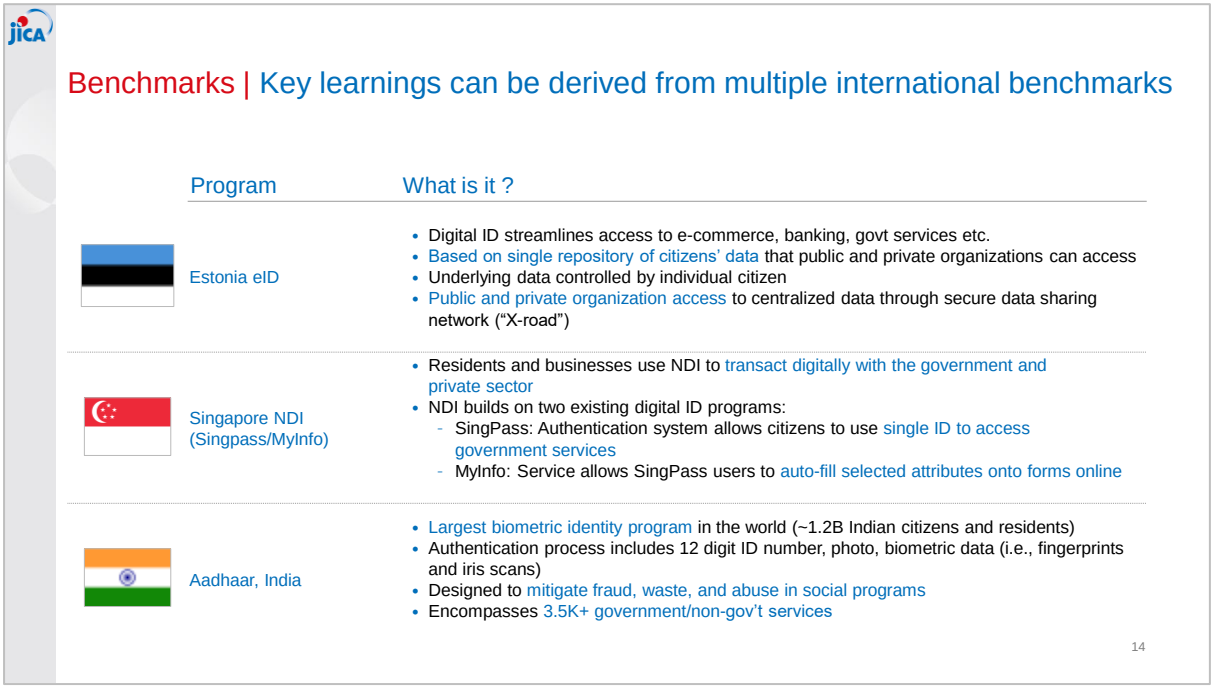


Figure 13: International benchmarks on Universal digital ID

Initiatives to be undertaken by Bangladesh:

Program objectives:		
To create a single source of truth for all citizens through a unified foundational digital identity		
Program targets		
2025	2031	2041
• Stabilized national digital ID in place • >30% Digital ID adoption	• >80% Digital ID adoption • 3-6% of GDP value impact	• 100% Digital ID adoption • >10% of GDP value impact through national digital ID adoption
Program components	**Objectives**	
Program design and governance	• Initial design and strategy of digital ID program • Set up of Digital ID governing body and operating model to drive ongoing enrolments and adoption • Ensure proper regulation of digital identity network with respect to security, adherence to norms, personal data protection, usage of digital signature, etc.	
Enrolment track	• Integrate Digital ID into National ID streamlining enrollment and increased levels of assurance	
Data and platforms track	• Implementation of MOSIP through MoU with best practice Institutes (like IIT Bangalore or others) to create an underlying platform enabling interoperability in registrations and enrolment, efficient capture & storage of data	
Service Provider track	• Open service provider market to competition in a way that maximizes Digital ID's value	
Program execution/ ownership		
Lead Agency	• ICT Division	
Implementing body	• TBD	
Program contributors	• Bangladesh Bureau of Statistics • All line Ministries with registration databases	
High level implementation timeline:		
• **Launch:** 6 months • **Stabilize:** 18 months • **Scale:** 4-5 years		

Table 7: Implementation overview for Universal Digital ID

Potential challenges for Bangladesh: Like most economies that have adopted unique digital identities, there are 3 challenges Bangladesh can potentially face in this journey:

1. Involves reinventing the wheel due to limited potential of leveraging existing identity systems through backward integration

2. High upfront costs of developing the basic digital infrastructure
3. Vendor lock-in results in reduced flexibility if the ID is built on proprietary technology

Philippines, Ethiopia, and Sri Lanka identified these threats early in their journeys and adopted a brownfield approach. They adopted an open platform like Modular Open-Source Identity Platform (MOSIP) that helped them address these challenges by introducing flexibility through a modular structure.

4.1.2 Citizen Upskilling

4.1.2.1 Bangla Digital Skilling – Digital Skilling Across All Levels of the Society

Context: The Prospective Plan 2021-2041 outlines a 3-pronged strategy to shape Bangladesh into an innovation economy:

1. Software innovation & service digitization
2. Fusion of labor advantage with high-tech innovation
3. Leveraging 4IR for competitiveness and low carbon economy.

Execution of these strategies will be driven by digitally ready citizens. Digital skills are a critical enabler to shape digitally ready citizens. A nation-wide coordinated digital skilling program is imperative to embed digital skills at all levels of the society.

Current state: The Government has unleashed multiple skilling initiatives. Some of the lighthouse projects are as follows:

1. **National Skills Portal** is a nation-wide skilling project by NSDA, spanning all sectors
2. **NiSE** is a skilling and job matchmaking platform for the youth and migrant workers
3. **ACMP 4.0, BD Skills Platform, Hire and Train Model** were skilling initiatives launched under LICT targeted at IT/IT-ES professionals spanning career levels

Additionally, most Government organizations and industry associations in the ICT sector drive their own skilling programs. Some are topic-focused (e.g., DSA drives training programs on areas like cybersecurity), while bodies like BCC and BASIS offer trainings on a broad range of topics. Interventions are a mix of regular programs and episodic trainings.

Challenges: As Bangladesh re-imagines its digital skilling imperative, 6 challenges must be addressed, both on the demand and supply sides.

Demand side challenges:

1. Disjointed efforts from multiple organizations
2. Overlaps in target segments and courses leading to potential redundancy
3. Programs are largely centralized in Dhaka with limited accessibility to other divisions
4. Lack of effectiveness/impact measurement mechanism

Supply side challenges:

1. Limited participation in paid trainings, especially driven by similar courses being offered by adjacent organizations
2. Low awareness among digitally passive segments on digital skilling initiatives and their benefits (This will be addressed by Smart Bangla Campaign)

With the demographic window projected to end by 2040, Bangladesh should act fast to achieve critical mass of digitally skilled citizens well before 2041.

Learnings from other countries India and Singapore have orchestrated best-in-class G2B2C digital skilling programs. Bangladesh can draw significant learnings from their journeys:

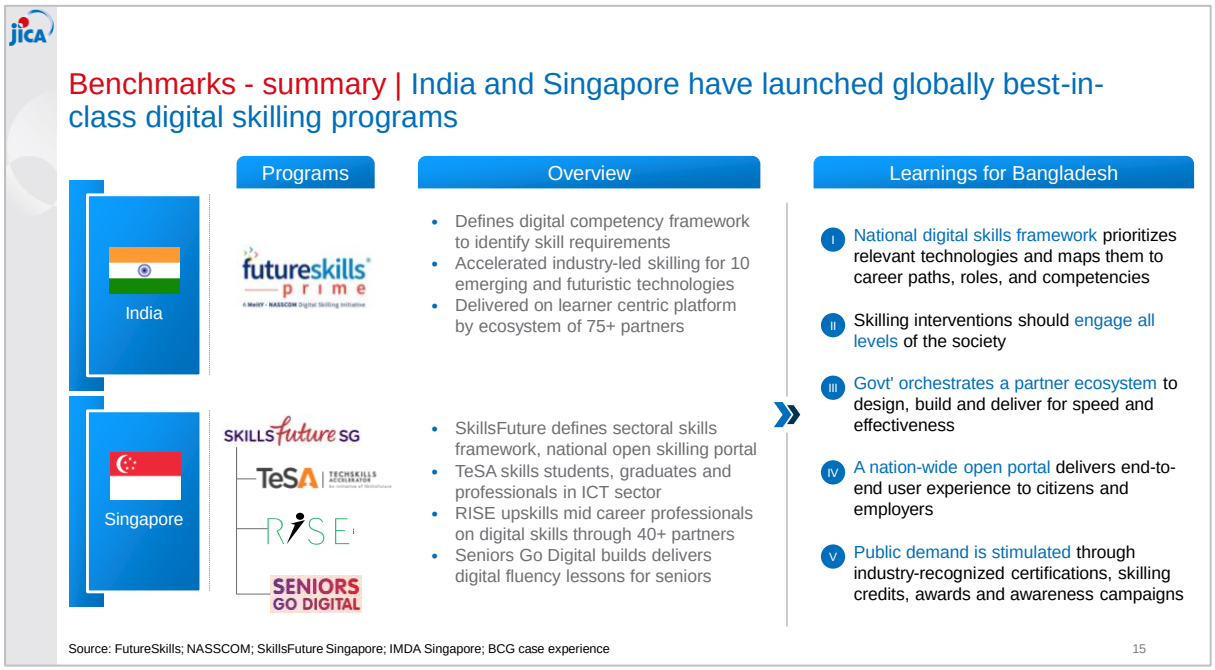


Figure 14: Digital Skilling international benchmarks

Bangla Digital Skilling Program: Needs for digital skilling differ across different levels of the society. There are 4 mega-segments that the program should target, and these segments should be further split into sub-segments with common needs and aspirations. Digital skilling needs and aspirations should be met through customized digital skilling pathways.

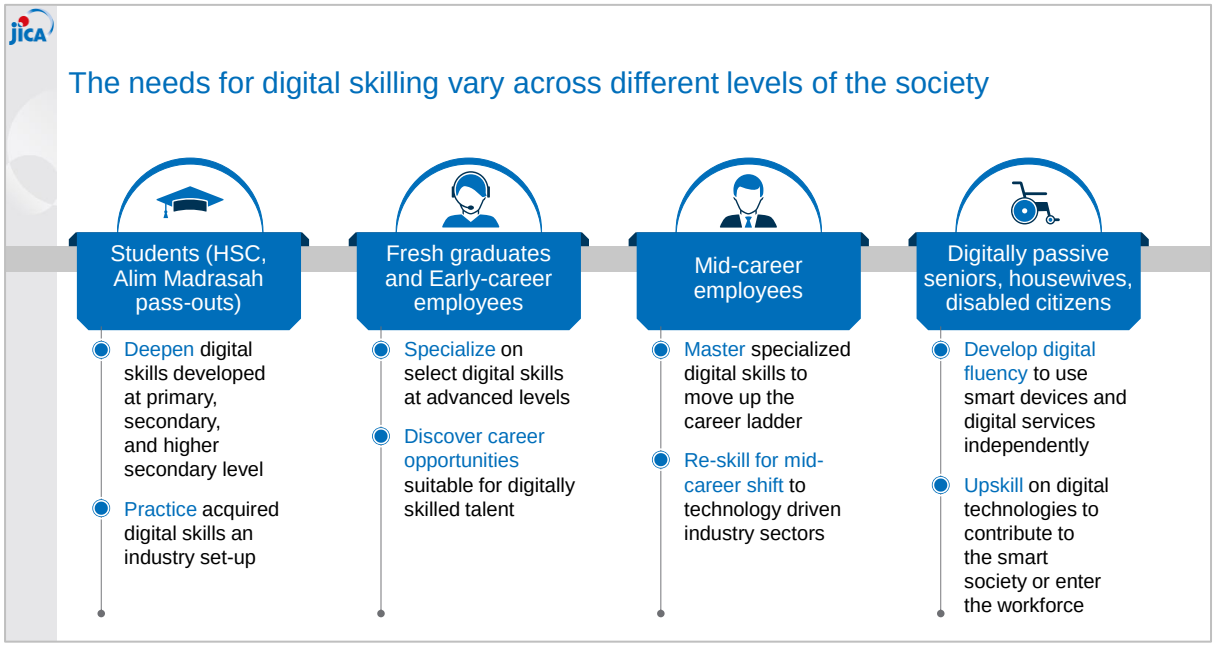


Figure 15: Four mega-segments that Bangla Digital Skilling program will target

Initiatives to be undertaken by Bangladesh:

Program objectives:		
Digital skilling across all levels of the society		
Program targets		
2025	2031	2041
• All sections of the society accessing digital skilling programs and technology led jobs on a unified portal	• A society that is skilled to use and innovate smart solutions	• A society empowered to live in and shape an innovation economy powered by future waves of frontier technologies

Program components	**Objectives**
Bangla Digital Skills Framework	• Prioritization of digital technologies and mapping them with career tracks, job roles, and competencies
Skills Intervention Portfolio	• Design portfolio of skilling interventions including regular programs like diploma, training programs, and 360-degree courses on digital fluency, digital upskilling, and reskilling
Delivery channels	• Design a mix of delivery channels optimized for target segment and type of skilling intervention (e.g., blended modes, community training channels, etc.)
Demand drivers	• Stimulate public demand through career advisory services, skilling credits, Gov't & industry recognized badges & certificates and awareness campaigns
Bangla Digital Skilling Portal	• Unified online portal and mobile application for end-to end digital user experience of all platform participants
Partner ecosystem	• Orchestrate an ecosystem of partners archetypes for speedy and effective delivery and develop a mechanism for supply-side partner evaluation and monitoring
Program execution/ ownership	
Lead Agency	• ICT Division
Implementing body	• Bangladesh Computer Council
Program contributors	• NSDA • a2i/CC • TVET • SHIFT • BASIS, BACCO, BCS, e-CAB • Ministry of Labor and Employment • Academia • ISPAB

High level implementation timeline:
• **Launch:** 12 months • **Stabilize:** 18 months • **Scale:** 2-3 years

Table 8: Implementation overview for Citizen Upskilling program

4.1.2.2 Digital Curriculum

Context: Digital literacy underpins all key elements of Bangladesh's Vision 2041, from becoming a digital society to driving tech-led industrialization to developing an innovation economy based on 21st century human resources. However, the country lags peers in terms of digital skills, including middle-income countries such as Kenya and India[1]. This results in inadequately educated workforce for the tech jobs of the future and an insufficient pipeline of tech grads to support Bangladesh's tech-led industrialization ambitions.

A broad portfolio of digital literacy, skills, and competencies must hence be developed starting from an early age across sectors and levels of society – from ensuring all citizens are equipped with the basic skills required to use smart devices and computers, to developing a subset of digital innovators.

Progress: Bangladesh has already defined many of the key skills that will be required for the economy and jobs of the future and has an established base of computer science higher education:

- Initial skilling strategy put in place to develop the workforce of Bangladesh's digital revolution, including general skills such as data visualization and machine learning, and applied skills such as robotics engineering and cyber security
- Range of BSc. and MSc. courses offered in Computer Science and Engineering in leading universities – e.g., Shahjalal University of Science and Technology, BUET
- University Grant Commission issued a general guideline to all 159 universities to update the syllabus of CSE/IT related departments, following the syllabus of Information Technology Engineers Exam, national exam mutually accredited in 9 Asian countries.

A new curriculum has already been designed, which includes digital literacy as a foundational skill, alongside Literacy and Numeracy, whilst both broadening and deepening the study of digital technology for Secondary level students via key skills including:

- ICT skills readiness – e.g., problem solving, creative thinking/ innovation
- Digital solution creation – e.g., computational thinking, design thinking

Challenges: Digital education must be tailored to the specific challenges and context of Bangladesh, such as incomplete school attendance, gender gap in access to technology, and lack of digital skills in educators.

Learnings from other countries: Bangladesh can draw inspiration and learnings from international peers including Australia, Kenya, Rwanda, and Japan.

1 WEF Global Competitiveness Index: digital skills among population score

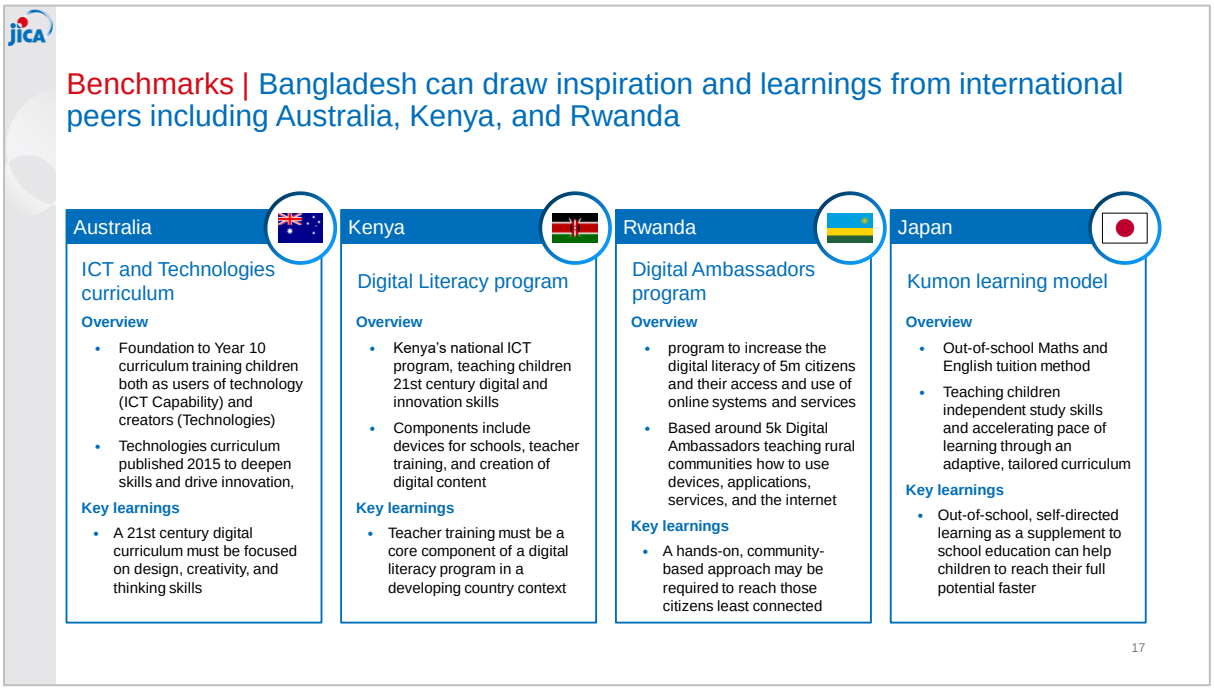


Figure 16: International benchmarks on digital curriculum

Digital curriculum across levels: Different digital skills will be required at different educational levels, ensuring all citizens have a common baseline literacy, with opportunities to go deeper and specialize further as students advance:

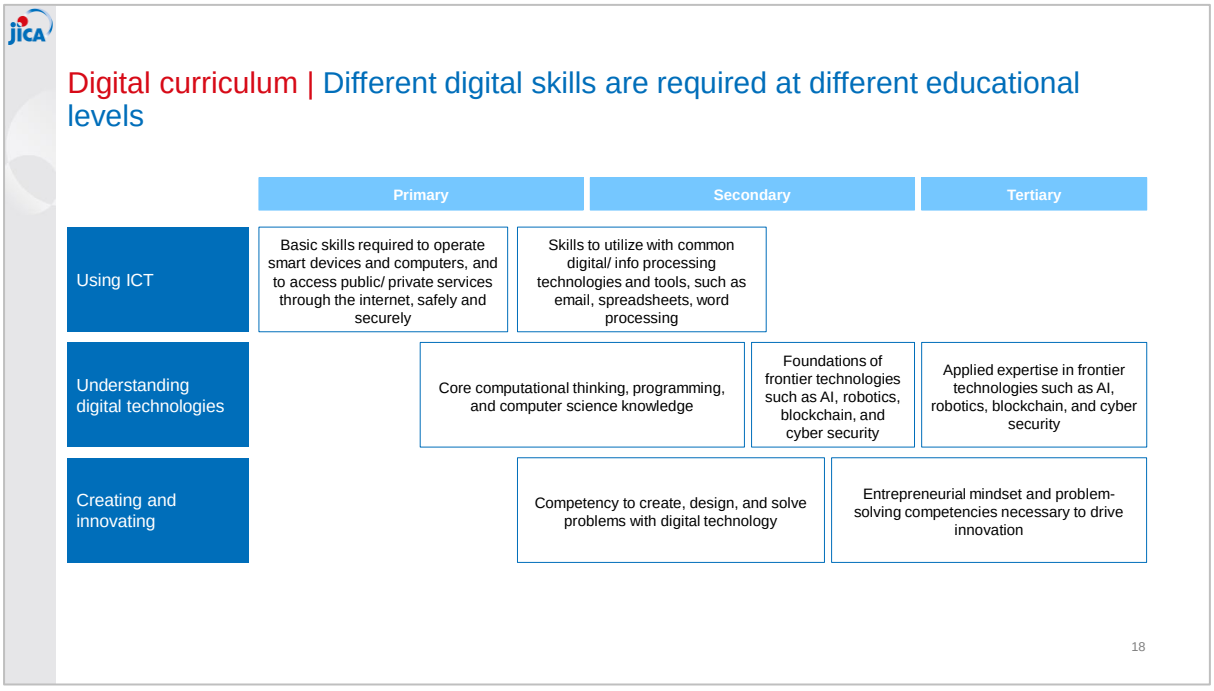


Figure 17: Digital skills across levels of education system

Initiatives to be undertaken by Bangladesh:

Bangladesh's curriculum across tiers must prepare a funnel of citizens, workers, and innovators equipped for a digital society and economy.

Program objectives:		
Creating an advanced, holistic digital curriculum - in and out of school - preparing the digital citizens, academia, workers, and innovators of the future		
Program targets		
2025	2031	2041
• 100% of primary and secondary age children with access to digital literacy education • World-class digital curriculum with approval of domestic and international educators and businesses	• 100% of primary & secondary children pursuing outside-of-the classroom digital learning • All teachers trained in digital technology	• Sufficient ICT-trained graduates per year • 2x top 30 globally ranked university for computer science

Program components	Objectives
Digital literacy in primary education	• Ensuring all citizens are equipped with basic skills required to use smart devices and computers, and to access public/ private services through the internet, safely and securely
Digital skills in secondary education	• Preparing all students to thrive in future digital workplaces across sectors, with some gaining the foundational advanced tech skills required for university-level education
Frontier tech in tertiary education	• Building a large tech-sector workforce with core computer science and programming knowledge as well as depth of applied expertise in frontier technologies
Innovation mindset in education	• Develop a nation of citizens and workers with the entrepreneurial mindset and problem-solving competencies necessary to drive innovation
Education outside of the classroom	• Accelerate digital skills acquisition amongst primary and secondary level students, and drive a culture of self-directed learning in digital education
Inclusion in digital literacy	• Ensuring digital education is available to all children regardless of gender, income level, or location, to broaden opportunity and fully leverage the nation's resources
Equipped educators	• Creating a large teaching workforce capable of effective digital education with the appropriate digital skills and knowledge, and digital-specific teaching methods/ practices
Program execution/ ownership	
Lead Agency	• Ministry of Education • Ministry of Primary and Mass Education
Implementing body	• Ministry of Education • Ministry of Primary and Mass Education

Program contributors	• Academia • Education sector • Private sector • ICT Division • NGOs
High level implementation timeline:	
• **Launch:** 12 months • **Stabilize:** 2 years • **Scale:** 7-8 years	

Table 9: Implementation overview for Digital Curriculum Program

4.1.2.3 Smart Device Access

Context: Widespread access to smart devices such as smart phones, laptops, and tablets will be fundamental to achieving Bangladesh's Digital Vision 2041. Usage of smart devices is expected to grow rapidly over the coming years. However, levels are low today and smart device mix is weighted towards lower tech devices. For example, less than half of mobile users in Bangladesh have smart phones and amongst smart phones, the majority are only 2G or 3G. Adoption of more advanced and versatile devices such as laptops and tablets is lower still.

Challenges: There are a range of barriers to achieving 100% smart device access in Bangladesh - from affordability to feasibility – and to address these challenges, the country must work to lower the cost of ownership, increase demand amongst citizens, and increase inclusivity of access:

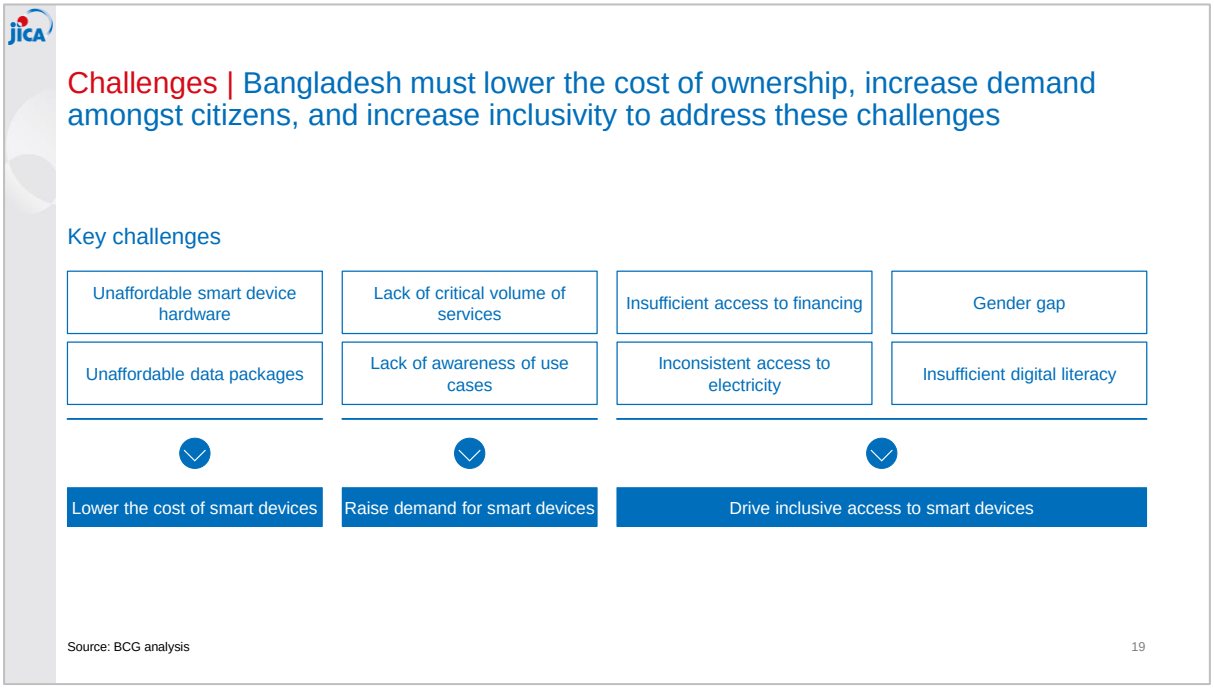


Figure 18: Key barriers preventing wider smart device access and required actions

Progress: Bangladesh is taking considerable action to ensure countrywide connectivity, with a wide-ranging infrastructure Program that will act to lower the running cost of smart devices indirectly due to free or cheaper internet access.

Additionally, programs to drive wider availability and quality of digital public services will increase the value of smart devices to citizens, as a critical mass of applications is reached. However, there remains scope for an integrated smart device access Program that directly targets the barriers to broad adoption by citizens, such as through making hardware affordable, increasing citizen awareness of use cases, and ensuring financing is available.

Learnings from other countries: Bangladesh can draw inspiration and learnings from international peers including Vietnam, Côte d'Ivoire, and the UK.

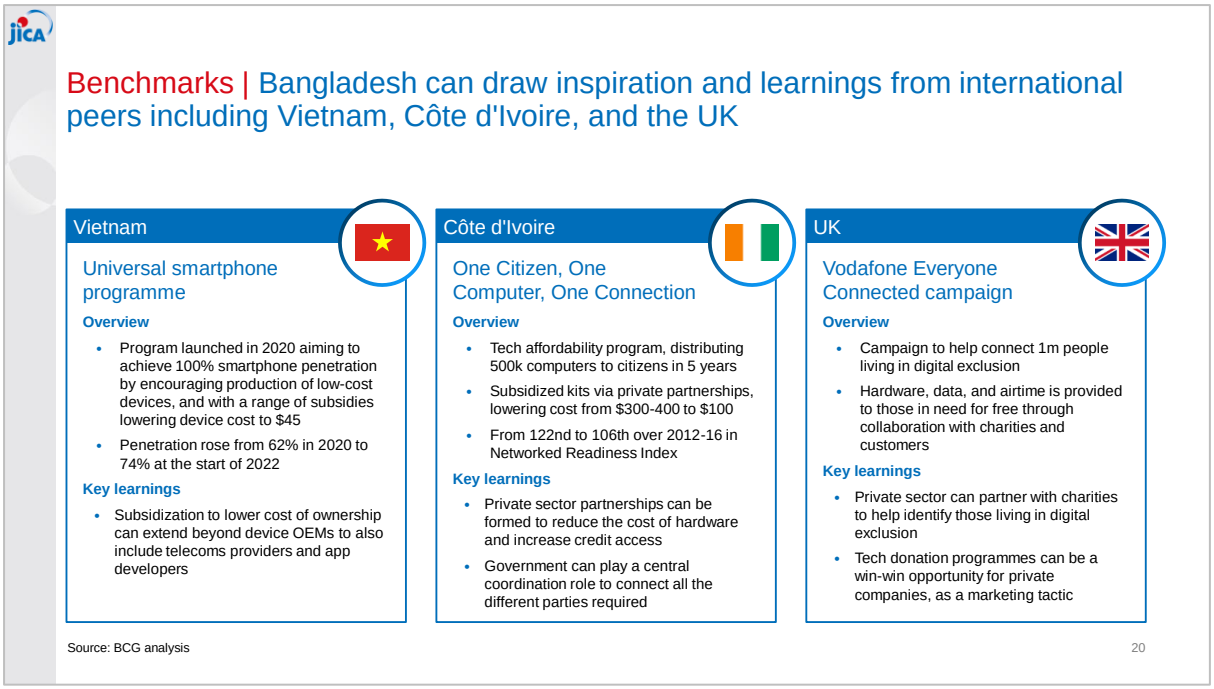


Figure 19: International benchmarks on smart device access

Initiatives to be undertaken by Bangladesh:

An integrated smart device access Program can be deployed by the government to catalyze and facilitate widespread adoption.

Program objectives:		
Driving widespread, affordable, inclusive access to smart devices such as smart phone, laptops, and tablets		
Program targets		
2025	2031	2041
• All initiatives designed and launched	• 100% of citizens with a 4G+ smart phone • Zero gender gap in access to smart devices	• 100% of citizens with access to multiple hi-tech smart devices

Program components	Objectives
Starter tech access kits	• Partnering with tech and telco providers to make entry level smart device and data packages available at low cost
Laptop and tablet lending	• Establishing a smart device library scheme for students and other citizens to borrow tech for periods of time
Awareness campaign	• Raising awareness of the different current and future use cases and benefits of smart devices
Content partnerships	• Partnering with entertainment content providers such as Spotify and Netflix to offer discounted access
Smart device financing	• Working with retail banks and microfinance providers to offer device financing at lower rates and lenient eligibility
Gender gap taskforce	• Creating an internal taskforce to ensure inclusion of women across smart device access initiatives
Program execution/ ownership	
Lead Agency	• Ministry of Posts, Telecommunications & IT
Implementing body	• ICT Division
Program contributors	• BCC • Private sectors
High level implementation timeline:	
• **Launch:** 12 months • **Stabilize:** 3-4 years • **Scale:** 4-5 years	

Table 10: Implementation overview for Smart Device Access program

4.1.3 Digital Collaboration Platforms

Context: Building citizen-citizen and government-citizen connections is part of Bangladesh's Vision 2041, to stimulate innovation and improve governance, with ambitions including:

- Connecting citizens in the ways most meaningful to them
- Citizen-centric civil administration
- Democratization and decentralization

As internet and smart device access increases, digital technology can be applied to achieve these goals through digital collaboration platforms

Current progress: Bangladesh has already put in place a number of one-way citizen-to-government feedback initiatives to drive decentralization and collaboration across society, including 'Ask Your Question' e-services such as ‘Ask Your Finance Minister’ and ‘Ministry of Labor and Employment complaints’, and a ‘Central e-Participation Portal’ enabling civil proposals, policy discussion, and corruption reporting. There is also a Grievance Redressal system which has been launched.

Collaboration platforms: Bangladesh must launch a variety of platforms to catalyze connection, collaboration, and innovation - tailored to specific use cases:

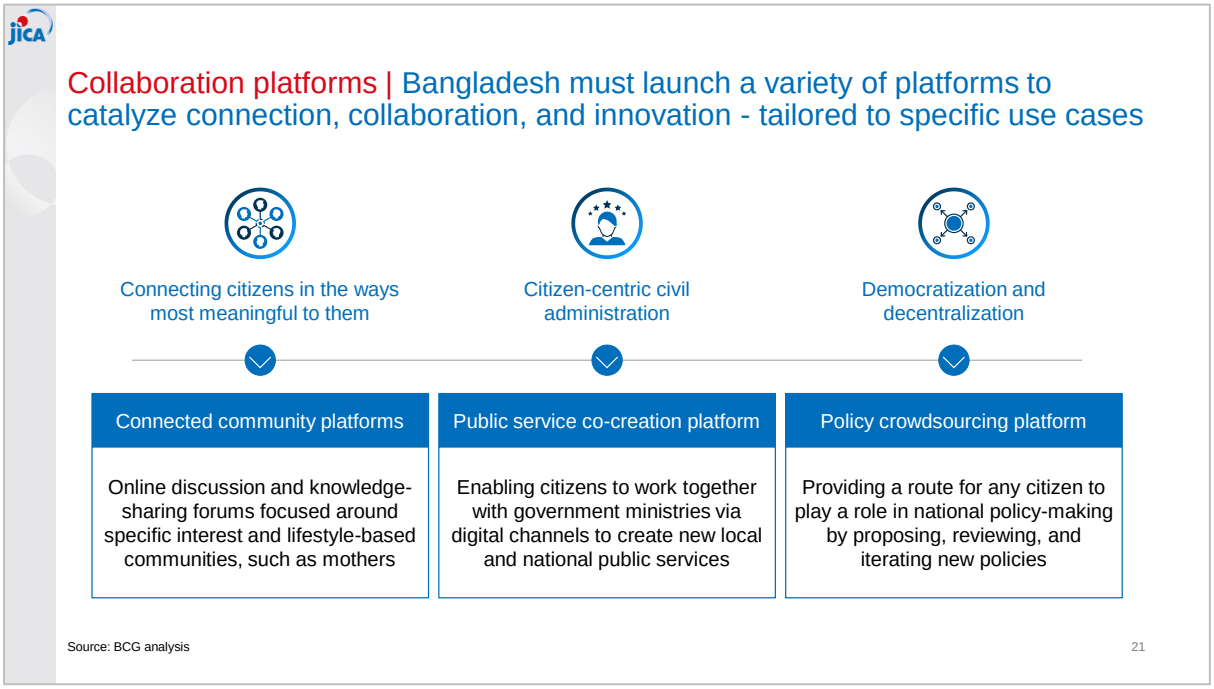


Figure 20: Proposed collaboration platforms for Bangladesh

Learnings from other countries: Bangladesh can draw inspiration and learnings from international peers including UK, Sweden, and Estonia:

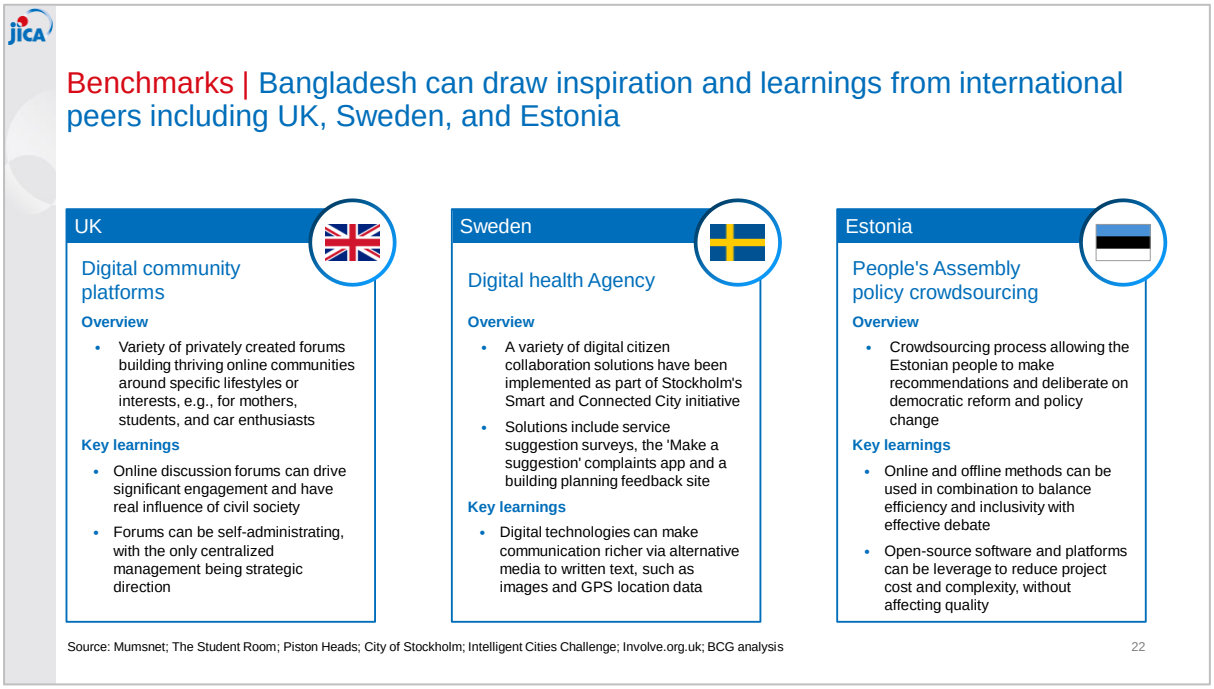


Figure 21: International benchmarks on digital collaboration platforms

Initiatives to be undertaken by Bangladesh:

To launch these platforms, Bangladesh must implement a program of five components, including build and enablement of platforms.

Program objectives:		
Driving participatory democracy and decentralization of administration via online discussion and collaboration platforms		
Program targets		
2025	2031	2041
• Active and diverse participation, with multiple public services launched annually	• 10x active community platforms with 0.5m+ active users each • Active and diverse participation, with multiple policies implemented annually	• 30x active community platforms with 1m+ active users each

Program components	**Objectives**
Connected community platforms	• Increasing knowledge-sharing and well-being of citizens through participation in existing and new online communities, via themed digital discussion platforms/ forums
Public service co-creation platform	• Involving citizens in the creation of public services to drive innovation and ensure citizen-centricity of administration, via a digital government-citizen collaboration platform
Policy crowdsourcing platform	• Involving citizens in the policy-making process to drive democratization and decentralization, via a digital citizen-to-government idea crowdsourcing platform
Crowdsourcing taskforce	• Ensuring ideas generated through the 'public service co-creation' and 'policy crowdsourcing' platforms are implemented by relevant government bodies, via a cross-ministry working group
Adoption campaigns	• Driving awareness and adoption of Bangladesh' various new digital collaboration platforms via a range of public communications campaigns targeted to specific platforms and audiences
Program execution/ ownership	
Lead Agency	• Ministry of Posts, Telecommunications & ICT
Implementing body	• ICT Division
Program contributors	• Local Government Division • BCC, a2i • Think tanks/ civil society

High level implementation timeline:
• **Launch:** 6 months • **Stabilize:** 1 year • **Scale:** 3-4 years

Table 11: Implementation overview for Digital Collaboration Platforms

4.1.4 Smart Bangla Campaign

Context: Digital Bangladesh movement has laid strong foundations for Vision 2041. One of the key pillars of Digital Bangladesh has been 'Connecting Citizens', where Bangladesh has made strong progress in providing access to digital technologies through national projects like info-Sarker, Union Digital Centers, etc. However, to realize Vision 2041, Bangladesh needs to create digitally ready citizens who are empowered with more than just digital access and digital skills. They are driven by digital-first mindset to use digital technologies to benefit of their lives and contribute to the society. Bangladesh needs a decade-long national campaign to seed digital-first mindset among all citizens in all aspects of day-to-day life.

Challenges: Bangladesh leads its peer nations in providing digital access to citizens through widespread device and internet penetration, but it lags peers in terms of share of population using the internet. This usage gap is majorly driven by barriers like lack of awareness and perceived utility of the internet, cultural reasons, lack of permission, and perceived security concerns. A mind-mapping workshop with JICA UDFs revealed that these barriers are deeper among senior citizens, rural residents, and non-working women.

Learnings from Singapore: Singapore's SG Digital Campaign is an example of a nation-wide campaign approach to driving adoption of digital technologies among the most digitally excluded segments of the society

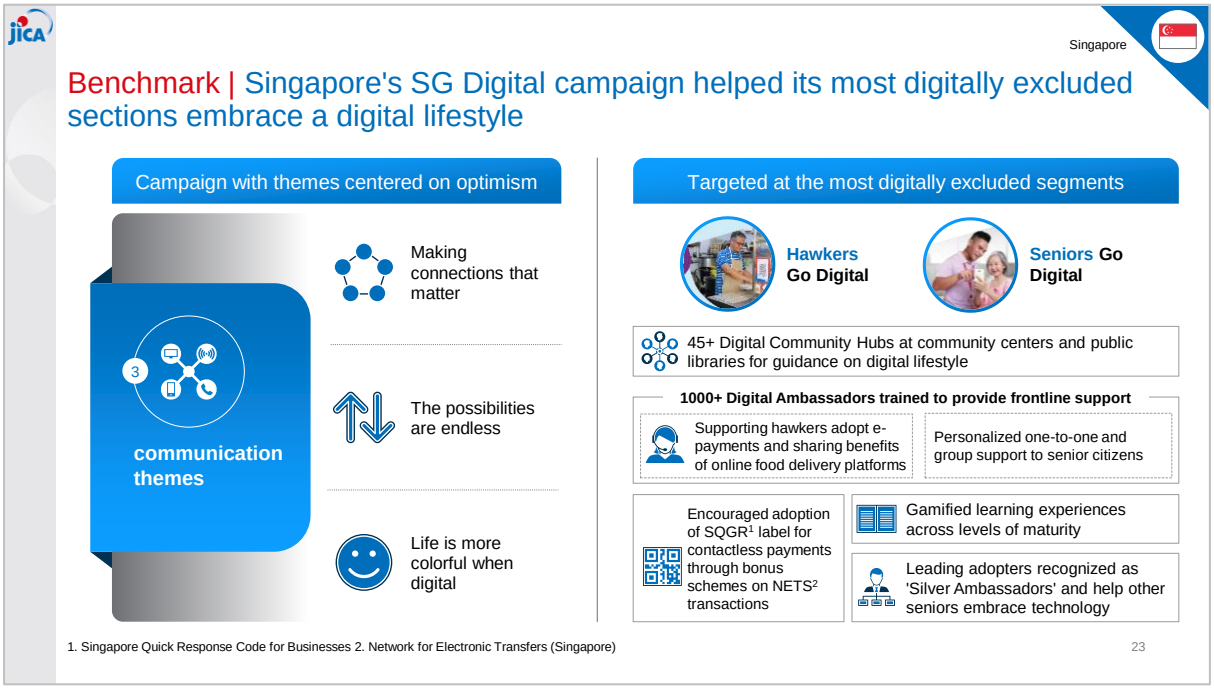


Figure 22: Overview of Singapore's SG Digital campaign

Initiatives to be undertaken by Bangladesh:

Program objectives:	
To seed digital-first mindset among all citizens in all aspects of day-to-day life	
Assessment of success	
Shift in citizen mindset and sentiments on usage of digital technologies	
Program components	**Objectives**
Digital-first slogan	• Stimulate digital-first mindset among citizens
Branding	• Develop a brand for Smart Bangla with strong recall
Use-case identification	• Drive digital adoption through immediate and high value use-cases among digitally excluded or passive segments
Mass media campaigns through characters	• Embed key messages on digital lifestyle through aspirational digital-savvy characters on mass media campaigns
Street theatres	• Promote benefits of digital lifestyle at community centers through entertainment
Digital ambassadors	• Trained front-line volunteers to help the digitally excluded embrace digital technologies
Channel partnerships	• Partner with various channels to deliver targeted campaigns
Campaign evaluation	• Monitor campaign outcomes and define course-corrections
Program execution Ownership	
Lead Agency	• Min. of Posts, Telecommunications & ICT
Implementing body	• ICT Division
Program contributors	• Ministry of Information & Broadcasting • Local Govt. Division • Union Digital Centers • Palli Daridro Bimochon Foundation • NGOs and NPOs • Youth forums (e.g., Youth Policy Forum)
High level implementation timeline:	
• **Launch:** 6 months • **Stabilize:** 2 years • **Scale:** 7-8 years	

Table 12: Implementation overview for Smart Bangla Campaign program

4.2 Smart Government

Smart Government will consist of multiple initiatives across different ministries and divisions and also national platform initiatives like national e-procurement marketplace, digital job platform, etc.

4.2.1 Smart Healthcare

Context: Bangladesh has ambitious health targets for 2041 which are around increasing life expectancy by 8 years, decreasing maternal mortality and infant mortality rates significantly, increasing health insurance coverage to cover at least 75% of the population etc. To make this possible, Bangladesh will require key step changes in accessibility, coverage, affordability, and quality of healthcare. Digitalization is going to be a key enabling factor towards all these dimensions and Bangladesh must look at creation of an ecosystem which puts Digital at the heart of the healthcare ecosystem of the future.

Current progress: Bangladesh is already trialing several digital health innovations to help address some of these objectives. For example:

- Consumer apps & portals like Shastho Batayon 16263 platform, Citizens' redressal system etc.
- Provider Apps and platforms like Human Resource Management Information System, Electronic attendance tracking, Online Web portal etc.
- Public digital infrastructure like District Health Information Software, Open Medical Record System, Civil Registration and Vital Statistics etc.
- Covid-19 Vaccine Management System (Surokkha)
- Covid-19 Tracker System
- Sankraman Barta (সংক্রমণ বার্তা) App

Also, Bangladesh has launched a series of telehealth services during Covid like 333 National helpline, Maa telehealth center, telemedicine services etc.

Challenges: Despite significant progress, there are multiple challenges still faced by Bangladesh some of them being as below

- Coverage - Fundamental lack of capacity in the country due to lack of trained healthcare professionals
- Accessibility - Inadequate capacity and quality of physicians and facilities, and high absenteeism - particularly in rural areas - limits accessibility of care
- Affordability - Low coverage and accessibility of health insurance resulting in a high personal health expenditure burden
- Quality - Avoidable deaths and inadequate treatment due to insufficient training, patient information and inconsistent quality of medicines.

Learnings from other countries: When looked at global benchmarks, Bangladesh can draw key learning from three countries who have made significant moves towards elevating healthcare through digitalization

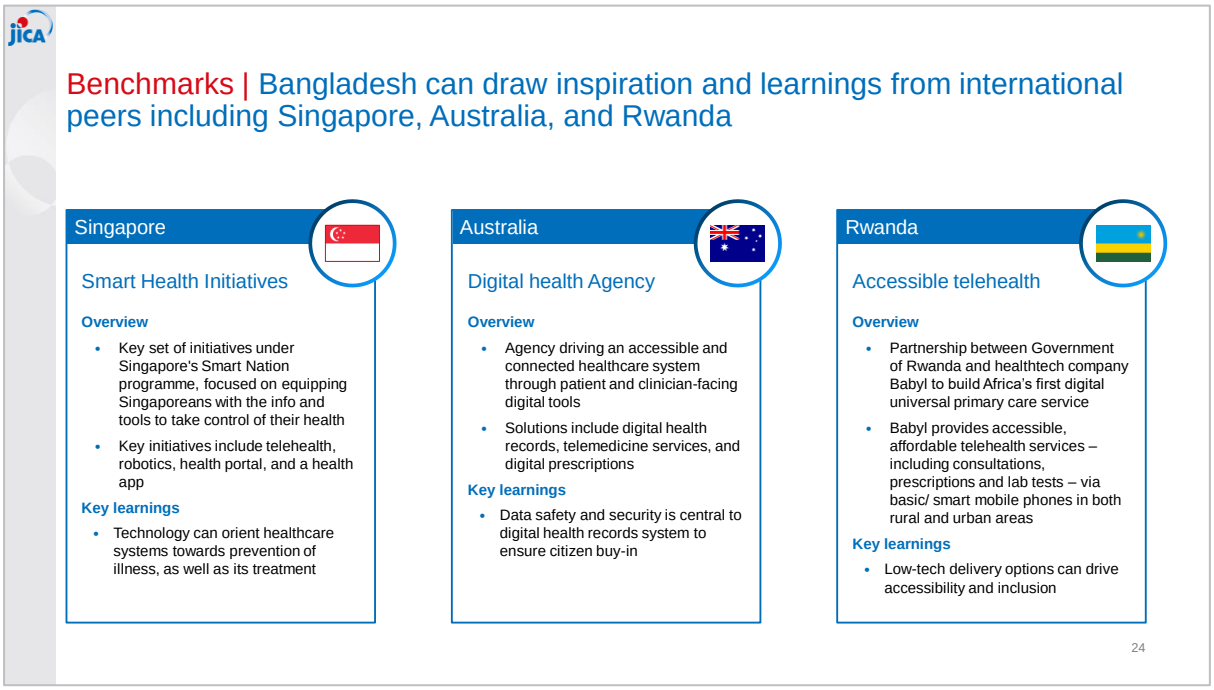


Figure 23: International benchmarks on smart healthcare

Initiatives to be undertaken by Bangladesh:

Bangladesh must follow a well - orchestrated set of initiatives to achieve vision 2041.

Program objectives:		
Driving inclusive, accessible, and affordable healthcare leveraging frontier technology solutions resulting in increased life expectancy, lowered infant mortality, etc.		
Program targets		
2025	2031	2041
• 100% citizens accessing health info directly via public health portal • 100% access to digital health records • 100% of professionals, facilities, procedures, and drugs in registry	• 100% access to telemedicine • 100% digital insurance claims • 100% of public hospitals with ERP • Health data collected remotely via smart devices (e.g., wearables) 100% health worker attendance rate	• AI/ predictive analytics used to pre-diagnose conditions • Robotics widely used in treatment • Artificial Intelligence (AI), Cloud and Blockchain used

Program components	**Objectives**
Accessible telemedicine	• Build an inclusive healthcare system through wide and affordable access to health consultation services for citizens across regions and income levels
Public health info portal	• Provide free, citizen-driven access to basic health and lifestyle information to increase public knowledge around health, simplify access to info, and dive inclusion

Frontier tech solutions	• Increase quality of treatment and enable a prevention-oriented healthcare system through applications of advanced tech (wearables data, AI predictive analytics, robotics/ AR)
Public hospital management system	• Increasing health service capacity through digital job aids and attendance tracking
Health worker app	• Increasing health service capacity through digital job aids and attendance tracking
Health data analytics	• Drive improved health service provision, policymaking, and health outcomes through widespread collection and analysis of health data across society
Personal health records	• Digitized, centralized personal health records that follow a patient throughout interactions
Digital health registries	• Unique identifiers for each doctor/ provider/ drug to ensure quality and consistency
Digital claims platform	• Reduce time, cost, and complexity around submitting health insurance claims to remove barriers to healthcare and support the national ambition of increasing coverage
Program Impact	
• Data used in Apps/website can be used for future research purpose. • Government can take necessary steps/precaution by analyzing this data for taking any decision. • Citizen awareness of vaccination.	
Program execution/ ownership	
Lead Agency	• Ministry of Health & Family Welfare
Implementing body	• Ministry of Health & Family Welfare in collaboration with ICT Division
Program contributors	• a2i • MoPA • Private sector • NGOs
High level implementation timeline:	
• **Launch:** 12 months • **Stabilize:** 3-4 years • **Scale:** 7-8 years	

Table 13: Implementation overview for Smart Healthcare program

4.2.2 Blended Learning

Context and challenges: World class, universal education is a key ambition for Bangladesh, both as an end in itself, and as a means of harnessing the demographic dividend, however the nation faces a number of barriers to achieving this:

Ambition	Key challenges
World class education	• Static, out-of-date content • Learning confined to the classroom • One-size-fits-all learning resources
Inclusive education	• Marginalized groups with limited access to resources • Inconsistent quality of education • Inconsistent access to technology
Demographic dividend	• 21C knowledge and skills not adequately covered • Real world-problem solving skills not taught

Table 14: Blended Learning context and challenges

Digital technologies and tech-enabled methods can play an important role in addressing the challenges faced by Bangladesh in driving world-class, inclusive education, through a Blended Learning education model.

Current progress: Bangladesh has already defined a Blended Learning framework and has developed a variety of specific educational point solutions:

- MuktoPaath - On-demand e-learning platform for professional and skills development
- Teachers' portal - Online portal for teachers to share resources, lessons, and ideas
- Kishor Batayon - Digital extracurricular learning platform for adolescents
- Multimedia Classrooms - Digital and AV tools for classrooms to enhance learning
- Sheikh Russel Digital Lab- Digital Multimedia Lab for ICT Learning and creating innovative IT culture.
- Sangsad Bangladesh Television: During the Covid-19 pandemic, Sangsad Television aired live lessons for students with time slots depending on the grade level. The channel uses Bangabandhu-1 for broadcasting on satellite television.
- E-learning registration system for BDITEC examination: http://registration.bditec.gov.bd/. Online registration for ITEE exam, e-learning system for ITEE exam preparation
- Training Management System of BKIICT (1st & 2nd Phase) http://bkiict.bcc.gov.bd:
- Digital Library: BCC Digital Library is an online database of digital objects that can include text, still images, audio, video, digital documents, or other digital media formats. Objects can consist of digitized content like print or photographs, as well as originally produced digital content like word processor files or social media posts.
- e-Learning platform for C programming
- SASEC Regional Training Portal (RTN)
- Video Conferencing System (Boithok): http://vc.bcc.gov.bd
- Online Examination System: http://ocs.bcc.gov.bd
- E-Learning System for Persons with Disabilities (Emporia Portal)

Blended Learning framework: A long term Blended Learning education model can build on Bangladesh's plans[2] to deeply integrate digital technology from end-to-end:

[2] First wave indicates components proposed by a2i, and second wave incremental components

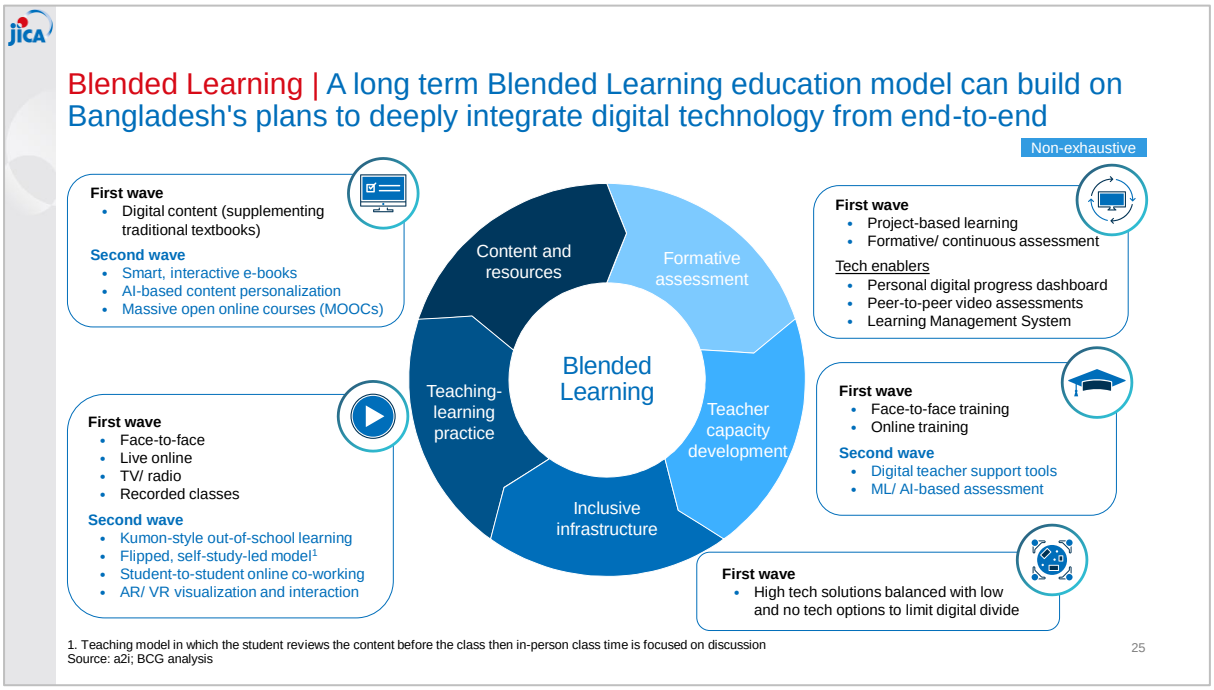


Figure 22: Blended Learning framework

Learnings from other countries: Bangladesh can draw inspiration and learnings from international peers including Estonia, China, and Japan.

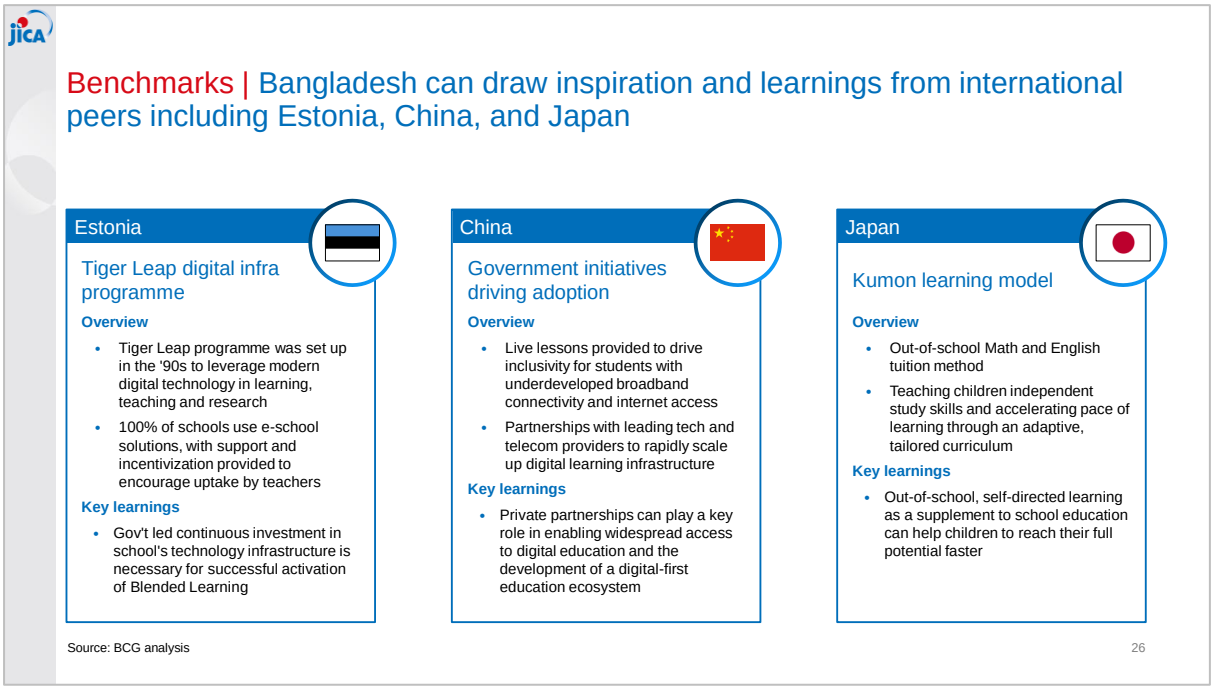


Figure 24: International benchmarks on blended learning

Initiatives to be undertaken by Bangladesh:

Bangladesh must follow a well - orchestrated set of initiatives to achieve the Smart Bangladesh Vision 2041.

Program objectives:		
Delivering world-class, inclusive education to all students, leveraging digital technologies, innovative methods, and modern content		
Program targets		
2025	2031	2041
• 100% of teachers trained in Blended Learning • 100% of curriculum available digitally • 100% of schools applying formative assessment	• 100% of students with access to Blended Learning • 100% of schools actively making lessons available online • 100% of schools with required digital tools	• Continuous innovation in blended learning programs

Program components	Objectives
Content and resources	• Creating high quality digital content and launching trials of innovations such as AI-based content personalization
Formative assessment	• Instituting project-based learning and formative/ continuous assessment across schools
Teaching-learning practice	• Rolling out a full range of digital media solutions in schools at scale, including live online classes and recorded content
Teacher capacity development	• Making training available to all teachers and rolling out more advanced methods in phases
Inclusive infrastructure	• Ensuring appropriate adaptations are made to Blended Learning resources and methods for different school contexts
Blended Learning stack	• Building the data and security architecture to enable a nation-wide multi-modal Blended Learning ecosystem
EdTech incubator	• Incentivizing and commercializing EdTech startups and innovations through investment, advisory, and network building
Partnership ecosystem	• Building partnerships and ongoing collaboration with OEMs for technology provision
Adoption campaign	• Raising awareness and driving adoption of Blended Learning amongst schools, teachers, families, and students

Program Impact

- Quality education and sustainable digital infrastructure
- Blended learning increases student engagement
- Traditional in-person courses require instructors to spend time outside of class completing administrative tasks like printing out handouts, uploading attendance data, hand-grading assignments, etc. Through the use of technology in blended learning, many of those tasks can be automated, allowing instructors to spend more time helping students comprehend material and develop their skills, in addition to creating more bandwidth to prepare strong lessons.
- In a blended learning model, students can partake in the online portion of class and look over class materials anywhere they have internet access, allowing them to choose where they work. In addition, students can complete the online portion when it fits their schedule, enabling them to more effectively balance school work and external obligations. For adult learners especially, a sense of autonomy and control over their learning experience is essential for success.

Program execution/ ownership

Lead Agency	• Min. of Education • Min. of Primary and Mass Education
Implementing body	• Ministry of Education and Ministry of Primary & Mass Education in collaboration with ICT division
Program contributors	• a2i • BCC • Private sector • Academia • Consumer tech OEMs
High level implementation timeline:	
• **Launch:** 3 months • **Stabilize:** 3 years • **Scale:** 4-5 years	

Table 15: Implementation overview for Blended Learning program

4.2.3 Smart Land Management

2041 vision: A fully digitized land records system in Bangladesh will ensure transparency and fairness for citizens, while incentivizing investment, through smart technologies such as:

- Establishment of Combined Land Management System
- Registration of land via an online self-service platform
- Transfer of land paid for and traced digitally
- Digital Surveying, Mapping and Record Management
- Surveying regularly updated, optimized by management software
- Land records organized in a single centralized database
- Land zoning and mapping conducted via Satellite imagery
- Establishment of Cadastral Database

Current progress: Bangladesh's land records have historically been paper-based, hand-written, and improperly stored - leading to incomplete records and corruption, such as 2,800 acres of public land being recorded to private developers by corrupt land officials during the Dhaka City Survey. However, digitization is now underway with the government investing in modern digital solutions such as:

- Satellite land-zoning
- Electronic deed registration
- E-mutation service
- e-Inheritance management
- Digital land record management (e-Porcha)
- Online land development tax payment service
- Online hearing management for land cases.

Learnings from other countries: The Digital India Land Record Modernization Program (DILRMP) serves as an example of end-to-end smart land management, including computerization of land records and registration, and use of digital surveying/ re-surveying. Key learnings for Bangladesh include building training & capacity for civil servants into the program to ensure adoption and full utilization of new tech solutions, and implementation of

the program at district level by state administrations with financial and technical support provided centrally by the Department of Land Resources.

Initiatives to be undertaken by Bangladesh:

Bangladesh must follow a well - orchestrated set of initiatives to achieve their vision 2041.

Program objectives:		
Ensuring transparency and fairness for citizens and incentivizing investment, through a digitized, integrated land record system		
Program targets		
s2025	2031	2041
• Solutions under development and trial across entire system • Private partnerships formed to accelerate tech	• Digital solutions implemented E2E • 100% coverage of citizens and regions	• Combined land management system • World-leading land records system • Frontier technologies employed at scale
Program Impacts:		
• Automation of land survey, land management and land registration by establishing network within organizations under Land Ministry. • Establishment of Land Data Bank which will pave the way for online land services and information. • Linkage between Mouza Mapping and Recording will be established which will show real time plot images with record information. • Reduction of land related cases. • Ease of land development tax collection. • Smart and technology driven skilled human resource will be generated in land survey and management. • Transparency and accountability will be ensured in land survey and management. • Data sharing with other organization related to urban planning and development.		

Program components	**Objectives**
End-to-end digitization	• Driving full digitization by working through the entire land records system to introduce appropriate digital solutions in every activity
Digitization at scale	• Ensuring full inclusivity and maximizing impact by expanding coverage of new and existing digital land solutions to serve all citizens across regions
Emerging tech in land records	• Preparing for the future and driving world class systems by designing and implementing advanced land record solutions, such as Unmanned Aerial Vehicle (UAV)/ Automated Drone Surveying, Global Navigation Satellite System (GNSS), Satellite Imaging, Electronic Total Machine (ETS) etc.
Private partnerships	• Forming partnerships with tech startups and hardware/ software companies, to source innovative ideas and solutions

Skills training	• Ensuring full adoption and utilization of new technologies by providing training sessions, digital resources, and ongoing guidance for government workers adopting new tech
Awareness campaign	• Public information campaign to drive awareness and understanding of new digital land records solutions
Program execution/ ownership	
Lead Agency	• Ministry of Land
Implementing body	• Ministry of Land in collaboration with ICT Division
Program contributors	• a2i • BCC • Private sector technology partners
High level implementation timeline:	
• **Launch:** 3 months • **Stabilize:** 2-3 years • **Scale:** 3-4 years	

Table 16: Implementation overview for Smart Land Management

4.2.4 Smart Postal Services

2041 vision: Smart postal services in Bangladesh will ensure efficiency, security, and inclusivity by leveraging frontier digital technologies including:

- Purchasing of postage via app-based order and pay
- Collection/ drop-off of parcels automated through an IoT-based system
- Sorting of parcels using robotics and augmented reality wearables
- Cross-country logistics facilitated by route optimization software
- Last mile delivery using drones and facial recognition ID verification
- Fintech Services

Current progress: Bangladesh's postal services today are overly dependent on manual processes, seeing the country rank 143rd globally[3] based on reliability (speed and predictability), reach (breadth and depth of network), relevance (demand for full range of services), resilience.

However, Bangla Post has a range of digital initiatives underway including:

- Process automation of Postal department back-office activities via introduction of digital hardware and integrated online software
- Postal ERP, an organization and administration management system that includes functions such as accounts, logistics and estate management, and procurement
- E-Post service that allows customers to send scanned images and messages via e-mail from post offices

[3] Integrated Index for Postal Development

- Digital Post Offices which offer a range of digital services such as providing ICT services and training, mobile money order and postal cash card services at 10k+ post offices, bridging the rural-urban digital divide
- Online postal charge calculator
- Postal cash card for cashless transaction and providing various safety-net allowances
- Post office mail tracking system for tracking domestic and international parcels
- Electronic money transfer service (EMTS)
- Nagad as digital financial service

Learnings from other countries: Switzerland's Swiss Post is consistently ranked as the world's best postal service, driven by tech-enabled efficiency, reliability, and a culture of innovation. Digital tools and teams include:

- In-house idea platform with incentives for submission - generating c.1,000 ideas annually with a 10% implementation rate
- Innovation lab (Espace Lab) providing a space in Swiss Post HQ for interdisciplinary teams to develop solutions to the customer needs of tomorrow
- Corporate venture capital team generating new products, services, and businesses for Swiss Post through sourcing of startups, collaboration, investment, and access to partner network
- Open data framework, making available info such as population statistics and service maps to drive innovation

Key learnings for Bangladesh include the use of operational freedom and market incentives to drive an entrepreneurial culture, and deeply embedding innovation into the business through internal and external support and incubation of new ideas, such as:

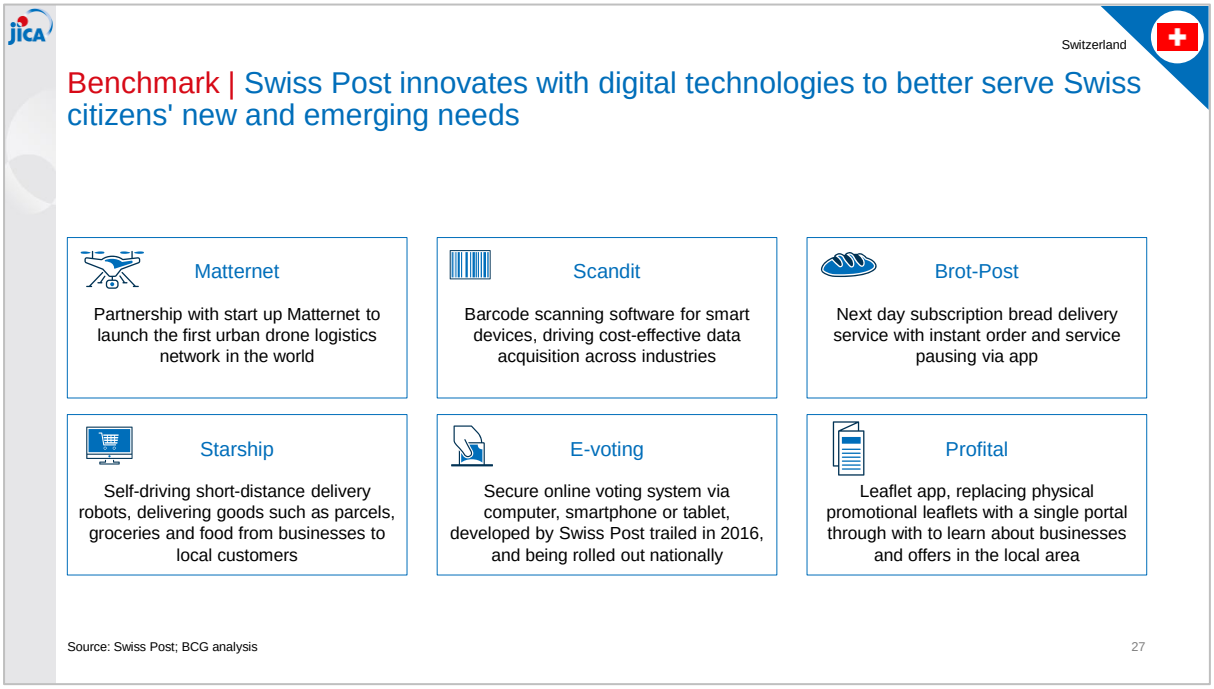


Figure 25: Examples of Swiss Post designed and partnered digital solutions

Initiatives to be undertaken by Bangladesh:

Bangladesh must follow a well - orchestrated set of initiatives to achieve their vision 2041.

Program objectives:		
Building a world class, efficient, secure, and inclusive postal network, by integrating digital and advanced tech throughout services		
Program targets		
2025	2031	2041
• Basic B2C and internal processes digitized across majority of postal service • Private partnerships established • Bringing mail transportation, collection and distribution under ICT based strict supervision	• All services fully digitized, end-to-end • Advanced digital tech under trial across postal service • Construct a modern technology-based mail processing and e-commerce hub	• Top 40 globally ranked postal service • Advanced digital tech widely used at scale across postal service • Commercializing postal services.

Program components	Objectives
Digital in postal services	• Bringing Bangladesh's postal service in-line with current global best practice by adopting common digital technologies such as a consumer app and remote digital drop-off lockers
Advanced digital tech in postal services	• Preparing for the future and driving excellence in the postal service by implementing advanced postal solutions, such as VR sorting headsets and drone delivery in remote areas and face recognition technologies to secure digital post boxes.
Process redesign	• Establishing new processes and operational norms to reflect and leverage the rollout of digital tech in the postal service
Private partnerships	• Forming partnerships with postal tech start-ups and hardware/ software companies, to identify new ideas and supply required tech to postal service
Skills training	• Ensuring digital technologies are properly adopted and utilized by providing training sessions, digital resources, and ongoing guidance for postal service workers
Behavioral change	• Complementing skills training with workshops focused on adapting mindsets of employees for a digital-first postal service

Program Impact
• Ensuring affordable, quality and international quality postal services through institutional development and modern technology • Postal ERP • Digital Dak Kendro • Postal D-Commerce • Digital Postal Kiosk machine • Postal Vending Machine • Secure Cash Box • Postal Delivery Machine
Program execution/ ownership

Lead Agency	• Posts and Telecommunications Division
Implementing body	• Posts and Telecommunication Division in collaboration with ICT Division
Program contributors	• a2i • BCC • Private sector technology companies
High level implementation timeline:	
• **Launch:** 6 months • **Stabilize:** 2-3 years • **Scale:** 3-4 years	

Table 17: Implementation overview for Smart Postal Services

4.2.5 Smart Agriculture

2041 vision: Digital technologies will revolutionize agriculture in Bangladesh, increasing yields, reducing wastage, and stimulating economic growth, including:

- Input sourcing based on smart requirement forecasting
- Tilling of farmlands via mechanized precision methods
- Planting guided by weather forecasting data and soil sensing analytics
- Irrigation & spraying using drone-based geo imaging and smart irrigation systems
- Harvesting of crops optimized by IoT crop readiness sensing
- Trading of produce via digital marketplaces with market-timing analytics
- Processing & packaging using robotics and blockchain tracing technology
- Logistics with greater visibility through IoT load and vehicle tracking

Key challenge Bangladesh had been facing Farmers in Bangladesh used to lack the information and tools required to reach this ambition, with the sector remaining overly manual, relying on outdated practices and information. Specifically, farmers lacked information and data around market demand and prices, historical weather trends, and modern farming practices, while value is being lost in key activities such as harvesting and market access which remain manual or analogue.

Current progress: The government is investing in a range of modern digital point solutions to address some of the above challenges including:

- Krishoker Janala: Database of plant diseases and samples
- Krishoker Digital Thikana: Info on crop specific production techniques
- Pesticide prescriber: Enables extension officers to prescribe appropriate pesticides
- SMS-based livestock services: Access to primary vet services via SMS for free
- Agri call service 16123: Toll free call service for expert advice on agriculture
- Agricultural Info and Comm. Center: Farmer run agri-info dissemination service
- National agricultural portal: One stop platform for access to info on crops
- Climate IMS: Dashboard that logs prevailing weather conditions
- e-Marketing portal: Initiative to disseminate market info to farmers, traders, etc.

Ministry of Agriculture and a2i have collaborated to design an architecture for creating a common service delivery gateway to farmers, agri-business and government which aims at integrating data and services across 25+ agencies. This implementation is already under way and augmentation of the same is to be a part of this Master Plan.

Learnings from other countries: Bangladesh can draw inspiration and learnings from international peers including Estonia, Columbia, Thailand, and India:

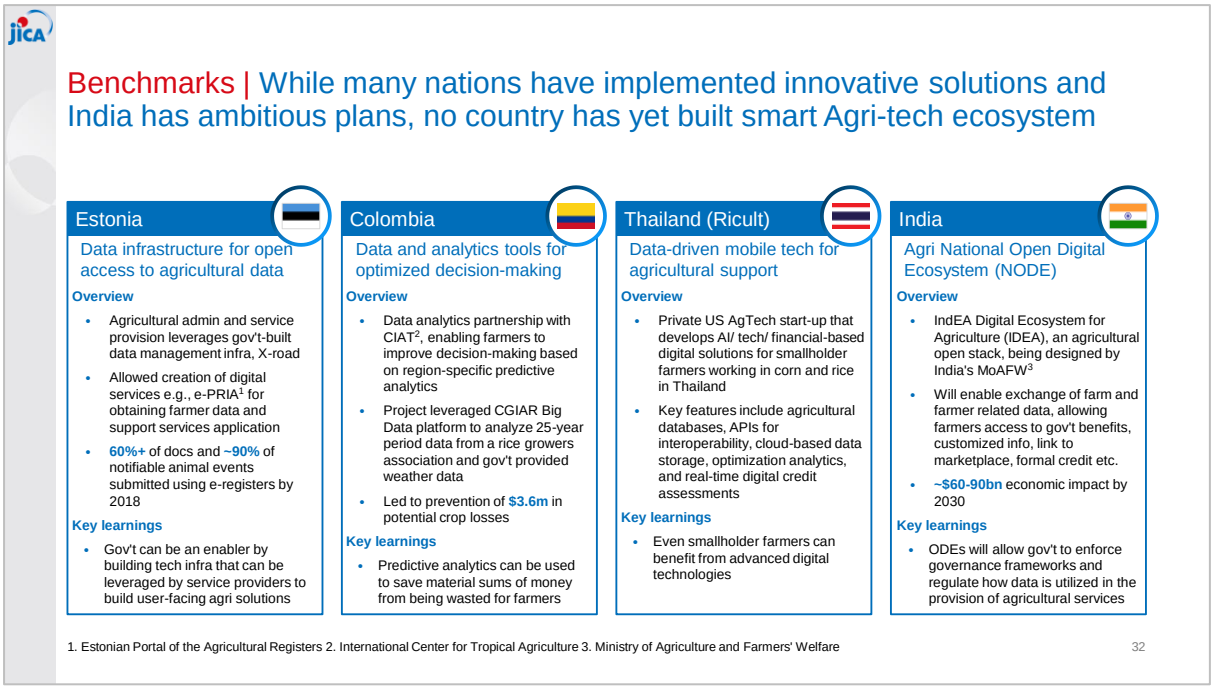


Figure 26: International benchmarks on smart agriculture

Initiatives to be undertaken by Bangladesh:

The current agriculture services architecture conceptualized by MoA and a2i is quite ambitious. To enable and augment the same, a program of core technology build and underlying initiatives will be required to successfully launch Smart Agriculture.

Program objectives:		
Increasing yields, reducing wastage, and stimulating economic growth through the development of smart agriculture technology ecosystem		
Program targets		
2025	2031	2041
• Core components of smart agriculture developed • All newly generated info in the sector digitized	• Historical data fully digitized and made available • Broad range of private sector solutions built on smart agriculture technology ecosystem	• 100% of farmers leveraging smart agri solutions • Advanced digital tech used at scale across agricultural sector
Program components	**Objectives**	

Core architecture	• Designing and building the core architectural layers including infra, integration, and analytics
Agricultural databases	• Building key databases such as historical weather data, market price/ demand data, and crop data
Farmer-facing use cases	• Scaling initial smart agriculture applications such as agri-service app and national agriculture portal to drive uptake
Agricultural lending	• Working with lenders and microfinance institutions to make financing available to farmers for tech adoption
AgTech incubator	• Incentivizing and promoting agri-tech startups through investment, advisory, and network building
Partnership ecosystem	• Establishing partnerships with key vendors and ecosystem participants for governance, financing, and research
Skills training	• Providing training, digital resources, and ongoing guidance to ecosystem users on platform usage and for value creation
Awareness campaign	• Driving adoption of solutions by farmers at all levels via a marketing campaign
Program execution/ ownership	
Lead Agency	• Ministry of Agriculture
Implementing body	• Ministry of Agriculture in collaboration with ICT division
Program contributors	• a2i • BCC • BARC, BARI, BADC, BRRI, DAM • Palli Daridro Bimochon Foundation
High level implementation timeline:	
• **Launch:** 6 months • **Stabilize:** 2 years • **Scale:** 3-4 years	

Table 18: Implementation overview for Smart Agriculture

4.2.6 Smart Judiciary

2041 vision: The judiciary of the future in Bangladesh will be effective, efficient, and fair, leveraging advanced digital technologies across the judicial process, including:

- Case analysis using digital case files with real-time updates
- Trail conducted via an e-Courtroom system
- Enforcement of trial outcome via a digital custody management system
- Appeal/ dispute resolution leveraging artificial intelligence tools
- Legal proceedings optimized using a real-time case management system

Challenges: The judicial system has traditionally been paper based and heavily voluminous & dis-coordinated leading to significant backlogs and delays, with limited public transparency and accountability. For example, 3.7 million cases are pending from subordinate courts to the appellate division, resulting in missed or severely delayed justice. Extreme service provider and receiver ration, i.e., lack of judicial officers and staffs is one of the main challenges of Bangladesh Judiciary. Another challenge is that the judicial system is mostly governed by centuries old laws which need to be reformed to meet the needs of the modern age in Bangladesh's context.

Current progress: To address some of these challenges, Bangladesh has embarked on a variety of digital court initiatives including:

- Judicial portal, a one stop platform for accessing judicial services
- Cause List Management System that provides greater visibility and effective case management in subordinate courts
- Judicial dashboard for monitoring the rate of disposal of lawsuits
- e-Mobile court that allows citizens to directly log cases with executive and district magistrates
- Digital court Management Information System which helps in monitoring digital court processes

Learnings from other countries: Bangladesh can draw inspiration from international peers including Denmark, Australia, UK, and the Netherlands:

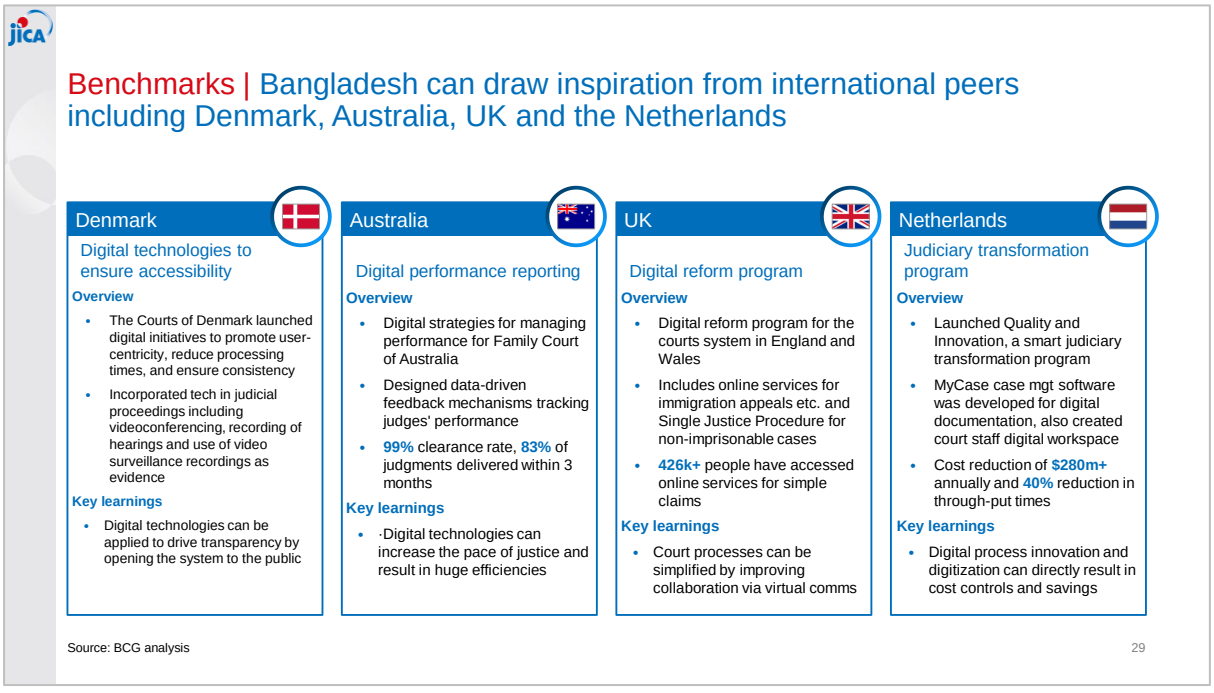


Figure 27: International benchmarks on smart judiciary

Initiatives to be undertaken by Bangladesh:

Bangladesh must follow a well - orchestrated set of initiatives to achieve their vision 2041.

Program objectives:
Building an effective, efficient, and fair judiciary in Bangladesh by implementing advanced digital technologies throughout

Program targets		
2025	2031	2041
• 100% of new cases digitized • All initiatives designed or launched	• 100% end-to-end digitization of judiciary system • Artificial Intelligence (AI) & Data driven assistive trial system • Various advanced digital tech solutions under trial • Case backlog eliminated	• Advanced digital tech implemented at scale across judicial services

Program components	Objectives
Digitized case record database	• Full digitization of historical case records into a single, accessible, national database, with processes to ensure ongoing update and usage
Case management system	• Implementing a case management software solution to integrate and digitize systems and processes end to end, driving efficiency
Online petition platform	• Developing an online system for citizens to file petitions and grievances, with ability to monitor progress in real time
e-Courtroom system	• Adopting an online courtroom to assist in the management and hearing of cases and allowing for the streaming of proceedings to the public
Process redesign	• Establishing new processes and operational norms, to take full advantage of the potential of new digital technologies
Skills training	• Providing training sessions, digital resources, and ongoing guidance to court officials to ensure ability to use new digital tools
Behavioral change	• Complementing skills training with workshops focused on adapting mindsets of employees for a digitally enabled judicial system
Program execution/ ownership	
Lead Agency	• Ministry of Law, Justice and Parliamentary Affairs
Implementing body	• Ministry of Law, Justice and Parliamentary Affairs in collaboration with ICT division
Program contributors	• a2i • Ministry of Public Administration • Supreme Court

High level implementation timeline:

- **Launch:** 12 months
- **Stabilize:** 3 years
- **Scale:** 3-4 years

Table 19: Implementation overview for Smart Judiciary

4.2.7 Smart Borders

2041 vision: Bangladesh's borders of the future will enable secure and seamless movement of people and goods by leveraging digital technologies including:

- Traveler authentication via digital passports, accelerated with optimization software
- Border security using facial recognition and live monitoring via geo-imagery
- Customs checks using blockchain load verification and AI compliance software
- Payment of customs dues through digital pre-payment and cashless methods
- Warehousing of goods using robotics and track and trace technologies

Challenges: Bangladesh's border operations face a range of important security and financial challenges, from illegitimate travelers to lost revenues due to customs non-compliance to leakages via corruption.

Current progress: However, the government is actively investing in a range of modern digital solutions including:

- E-Visa: Online application and documentation with faster turnaround and ability to track
- E-payment: Electronic payment for customs charges exceeding $23k
- Machine Readable Passport: Physical passport enabling automated verification and faster immigration checks
- E-passport: Physical passport with biometric data loaded on an integrated chip, enabling enhanced security
- e-Customs Service Single Window: Digital customs clearance services based on UNCTAD's Automated System for Customs Data platform
- e-Immigration Information System: Automatic immigration service integrated with Bangladesh National ID system

Learnings from other countries: Bangladesh can draw inspiration and learnings from international peers including Australia and Singapore:

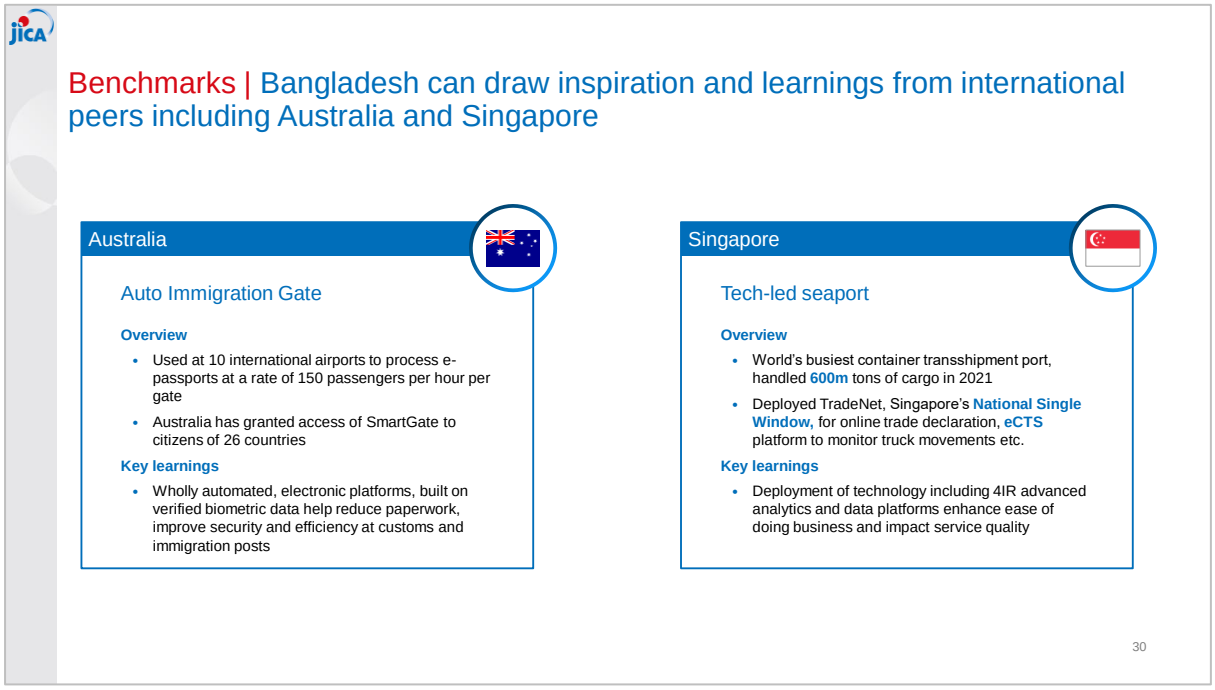


Figure 28: International benchmarks on smart borders

Initiatives to be undertaken by Bangladesh:

Bangladesh must develop and implement a set of key digital technologies to build a world class digital border ecosystem.

Program objectives:		
Enabling secure and seamless movement of people and goods across Bangladesh's borders with digital technologies		
Program targets		
2025	2031	2041
• Basic B2C and internal processes digitized across majority of border services • More bilateral agreements established	• All services fully digitized, end-to-end • Advanced digital tech widely used at scale to automate trade	• Fastest clearance system in South Asia

Program components	**Objectives**
Digital authentication	• Ensure fast and simple crossing of borders via adoption of digital profiles and interfaces for advance travel authorization and accurate identification of travelers by security actors
Digital security	• Implementing technologies such as facial recognition and geo-imagery to improve border security
Expedited business travel program	• Creating seamless business travel experience by establishing accelerated checks and improved border services via digital solutions such as digital concierge, travel app, and one day e-visa
Digital customs checks	• Driving efficiency and security through application of digital systems to the customs process such as digitization of paperwork and usage of AI-based automated compliance software
Digital customs payment	• Minimizing delay and reducing scope for corruption via development of fee processing and calculation systems for instant settlement and accurate revenue collection at customs
Tech-enhanced logistics	• Use of logistics robotics, IoT track and trace technologies, and digital scanning to enhance the security and efficiency of border warehousing
Skills training program	• Providing training and reskilling of customs and immigration officials on operation and maintenance of border systems, data handling etc.
Program execution/ ownership	
Lead Agency	• Ministry of Home Affairs

Implementing body	• Ministry of Home Affairs in collaboration with ICT Division
Program contributors	• BCC • Ministry of Finance • Ministry of Shipping
High level implementation timeline:	
• **Launch:** 12 months • **Stabilize:** 3 years • **Scale:** 2-3 years	

Table 20: Implementation overview for Smart Borders

4.2.8 Smart Transportation

4.2.8.1 Smart Roadways

2041 vision: Smart Roadways of Bangladesh will be powered by multiple digital technology interventions across the road value chain, some of which are as follows:

- Smart development and planning enabled by geospatial network planning, traffic analysis and simulation, etc.
- Smart design and engineering enabled by remote sensing topographic surveys/maps, radar based sub-surface utility mapping, auto traffic counter classifier, digital cadastral mapping, 3D modelling, etc.
- Smart construction enabled by advanced construction technologies, SCADA, etc.
- Smart road operations enabled by
    - Mobility solutions like smart highways and bridges
    - Maintenance solutions like digital twins
    - Tolling solutions like electronic toll collection, express tolling solutions
    - Safety solutions like smart loop detectors, smart traffic management and lane control system, geo-analytics for blackspots, weigh-in-motion systems

Current state: Bangladesh has already taken multiple steps towards digitalizing its road transport system. Some initiatives undertaken or currently underway, are outlined below:

- Intelligent traffic system, in partnership with KOICA – piloting underway for Dhaka Mawa Road across 39 kilometers. Expansion has been planned for 4,900 kilometers
- CCTV coverage of national highways for use-cases like incident tracking and management
- Digital services on BRTA portal like vehicle registration certificate, driving license, etc.
- XMEye – Smartphone based travel planner
- Online banking system for tax and fee collection
- Software based fleet management
- Online gate pass system for bridges
- Retro-reflective number plates
- Variable messaging systems
- Smartcard based touch and go systems
- RFID tags
- E-ticketing portal

Learnings from other countries: Bangladesh can draw learnings from smart road initiatives of Japan and South Korea:

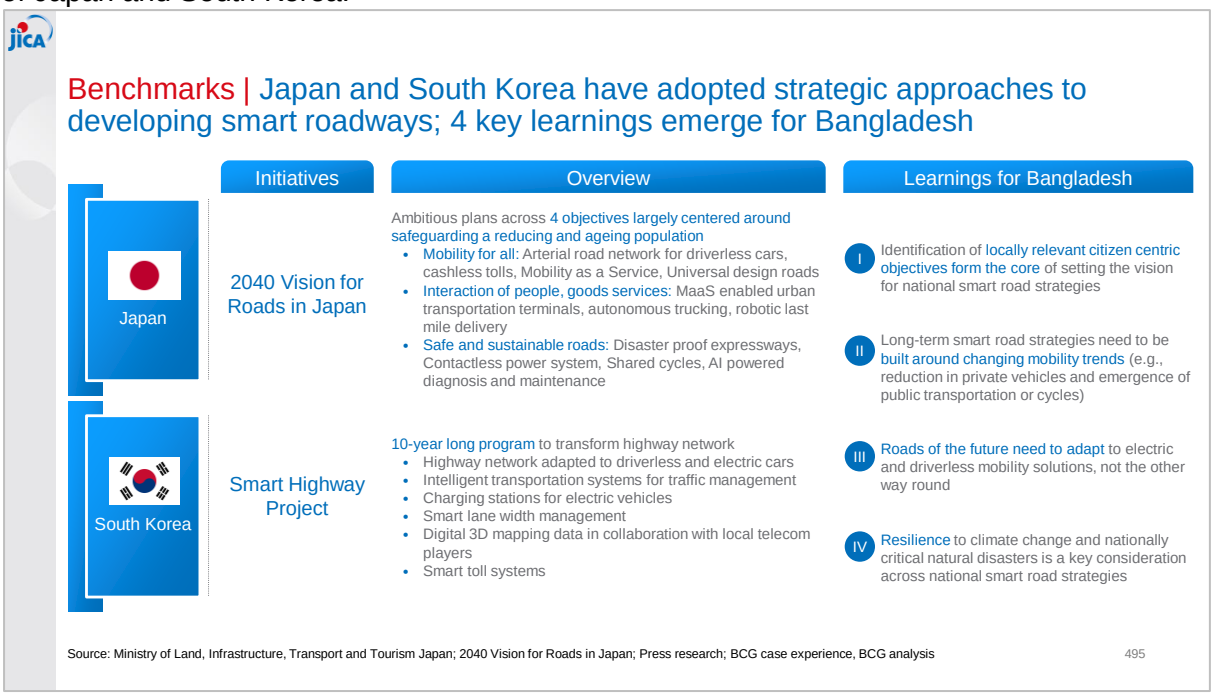


Figure 29: International benchmarks on Smart Roadways

Initiatives to be undertaken by Bangladesh:

Program objectives:		
Ensuring safe, convenient, community friendly, and environmentally sustainable roadways by sector-wide integration of digital technologies		
Program targets		
2025	2031	2041
• Digital use-cases identified and prioritized across the roadways value chain • Partnerships with industry and academia established	• High impact digital use-cases rolled out and adopted across the roadways value chain • Implement real time data driven traffic and transport management in all large cities, ports and docks.	• Bangladesh emerges as a regional leader in smart roadway solutions • Smart solutions adopted at scale across roads and bridges of Bangladesh

Program components	**Objectives**
Smart Roadways Development and Planning	• Driving intelligence in development and planning activities identifying high impact use-cases and mapping them to digital technologies
Smart Roadways Design and Engineering	• Digitalization of design and engineering activities in roadways sector by identifying use-cases and mapping them to digital technologies

Smart Roadways Construction	• Digitalization of construction activities in roadways sector by identifying use-cases and mapping them to digital technologies
Smart Roadways Operations	• Rollout of intelligent solutions by identification of high impact use-cases across areas of mobility, maintenance, tolling and safety
Skills Training	• Digital upskilling and reskilling across all levels of roadways sector and general public to build capacity for consumption and management of digital solutions
Awareness Campaign	• Increasing awareness of digital solutions for roadway sector officials, staff, and general public, through targeted campaigns under Smart Bangla Campaign
Program execution/ ownership	
Lead Agency	• Ministry of Road Transport and Bridges
Implementing body	• Ministry of Road Transport and Bridges in collaboration with ICT Division
Program contributors	• a2i • Highway Police, Range Police, Metropolitan Police • Private sector tech. partners • Emerging technology CoE
High level implementation timeline:	
• **Launch:** 6 months • **Stabilize:** 3-4 years • **Scale:** 6-7 years	

Table 21: Implementation overview of Smart Roadways

4.2.8.2 Smart Railways

2041 vision: Smart Railways of 2041 in Bangladesh will be powered by multiple digital technology applications across rail infrastructure, rolling stock, and rail transportation. Some of the most relevant technologies that will shape smart railways include Industrial IoT, Big data and AI, Augmented and virtual reality, Location based services and GIS, Cloud and digital platforms, and Mobile high-performance networks. These technologies can potentially power use-cases across all 3 segments of the railway sector, some of which are outlined below:

- **Use-cases in rail transportation** include digital platform covering customer journeys, personalized communication offerings, embedded payment processes, digital train station, digital platform for planning and management of freight transport, intermodal freight transport through automated and digitally interlinked traffic hubs, distributed ledgers, etc.
- **Use-cases in rolling stock** include VR based optimization of rail vehicle design, connected machines in vehicle manufacturing, AI based prediction of mobility behavior of passengers and goods, real time location, intelligent freight trains, predictive maintenance of rolling stock, robotic train maintenance, etc.

- Use-cases in rail infrastructure include digital twins, automated timetable development and dispatching, digital interlockings, fiber optic sensors for object detection, AI based image analysis for predictive fault detection, etc.

Current state: Bangladesh has crafted an ambitious 2045 Railway Master Plan, and some digitalization initiatives undertaken / currently underway include:

- Railway e-ticketing portal
- Computerized seat reservation system
- Train tracking and monitoring system
- Automatic train protection
- Computerized train information display system
- Digital signaling systems (computer-based interlocking)
- Optical fiber network and GSM-R communication
- Customer facing technology upgrades like CCTV, real-time view for drivers and controllers, remote announcements, MIS, PIS, Wi-Fi on moving trains, etc.

Learnings from other countries: Bangladesh can draw significant learnings from railway digitalization journeys of UK and Germany:

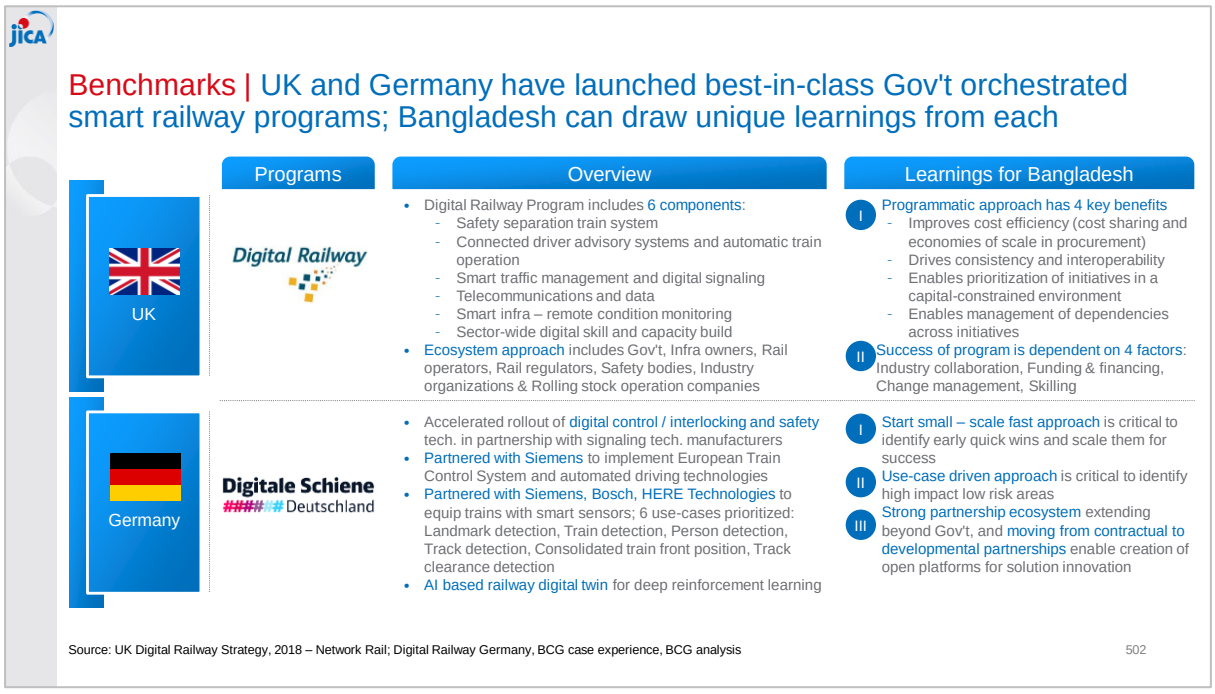


Figure 30: International benchmarks on Smart Railways

Initiatives to be undertaken by Bangladesh:

Program objectives:
Ensuring reliable, convenient and environment friendly railways by sector-wide integration of digital technologies
Program targets

2025	2031	2041
• Digital use-cases identified and prioritized across infrastructure, rolling stock and rail operations • Partnerships with industry and academia established	• High impact digital use-cases rolled out and adopted across all 3 segments of railways (infra, rolling stock and rail operations) • Apply digital solutions to ensure transparency & accountability targeting 3 segments (rail operation & transportation, rolling stock, rail infrastructure)	• Bangladesh emerges as a regional leader in smart railway solutions • Smart solutions adopted at scale in Bangladesh Railways

Program components	**Objectives**
Smart Rail Infrastructure	• Identification and roll-out of use-cases for intelligent railway infrastructure across core infra functions like design and planning, construction, operation & control, and maintenance
Smart Rolling Stock	• Use-case driven implementation of digital solutions cross rolling stock design & production, operations, and maintenance
Smart Freight / Passenger Management	• Adoption of intelligent systems for end-to-end digital experience for railway passengers and management of railway freight using emerging technology solutions (e.g., RFID)
Skills Training	• Digital upskilling and reskilling across all levels of the railway sector to build capacity for consumption and management of digital solutions
Awareness Campaign	• Increasing awareness of digital solutions for railway sector officials, staff, and railway passengers, through targeted campaigns under Smart Bangla Campaign
Program execution/ ownership	
Lead Agency	• Ministry of Railways
Implementing body	• Ministry of Railways in collaboration with ICT Division
Program contributors	• a2i • Railway Police • Private sector tech. partners • Emerging technology CoE
High level implementation timeline:	

- **Launch:** 6 months
- **Stabilize:** 3-4 years
- **Scale:** 6-7 years

Table 22: Implementation overview of Smart Railways

4.2.9 Smart Tax

2041 vision: A digitized tax system in Bangladesh will drive efficiency and transparency, while minimizing taxpayer effort and lost revenue, enabled by digital technologies such as:

- Registration for taxes via an online self-service platform using digital ID verification
- Declaration of earnings supported by AI assistant
- Validation of taxes conducted with machine learning to detect evasion
- Reports generation automatic and stored in a single centralized database
- Payment completed digitally with automated calculation of refunds due

Challenges: The taxation system has been primarily manual, leading to a time-consuming experience for citizens and government and inefficiencies such as under-reporting and under-invoicing. For example, only 10m of 40m eligible citizens pay tax as per latest statistics.

Current progress: To address some of these challenges, the government is implementing a range of digital tax technologies including:

- Digital centers: Physical info and service delivery locations offering tax services
- VAT Online: Automation of VAT collection, incl. call center
- E-Return: Online tax platform, still including paper return option
- E-TDS: Online platforms for collection of tax from the source of income
- E-BIN: Online Business Identification Number (BIN)
- E-TIN: Online Taxpayer's Identification Number (TIN)

Learnings from other countries: Bangladesh can draw inspiration and learnings from international peers including USA and Brazil:

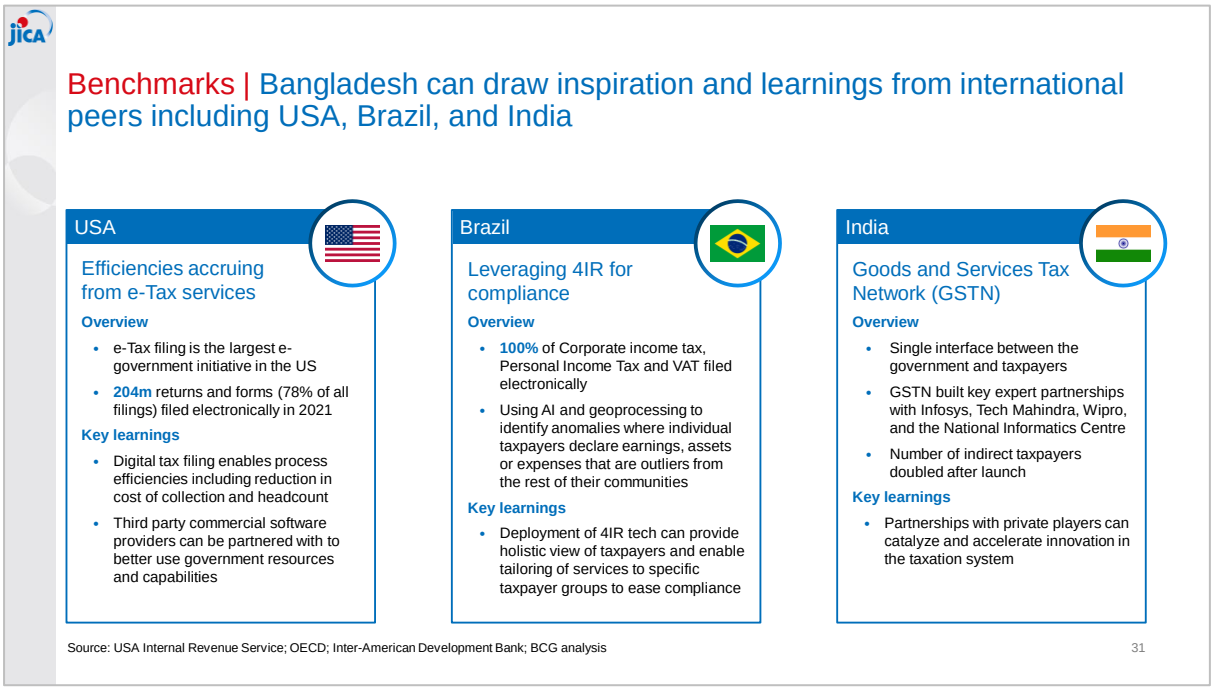


Figure 31: International benchmarks on smart tax

Initiatives to be undertaken by Bangladesh:

Bangladesh must follow a well - orchestrated set of initiatives to achieve their vision 2041. Smart Tax program should initially cover all tax revenue channels including NBR and Non-NBR taxes. Tax revenues shall be prioritized owing to their majority contribution to the Government's revenue receipts (as per Revenue receipts published by Ministry of Finance, the 2022-23 budgeted tax revenue constitutes 85-90% of the total revenue receipts, excluding Grants, Loans, and Food account transactions). Internal Resources Division of Bangladesh should perform a thorough assessment for extension of this program to non-tax revenue channels post stabilization of Smart Tax program.

Program objectives:		
Driving efficient and transparent tax collection, while minimizing taxpayer effort and minimizing lost revenue, enabled by digital technologies		
Program targets		
2025	2031	2041
• 10% tax to GDP ratio • 30% of taxable individuals paying tax • 35% direct tax share of tax revenue	• 14% tax to GDP ratio • 55% of taxable individuals paying tax • 40% direct tax share of tax revenue	• 20%+ tax to GDP ratio • 100% of taxable individuals paying tax • 50% direct tax share of tax revenue
Program components	**Objectives**	
Digital user-centricity	• Adopting digital technologies such as online self-service platform and AI declaration assistant to simplify and streamline the tax user journey	

G2G efficiency technologies	• Scaling tax administration tech such as a single centralized database and auto refund calculation/ payment to increase internal operational efficiency
Fraud/ error detection analytics	• Ensuring all eligible taxpayers pay the full amount due, via digital solutions to reduce gov error and taxpayer evasion, such as ML evasion detection/ flagging
End-end-tax digitization	• Rolling out foundational digital transformation across all tax stages, processes, and locations
Frontier technologies in tax	• Exploring and implementing emerging technologies such as AI, ML, blockchain, and IoT throughout the tax system – such as ML evasion detection/ flagging
Skill training program	• Providing training and reskilling of tax officials on tax intelligence, compliance and operation of digital tax systems, data handling etc.
Awareness campaign	• Increasing tax compliance and adoption of new systems amongst citizens and businesses, via a marketing/ info campaign
Program execution/ ownership	
Lead Agency	• Ministry of Finance
Implementing body	• Internal Resources Division in collaboration with ICT Division
Program contributors	• BCC • Private sector partners
High level implementation timeline:	
• **Launch:** 12 months • **Stabilize:** 3 years • **Scale:** 2 years	

Table 23: Implementation overview for Smart Tax

4.2.10 National Procurement e-Marketplace

Context: Public procurement is a key responsibility of government, with considerable impact on levels of budget efficiency, government effectiveness, and corruption in a country. Digital technology can be adopted in the form of a national procurement e-marketplace - a centralized, unified procurement platform through which government agencies can be connected with vendors, to facilitate and optimize category-based transactions.

Progress: Bangladesh's current solution – the e-Government Procurement (e-GP) portal – offers a range of features, from centralized registration to e-tendering to e-payment, and is used to process more than 60% of public procurement, with benefits already realized including:

- Cost savings of $600m between FY12 and FY18

- Reduction in average procurement lead time from 87 days to 62 days
- Increased competitiveness with 16 bidders per tender vs. only 4 in 2007

Further efficiencies through procurement e-marketplace: While Bangladesh's e-GP is driving significant benefits for the nation, there are several further efficiencies which can be brought in:

- Drastically improved efficiency for direct catalogue-based purchases
- One-stop shop for procurement of works, goods, and services plus through multiple different types of bidding like L1, reverse auction, large tenders, direct purchase etc
- High levels of transparency through automated tracking and reporting
- Standardization of specifications and pricing across categories
- Increased inclusivity of small and micro enterprises

Bangla e-marketplace: A digital e-marketplace will leverage digital capabilities to offer many new generation features & benefits to address current gaps including:

- Demand aggregation providing buyers with rich listing of products and services, and sellers with direct access to all government departments
- Electronic payments with access to multiple modes of payments and potential of costs savings of ~25% to buyers, and payment tracking and guaranteed timely payments for sellers
- Advanced search and discovery to drastically increase time efficiency, as well as enable dynamic pricing and implementation of inclusivity filters, such as locally manufactured goods
- Logs and audit trail ensuring consistent and uniform purchase procedures for buyers, and a vendor rating system for sellers
- Alerts and notifications to increase user-centricity via tracking and monitoring dashboards

Learnings from other countries: Bangladesh can draw inspiration and learnings from international peers including India, Singapore, South Korea, USA, Canada, and Chile:

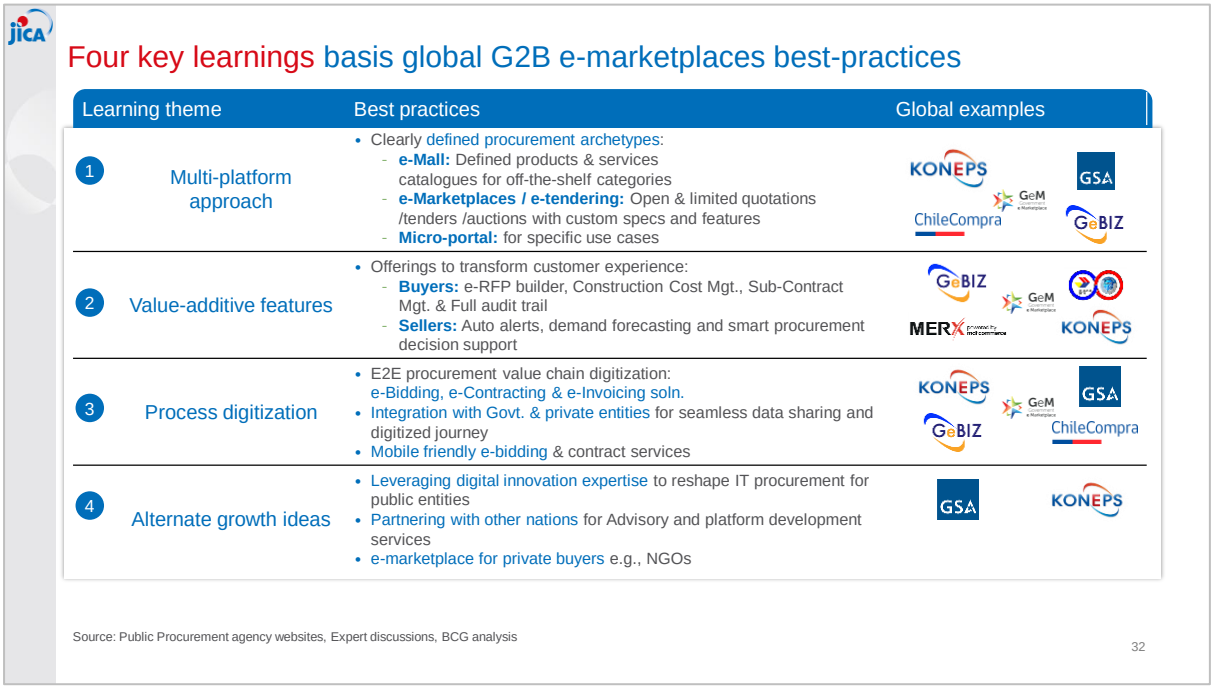


Figure 32: International benchmarks on National Procurement e-Marketplace

Initiatives to be undertaken by Bangladesh:

Bangladesh must follow a well-orchestrated implementation program to design and build a next generation National Procurement e-Marketplace:

Program objectives:		
To improve existing e-procurement services and create an online, end-to-end marketplace that is inclusive, efficient, and transparent		
Program targets		
2025	2031	2041
• GMV equivalent to 0.5% of GDP • >50% of public procurement expenditure processed through e-Marketplace	• ~2-3% - GMV as percentage of GDP • >5% in exchequer savings annually	• >5% GMV as percentage of GDP • 10-15% exchequer savings annually

Program components	**Objectives**
Target state design and Special Purpose Vehicle set up	• Vision, Mission, Values & Goals definition for national procurement platform • Ministry alignment – inter-ministerial alignment on future of public procurement • Set up of Special Purpose Vehicle or Autonomous body for ownership • Design of SPV organization structure

Technology partner ecosystem build	• Talent sourcing strategy – Differentiated talent sourcing through channels other than traditional govt channels • Selection of Managed Service Provider for tech platform development and maintenance
Revenue model build	• Defined roadmap for GMV growth • Platform monetization model (self-sustenance) and business case formulation
Ecosystem policy and procedures definition	• Unified online procurement policy definition and approval from cabinet • Creation of customized HR and Finance policies for SPV
Operating model build	• Define business processes for marketplace • Establish marketplace governance model
Process diagnostics & revamp	• Day-to-day execution model institutionalized
Program execution/ ownership	
Lead Agency	• Ministry of Planning
Implementing body	• Special Purpose Vehicle/CPTU in collaboration with ICT Division
Program contributors	• CPTU • Line ministries (e.g., IME Division at MoP, MoF) • Regulators (e.g., Bangladesh Bank)
High level implementation timeline:	
• **Launch:** 6 months • **Stabilize:** 1 year • **Scale:** 3-4 years	

Table 24: Implementation overview for National Procurement e-Marketplace

4.2.11 Digital Job Platform

Context: Job creation is central to Bangladesh's Vision 2041 - in terms of harnessing the demographic dividend and driving a zero poverty, innovation economy – and a broad, well-functioning digital job platform can play an important role in driving employment and inclusion.

Challenges: Bangladesh currently faces 3 key challenges on job creation for its citizens:

1. Women are currently at a disadvantage with lower employment rates than men
2. Unemployment rate is particularly high among youth, especially female youths
3. Females represent higher section of participants in vulnerable employment

Current state: The **NiSE** (National Intelligence for Skills, Education, Employment and Entrepreneurship) Platform provides a solid start by targeting youth and migrant workers exploring opportunities around employment, skilling, entrepreneurship support and apprenticeship. Key features of the platform include dashboard for future jobs and skills, district wise tracker for registered youth and jobs, job opportunities through circulars, and access to courses by 14 government and private sector organizations.

Recently, Ministry of Labor and Employment has launched Labor Information Management System (LIMS) for digitalization and integration of labor and employer databases, digitalization of Labor Identity Number (LIN), Labor ID, and Worker Service Book. Labor force across organized and unorganized sectors of Bangladesh will be targeted, and targeted extension of Government benefits has been planned through LIMS. The project will be piloted from May 2022 to April 2025, targeting inclusion of approximately 3 Lakh labor force across 5000 organizations across select organized sectors (e.g., Tea gardens, Garments, Pharmaceutical, Leather, Ship breaking and recycling, etc.) and select unorganized sectors. Extension to all sectors of Bangladesh has been planned for subsequent scale-up phase. As Bangladesh crafts Digital Job Platform Program, there are two potential expansion opportunities for LIMS:

1. Potential integration into Digital Job Platform as a microservice to employers and labor force across sectors
2. LIMS databases can be potentially integrated into the data layer of platform design and build as a part of the Digital Job Platform, to enable smart labor management

Additionally, the **Emporia** Portal empowers disadvantaged groups citizens through a combination of a job portal and an e-learning platform. **Kormo Jobs** is a Google-led digital job matchmaking portal with over 2.7 Mn jobs posted online. **Sheba.xyz** offers on-demand professional services opportunities to private service providers.

Key expansion opportunities: Bangladesh should now build upon existing platforms to expand horizons beyond the current scope. Four expansion opportunities should be considered:

1. **Unified portal for all sections of the society** including marginalized segments like disadvantaged groups, third gender citizens, and women
2. **Inclusion of gig workers** as a key target segment
3. Promotion of **government and all public sector jobs** on the platform
4. Expansion to **real-time job coverage** across all sectors of Bangladesh

Learnings from other countries: Bangladesh can draw significant learnings from national digital job platforms of Singapore, UK, USA, and Sweden.

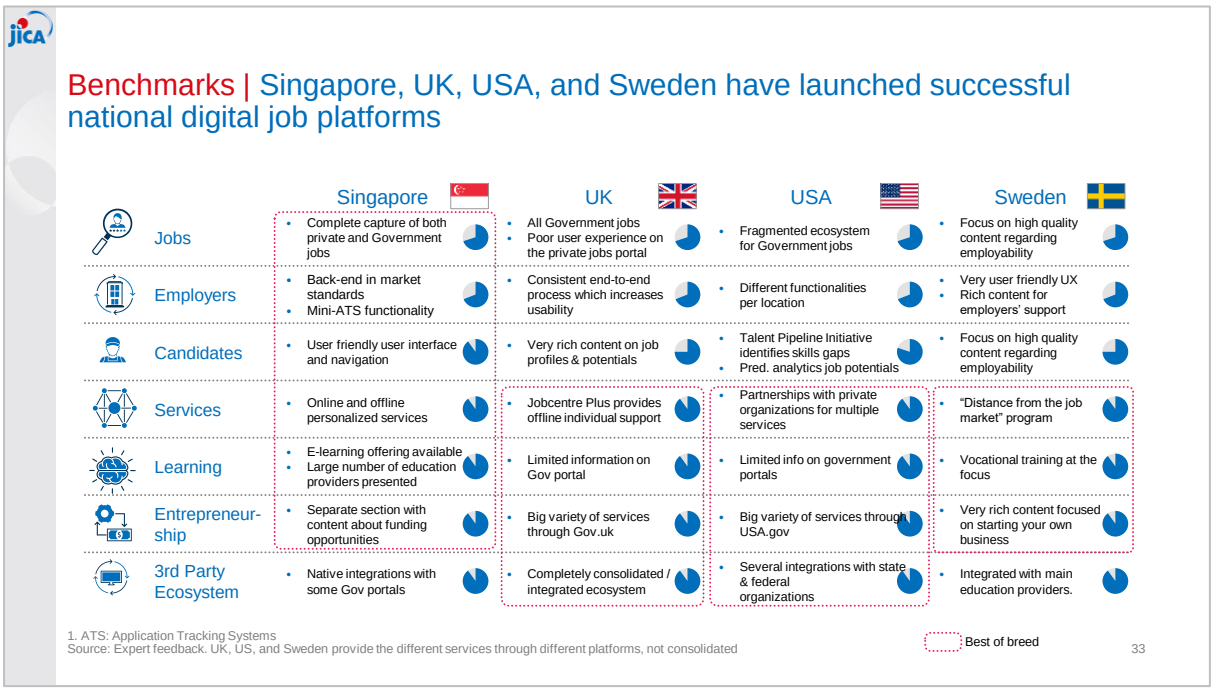


Figure 33: International benchmarks on digital job platforms

Key considerations for Bangladesh: As Bangladesh envision a Digital Job Platform, there are key considerations critical for success:

1. **Inclusion of 7 key features** on the platform for seamless user experience: Job search, Training, Skills credentialing, Skills / work experience verification, Skills financing, Government accreditation & schemes, and Analytics microservices
2. It is critical to **address a wide range of employment opportunities** across 4 key segments: IT/IT-ES, Creative services, Professional services, and Low-skilled labor services
3. Building on NiSE, the Digital Job Platform should cover **10 capabilities spanning "Minimum Viable Product" features** (e.g., Smart matching, Employer review system, etc.) **and select "Good to have" features** (e.g., Proficiency-based scoring, Integration with skill training, etc.) which are to be added over time (details included in Digital Job Portal chapter of Appendix A)

Initiatives to be undertaken by Bangladesh:

Program objectives:		
Nation-wide unified job matchmaking portal targeted at all sections of the society including disadvantaged groups and freelancers		
Program targets		
2025	2031	2041
• Existing job portals integrated on Digital Job Platform • Jobs across key Gov't bodies and select private sectors offered on the platform • Platform accessed by all digitally ready sections of the society	• Nation's one-stop job matchmaking and gig economy portal • Jobs across all Gov't bodies and all industry sectors on the platform • Accessibility extended to all the digitally passive and marginalized sections	• All sections of the society accessing nation-wide job and freelancing opportunities on a single platform

Program components	**Objectives**
Concept design	• Design of the portal and selection of key functionalities
Platform development	• Creation of a new platform from scratch or conceptualizing a platform of platforms (integrating all existing job portals and allied services, e.g., NiSE, Emporia, LIMS, etc.)
Governance model	• Design of entity structure, degree of independence, and operational flexibility
Revenue model	• Definition of financial model for self-sustainability of the platform

Organization & Talent	• Designing organization structure and optimizing talent outsourcing mix
Go to Market	• Design detailed GTM strategy for nation-wide adoption
Program execution/ ownership	
Lead Agency	• Ministry of Labor and Employment
Implementing body	• ICT Division
Program contributors	• a2i • Industry bodies • Private sector
High level implementation timeline:	
• **Launch:** 6 months • **Stabilize:** 1 year • **Scale:** 1 year	

Table 25: Implementation overview for Digital Job Platform

4.2.12 Smart Social Safety Net

2041 vision: A smart social safety net in Bangladesh will ensure rapid, effective, and inclusive response to crises for the country's vulnerable citizens, enabled by digital technologies such as:

- Cash transfers via mobile money and digital biometric ID verification
- Public works job creation with digital personal skills profiles and low skill gig platforms
- Emergency food and clothing using remote drone delivery
- Emergency enterprise loans based on mobile money led MSME credit ratings
- Education, health, and housing incentives integrated with health/ education data
- Natural disaster response coordination using AI prediction and management software

Challenges: While digital payments are used in the country, there remains considerable scope for digitization and integration of the system via full-scale rollout of digital cash transfers, end-to-end digitization of all forms of social safety net, and development of a dynamic, responsive, and fully integrated digital social safety net system.

Current progress: The government has launched a citizen-centric digital payments infrastructure enabled by digital platforms such as E-Challan and EkPay, with agent banking services rendered through 4,000 Digital Centers and 1.5m+ citizens having received allowances. Benefits include:

- Leakage-free disbursement of social safety net payments
- Enablement of future digital finance innovations around savings, credit, insurance

Learnings from other countries: Bangladesh can draw inspiration and learnings from international peers including USA and India:

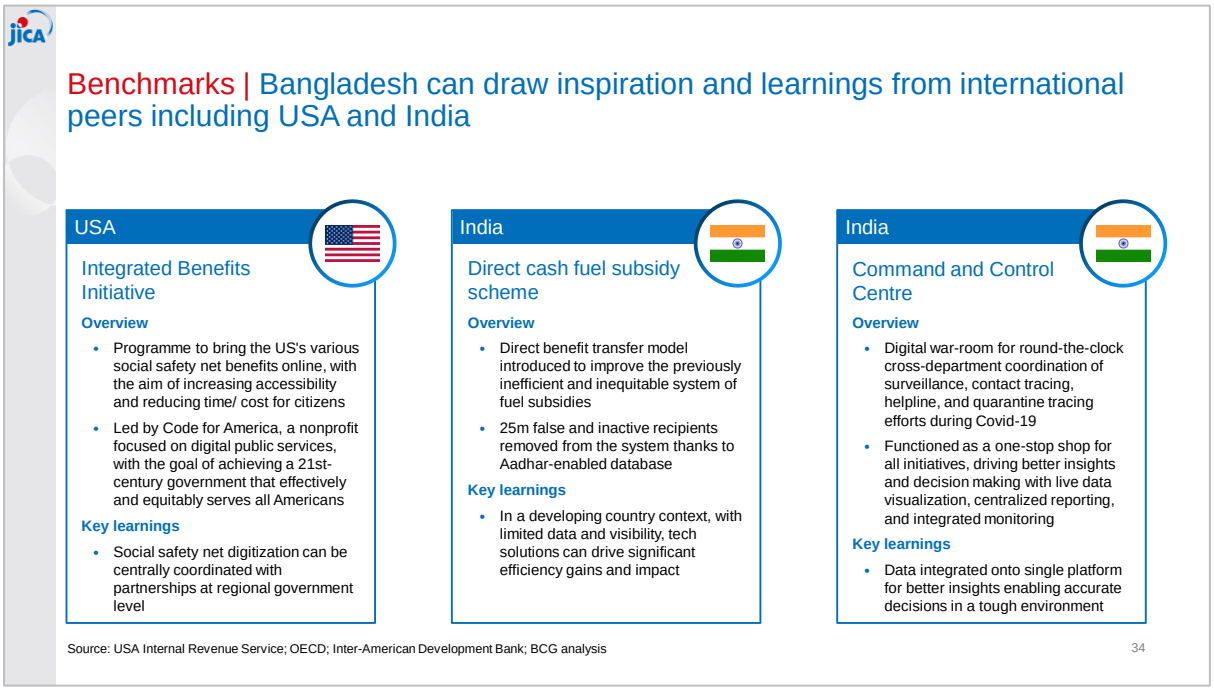


Figure 34: International benchmarks on smart social safety net

Initiatives to be undertaken by Bangladesh:

Bangladesh must launch a phased digital and cultural transformation program to build a world class social safety net ecosystem.

Program objectives:		
Ensuring rapid, effective, and equitable social safety net response to crises for the country's vulnerable citizens		
Program targets		
2025	2031	2041
• Digital technologies under development and trial across all social safety net use cases	• 100% of required cash transfers with digital option	• End-to-end digitized social safety net ecosystem, enabling world class disaster resilience

Program components	**Objectives**
Digital cash transfers at scale	• Refining and expanding current mobile money cash transfer systems to cover all citizens at risk, including databases and delivery mechanisms
Digital public works platforms	• Designing and trialing an emergency employment low skilled digital gig platform and establishing a supporting skills profile database for vulnerable and marginalized citizens • Digital public works platforms would be a feature of the Gig Economy Platforms program, covered in separate chapter

Tech-led emergency food and clothing	• Establishing necessary databases and tech delivery solutions to ensure preparedness for disasters, including a family requirements database and drone delivery
Digital emergency enterprise loans	• Setting up a database of MSMEs nationwide with mobile-money enabled credit rating data, to enable provision of emergency loans in the case of disasters
Digital core public service incentives	• Establishing a digital voucher system with direct linkages into local education, health, and housing providers and personal data across the country
Digital disaster response coordination	• Leveraging digital technologies such as an emergency social safety ERP system and remote drone imagery to enable rapid and coordinated response to future disasters
Program execution/ ownership	
Lead Agency	• Ministry of social welfare
Implementing body	• Directorate of Social Welfare in collaboration with ICT Division
Program contributors	• a2i • Ministry of Finance • Ministry of Social Welfare • Ministry of Health & Family Welfare • Palli Daridro Bimochon Foundation
High level implementation timeline:	
• **Launch:** 12 months • **Stabilize:** 3 years • **Scale:** 3-4 years	

Table 26: Implementation overview for Smart Social Safety Net

4.2.13 Smart Public Services and Paperless Administration

Context: Digital tech can play a vital role in building world class government in Bangladesh, by replacing paper-based processes and transforming services.

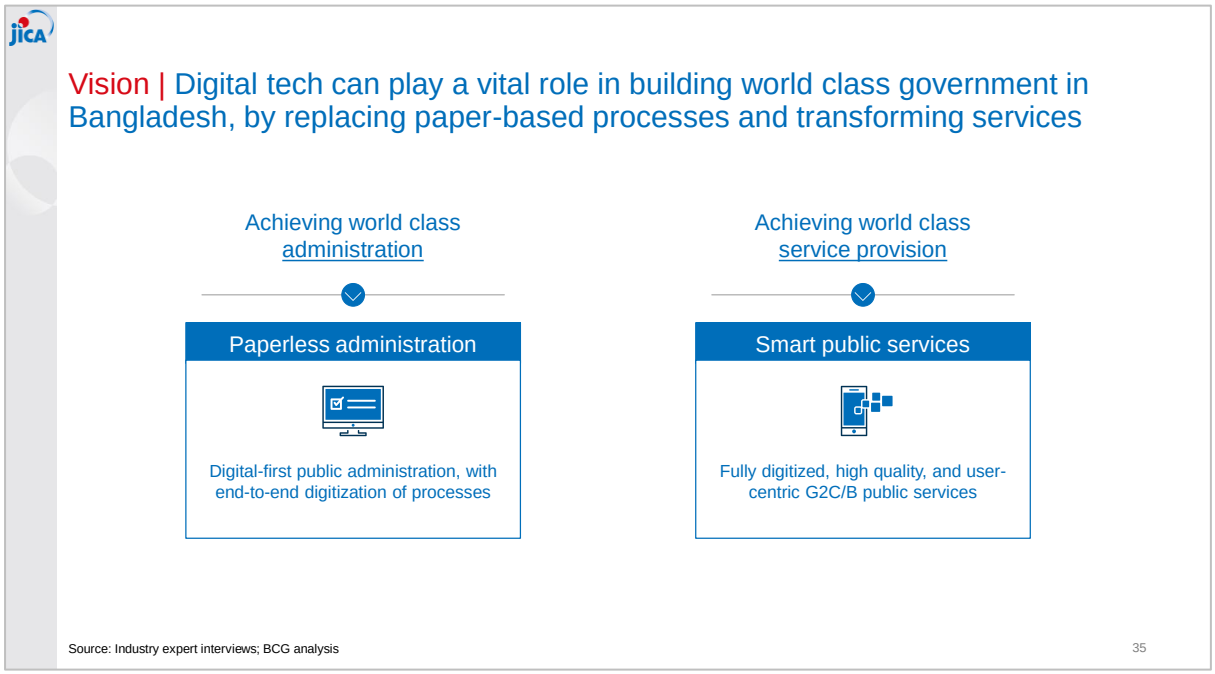


Figure 35: Required initiatives to achieve world class administration and services

Bangladesh has ambitious goals for efficient, accountable, user-centric public administration and service provision, but faces several challenges that are holding the country back from realizing this vision:

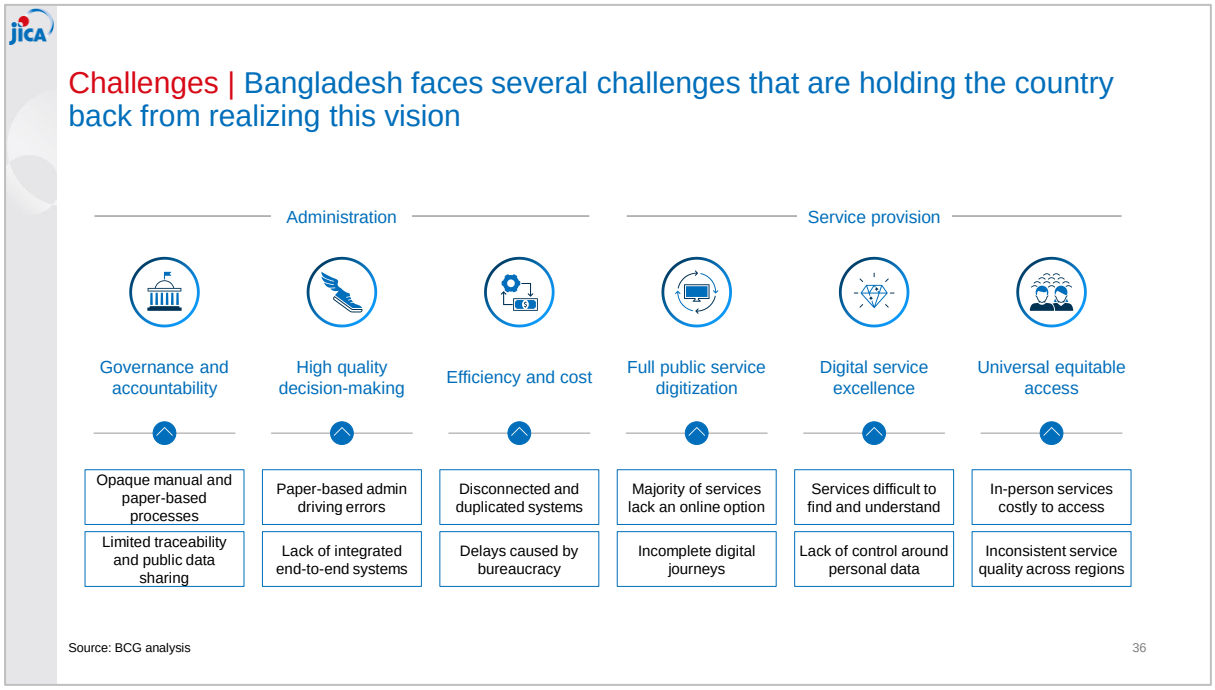


Figure 36: Challenges limiting Gov't administration and service provision

Progress: Bangladesh is already making progress towards digitization of public administration via a range of digital point solutions; however, the country still lacks end-to-end digitization. Solutions launched include the e-Nothi electronic document management system,

the Porichoy digital signature solution, the e-Form online forms portal, and the National Portal government services gateway.

Additionally, the home-grown Government Resource Planning (GRP) project by Bangladesh Computer Council, is a significant leap towards Government-wide integration of public administration functions and services. As the Government's ERP system, it integrates existing digital administrative services like e-Nothi, e-GP (by Ministry of Planning), Personal Management Information System (by Ministry of Public Administration), Integrated Budget and Accounting System (Ministry of Finance), etc. GRP is hosted on the BNDA National e-service bus to enable interoperability. Built on modular approach, it extends beyond integration of existing systems to extend 9 service categories for digital public digital administration spanning Meeting Management, Inventory Management, Asset Management, Human Resource Management, Procurement Management, Budget Management, Accounts Management, Audit Management, and Project Monitoring.

Digitization of public services is a priority for Bangladesh, as a key pillar of the Digital Bangladesh program, and as a focus of major cross-government initiatives and strategies:

- e-Government Master Plan: Defined in 2019 to provide a strategic guideline and implementation plan of government ICT innovation, including an assessment of the current state of e-services with a prioritized list of 44 proposed digital public services
- Digital Service Accelerator: Launched by a2i and the Cabinet Division to facilitate further e-Services across Ministries, in addition to the 22% of 2.7k public services already available online

Adoption of digital public services by citizens is high by global standards, however quality remains an issue, with considerable variation in satisfaction, as well as concerns around control of data.

Digital transformation: Bangladesh must transform its administration with the adoption of digital tools and systems:

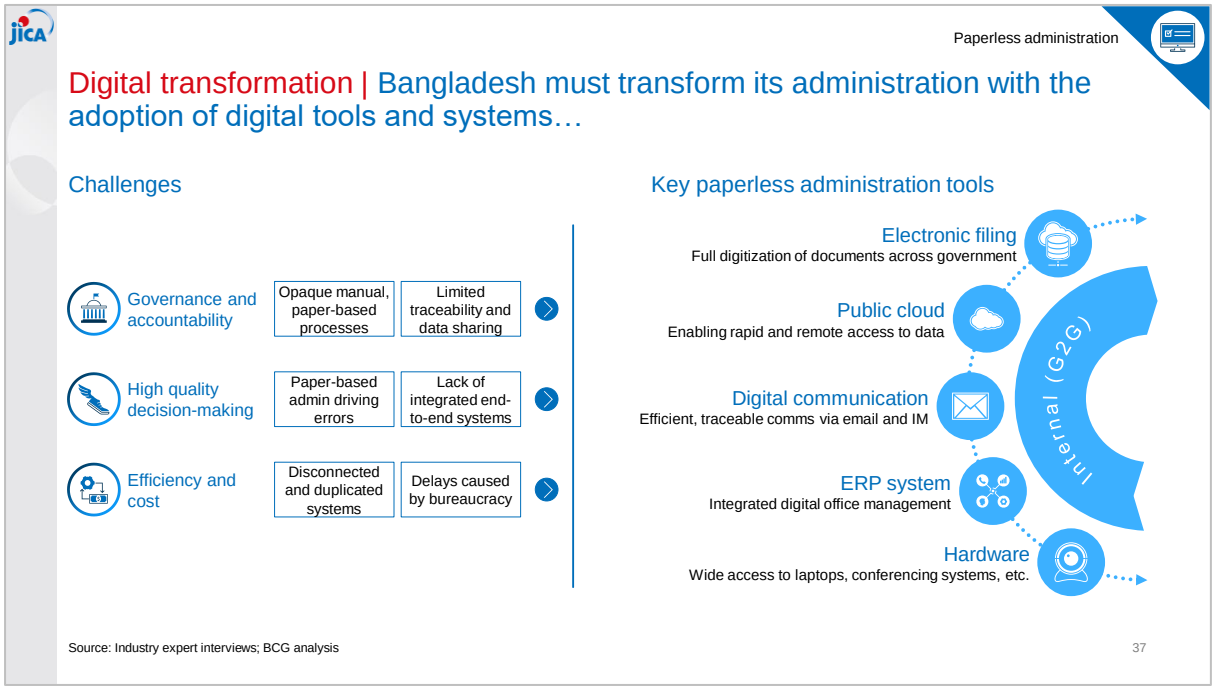


Figure 37: Key elements of paperless administration and challenges to be addressed

Additionally, it is critical to take action to achieve the country's vision of world class public services, by addressing current challenges:

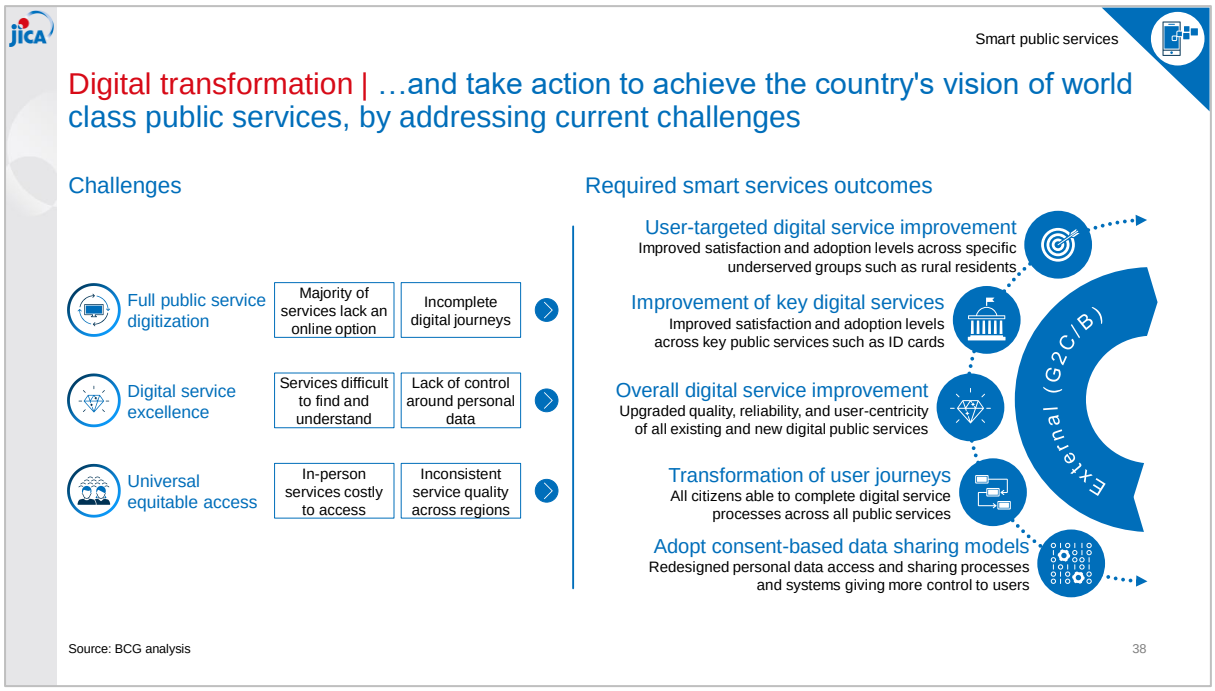


Figure 38: Key elements of smart public services and challenges to be addressed

Learnings from other countries: Bangladesh can draw inspiration and learnings from international peers including UAE, Denmark, and Estonia:

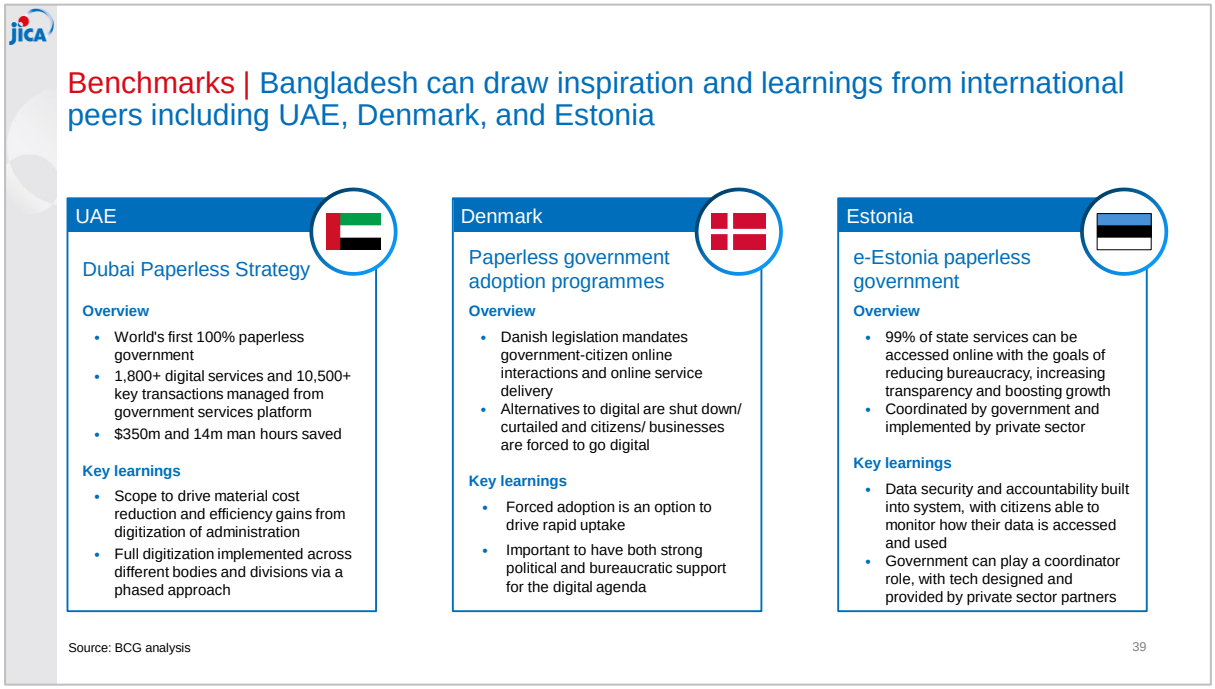


Figure 39: International benchmarks on smart public services and paperless admin.

Initiatives to be undertaken by Bangladesh:

Driving Paperless Administration and Digital Public Services will require a cohesive program of both operational and cultural change.

Program objectives:		
Driving smartification of public services across ministries (e.g., MoFA, MoC, IRD etc.) through a systematic program of quality assessment and assurance of current and future initiatives		
Program targets		
2025	2031	2041
• 100% of internal comms in-person or digital • 100% of civil servants equipped with required digital tools • Service transformation strategy defined for every digital public service • 100% awareness within government	• 100% of documents digital • 100% awareness amongst citizens	• 100% of public services available online with 95%+ citizen satisfaction

Program components	**Objectives**
Electronic filing	• Enacting full digitization of documents across government, eliminating use of paper in administration
Workflow management software	• Developing integrated digital office mgmt. software, centralizing operations across departments
Digital communication	• Setting up fully integrated, efficient, and traceable internal comms, including email and instant messaging
Digital devices	• Rolling out digital hardware across all levels of government, ensuring wide access to laptops, conferencing systems, etc.
Process redesign	• Establishing new processes and operational norms to enable the rollout of paperless administration
Holistic service quality assessment	• Establishing a baseline of quality of digital services via surveys, focus groups, and desk research to identify issues and gaps
Service excellence build	• Defining digital public service creation standards and guidelines to share best practice around processes and technologies
Sustainable excellence	• Setting up cross-functional and cross-ministry working groups to coordinate the implementation of service transformation
Skills training	• Providing training, digital resources, and ongoing guidance for government employees adopting new tech

Adoption campaign	• Raising awareness of the benefits of paperless administration and digital services amongst gov and citizens
Program execution/ ownership	
Lead Agency	• ICT division
Implementing body	• ICT Division
Program contributors	• a2i • BCC • MoPA • All line ministries
High level implementation timeline:	
• **Launch:** 6 months • **Stabilize:** 18 months • **Scale:** 3-4 years	

Table 27: Implementation overview for Smart Public Services & Paperless Admin.

4.2.14 Police Modernization

2041 vision: The police force of the future in Bangladesh will be responsive and proactive, leveraging advanced digital technologies across operations and administration, including:

- Prevention of crime using predictive analytics to model future risks
- Detection of crime via smart video surveillance systems and AI
- Crime identification & prevention via smart digital solution through community engagement
- Crime response organized with resource deployment optimization software
- Investigation aided by digital casefiles and biometrics
- Administration of police via digital criminal records database and collaboration tools

Challenges: Policing in Bangladesh has historically been overtly reliant on manual processes and not designed for the modern digital age. Specific challenges include limited tech-enabled mobile and responsive policing, manual handling and processing of intelligence, lack of digital communication methods, a lack of AI and advanced analytics supported pre-emptive crime prevention, and widespread use of paper-based records.

Current progress: Bangladesh has introduced various digital point solutions to improve services, including:

- Online Police Clearance Certificate: Issued to Bangladeshi emigrants; QR verifiable by foreign missions
- BD Police Phonebook: Validated contacts and addresses of Bangladesh Police
- Bangladesh Police Accident Info app: Used by police to log info on traffic accidents
- Service Friendly Traffic Management System: Real time traffic data and control
- BD Police Helpline: Service delivery app for police-citizen collaboration and info sharing
- BD Police Photo Edit App: Digital image forgery testing tool
- PMIS: Personnel Information Management system

- Online GD: Online General Diary (GD) for lost and found

Learnings from other countries: Bangladesh can draw inspiration from international peers including France, Canada, Singapore, and Norway:

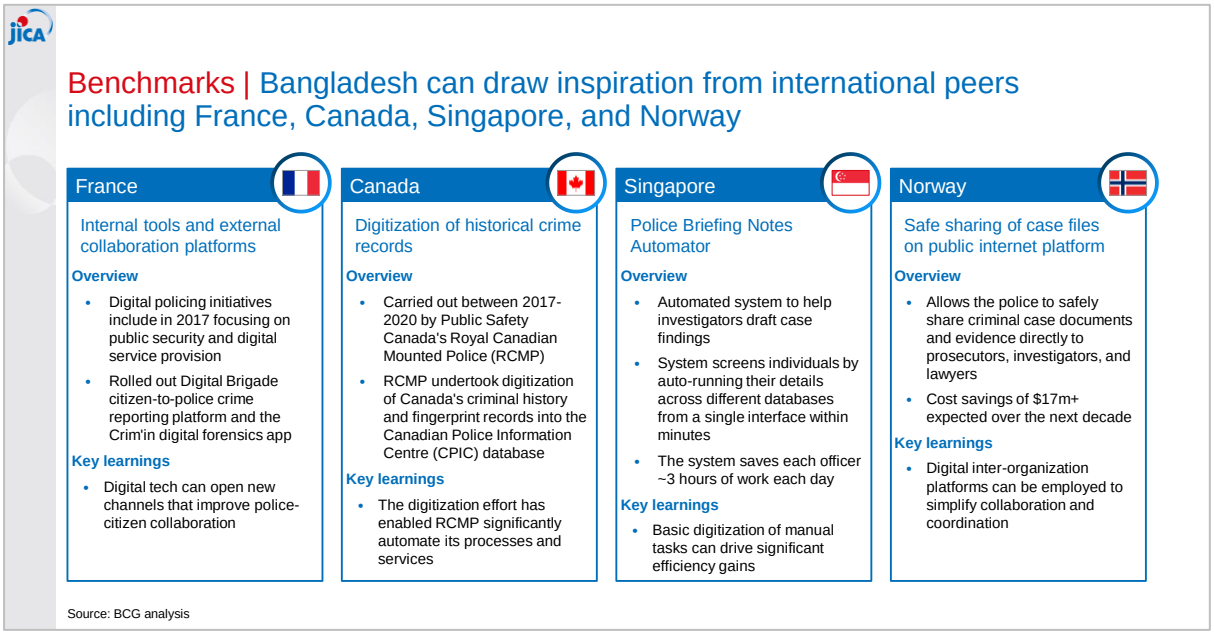


Figure 40: International benchmarks on police modernization

Initiatives to be undertaken by Bangladesh:

Bangladesh must follow a well - orchestrated set of initiatives to achieve their vision 2041.

Program objectives:		
Building a responsive and proactive police force fit for the 21st century, by leveraging advanced digital tech across operations and administration		
Program targets		
2025	2031	2041
• Solutions under development and trial across entire system • Data being actively used to generate insights	• 100% process re-design and E2E implementation • 100% coverage of frontline officers and communities	• Leading police force leveraging smart technologies in service provision and combating crime
Program components	**Objectives**	
Smart prevention systems	• Establishing proactive policing systems with the use of digital technologies, to identify and handle threats before they materialize – such as predictive analytics	

Smart detection systems	• Deployment of crime detection solutions, such as online crime detection software and smart video surveillance systems, to increase effectiveness of policing • Crime identification via smart digital solution engaging communities
Smart response systems	• Adoption of digital technologies such as resource deployment optimization software to enable faster incident response and wider coverage
Smart investigation systems	• Leveraging digital solutions to enhance the ability of police to investigate and solve crimes, such as through biometric suspect identification
Smart administration platforms	• Employing internal police force management optimization and efficiency tools such as digital collaboration and digital criminal records database
Digital criminal record database	• Full digitization of historical criminal records into a single, accessible, national database, with processes to ensure ongoing update and usage
Skill training program	• Ensuring full adoption and utilization of new technologies by providing training sessions, digital resources, and ongoing guidance for police officers adopting new tech
Awareness campaign	• Driving awareness of digital policing program and tools amongst both police force and citizens
Program execution/ ownership	
Lead Agency	• Ministry of Home Affairs
Implementing body	• Ministry of Home Affairs in collaboration with ICT Division
Program contributors	• Bangladesh Police • BCC
High level implementation timeline:	
• **Launch:** 12 months • **Stabilize:** 3 years • **Scale:** 4-5 years	

Table 28: Implementation overview for Police Modernization program

4.2.15 ICT Policies

Context: ICT policies are essential to promote the multipurpose use of ICT and to ensure transparency and accountability of citizens, government, and businesses to achieve national development goals.

Series of following recent trends have implied that Bangladesh needs to think about polices in Cybersecurity, Emerging Technology (particularly AI) and ease of doing ICT business.

- Cybersecurity and Data Protection policies – Increase in number of data breaches and data privacy infringements along with increase in use of free & open software as a platform
- Emerging Technology policies – On-going "technologization" of society through emerging technologies (e.g., AI, IoT, Blockchain etc.) along with an impending data explosion through use cases from smart city enabling technology (e.g., AI, connected devices etc.)
- Ease of doing ICT business policies - ICT is increasingly a key driver of economic development for emerging and developed markets. There is also high level of interdependence between economic activity and ICT infrastructure development.

Current Progress: Several key initiatives have been launched in each of these key policy areas –

- Cybersecurity and Data Protection:
  - **National Cyber Security Council:** Council performs different roles such as developing national cyber plans, incident response capacity planning and offering strategic advice
  - **National Incident Management Capacity**: To create the Bangladesh threat landscape report that highlights critical cyber threat areas
  - **National Cyber Security Framework**: The framework outlines minimum-security measures that all stakeholders must abide to
  - **Digital Security Act:** The Digital Security Act passed in 2018 to protect against spread of hatred through social media
  - **Digital Security Agency (DSA):** Digital Security Agency is a Bangladesh Govt security and intelligence agency responsible for monitoring online communication and countering cyber crimes
- Artificial Intelligence roadmap: Bangladesh has put in place a comprehensive 5-year roadmap to institutionalize AI policies

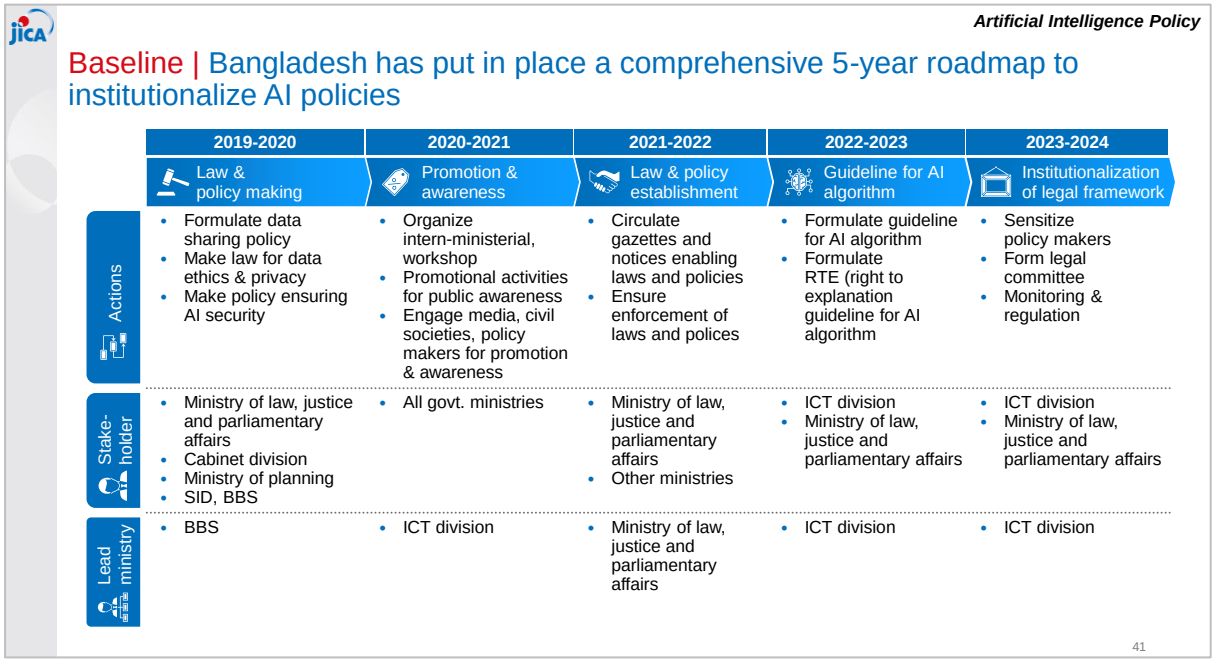


Figure 41: Bangladesh's Artificial Intelligence (AI) policy roadmap

- Ease of doing ICT business policies:
  - Initiatives to streamline tax incentives
    - 100% CIT exemption for ICT/ software industry
    - Access to Equity Entrepreneurship Fund to support equity provision
    - 10% export subsidies/cash incentives on software, ITes, computer hardware export
    - Avoidance of double taxation for foreign investors basis bilateral agreement
    - 2% duty on ICT related hardware imports
  - Talent and Infrastructure policies
    - VAT exemption on local bills during production
    - Fully subsidized customized training program for technical & managerial skills.
    - Stamp duty exemption on mortgage deed registration
  - Initiatives to attract foreign investment
    - 100% tax exemption for income derived from software development & Information technology enabled services (ITes)
    - 2% duty on ICT related hardware imports
    - Access to 10% cash incentive for exports
    - Full repatriation of capital & dividend: No restrictions on foreign equity holding

Learnings from other countries: Key ICT policies that have been implemented by other best-in-class countries –

Figure 42: Examples of ICT policies drafted by other countries

Bangladesh can draw inspiration and learnings from several international peers across each of these 3 policy areas:

- **Cybersecurity and Data Protection:** Bangladesh can draw inspiration and learnings from Israel's and UK's Cybersecurity policy

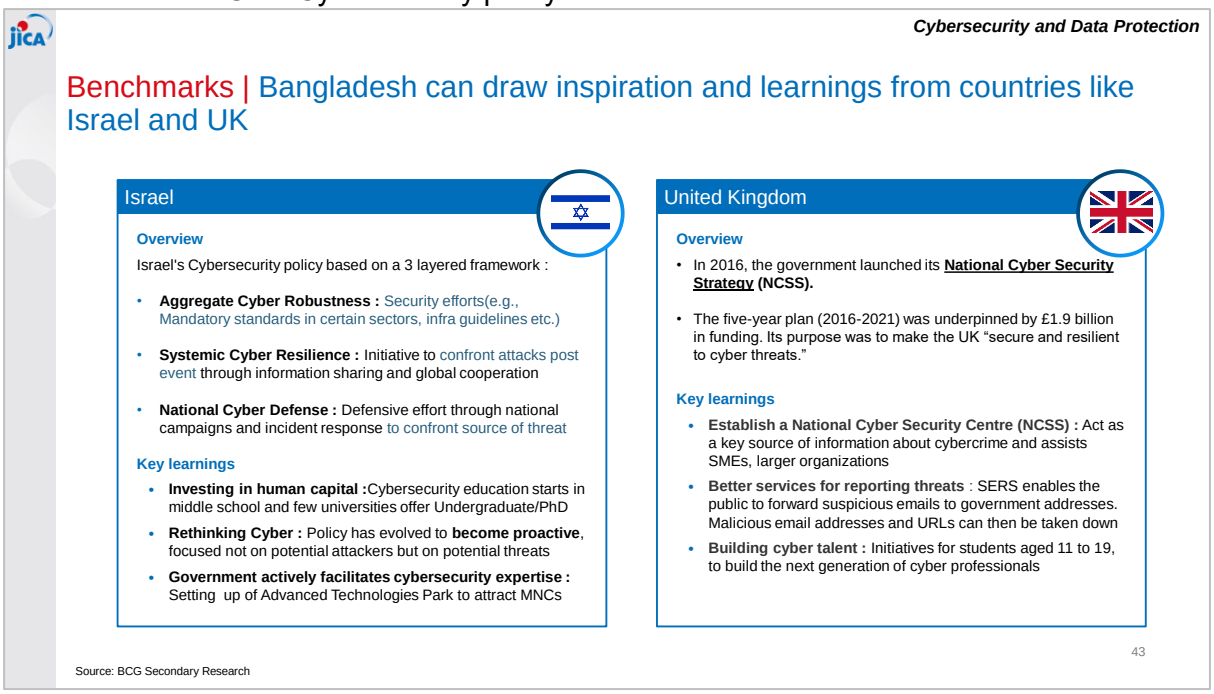


Figure 43: International benchmarks on cybersecurity and data privacy policies

- **Artificial Intelligence:** Bangladesh can draw inspiration from France and South Korea on key AI policy aspects

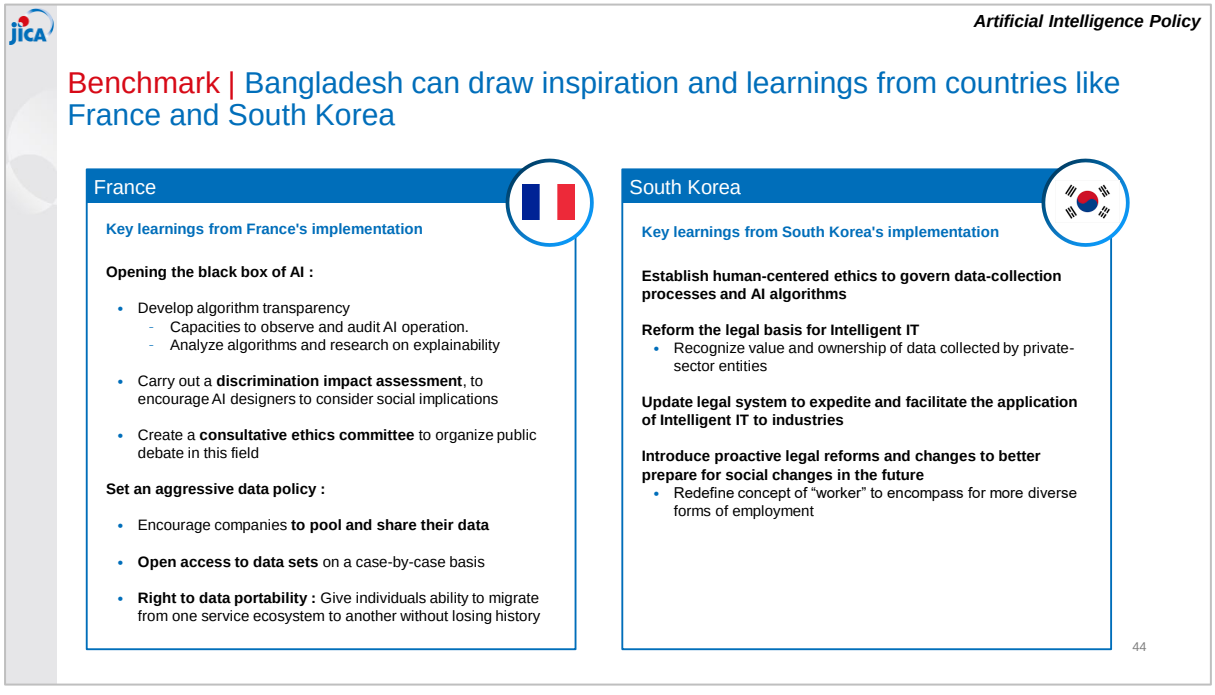


Figure 44: International benchmarks on Artificial Intelligence (AI) policy

- **Ease of doing ICT business policies:** India, Vietnam and Malaysia have crafted best-in-class policies on enabling ICT businesses.

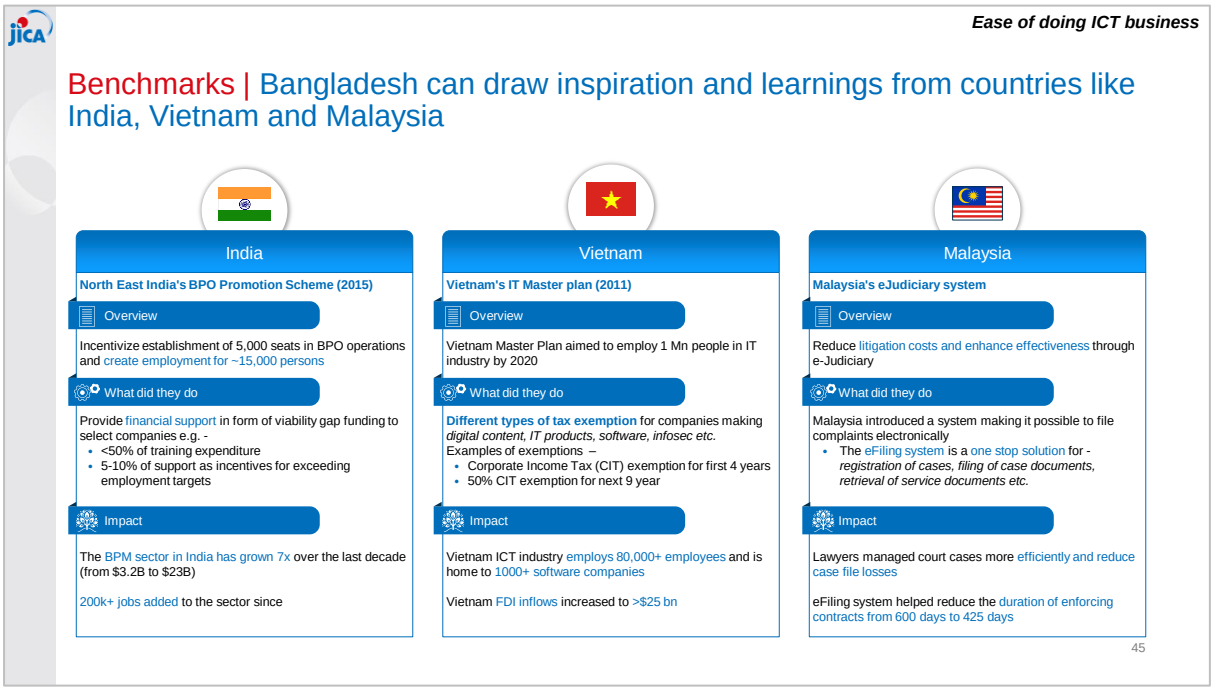


Figure 45: International benchmarks on policies for ease of doing ICT business

Initiatives to be undertaken by Bangladesh: Bangladesh to implement key sets of initiatives to facilitate establishment of key initiatives in each policy area:

Program objectives:			
Incorporate policies to channelize govt. funding and taxpayer's money into sustainable mechanisms of development likely to benefit generations			
Program targets			
Today	2025	2031	2041
• Scope for improvement in terms of number of data breaches, ICT job creation, ease of starting a business	• Draft policies and updates made to cybersecurity, data protection, emerging tech areas • AI legal committee formed	• Implementation of National Data protection • 0 data breaches • WEF/IPR ranking jump	• Concrete detailed policies and corresponding governance created for cybersecurity, emerging tech areas and economic incentivization areas

Program components	**Initiative**	**Description**
Cybersecurity and Data Protection	• Intellectual Property Rights (IPR) education	• Increase IPR awareness through educational campaigns in academic institutions, industry etc.

	• Increase Cyber law coverage	• Clearly define and educate on the set of cyber policy areas that will be administered (e.g., Infrastructure and Networks, Emergencies, Data Protection etc.)
	• Build Cyber talent	• Modify school and graduate curriculum to include cyber education.
	• Modernization of Cybersecurity Standards	• Deploy standards like Zero Trust Architecture, Multifactor Authentication etc.
	• Continuous Diagnostics and Mitigation (CDM)	• Provide cybersecurity tools, integration services, and dashboards to participating agencies
	• Personal data governance policies	• Mandate for organizations to ensure personal data is gathered legally and under strict conditions
	• Critical information infra protection policies	• Devise audit parameters for threat preparedness & cyber-insurance products
Artificial Intelligence	• Data-related regulations	• Data-related regulations, including data collection, management, and privacy
	• AI ethical standards	• Involves rules, standards, and principles to guide ethical and sustainable use of AI
	• Research & Innovation	• Policies to establish R&D foundations to identify priority sectors to be developed • Provide direct short/long term funding & identify government AI priority areas
	• Stimulus measures	• Tailor foreign investment policies to facilitate market entry of AI companies • Allow certain privileges to AI companies and start ups
Ease of doing ICT business	• Provide benefits for direct job creation	• Provide subsidies seat for each new headcount added basis certain criteria (min wage, min head count etc.)

	• Partner with private sector players for local capability development	• Create joint training institutes and ICT labs, set-up with funds from govt and global experts
	• Tailored benefits to attract first wave of large investors	• Tailor incentives to attract investors e.g., Exempted VAT, Central Sales Tax for 10 years
	• Streamlined processes while setting up business	• Introducing digital solutions for tax filing and judiciary
	• Dedicated relationship management for investors	• Enable marquee investors to navigate across different government agencies and reduce physical visits
	• Increase duration of tax exemptions for global firms	• Become more cost competitive through longer duration tax exemptions
	• Software IP valuation support	• Govt support is necessary for local IT/ITes players for valuation of their IPs so that they can approach banks for funding
Program execution/ ownership		
Lead Agency		• ICT Division
Implementing body		• ICT Division working with relevant ministries, for example, Min. of Commerce, Min. of Finance, Min. of Law, Justice & Parliamentary Affairs, etc.
Program contributors		• Cabinet Division • Ministry of Planning • BCC • SID, BBS • Other line ministries
High level implementation timeline:		
• **Launch:** 6 months • **Stabilize:** 2 years • **Scale:** 2-3 years		

Table 29: Implementation overview for ICT Policy program

4.2.16 Digital Leadership Academy

Context: Digital Leadership Academy (DLA) will be a government led program with 2 key objectives:

1. Digital upskilling and re-skilling at all levels of the Government, from Local Government Representatives to MPs.
2. Unlocking digital transformation capabilities in private sector leadership by extending offerings to select C-suite executives across focus sectors

Current state: Bangladesh Public Administration Training Center is an apex institution for 360-degree training of public sector officials, targeting most levels of Government – From all cadres of Bangladesh Civil Services to Government support staff (Class III and IV). Digital skills are embedded as compulsory modules in most of its flagship training programs. The focus within digital skill related courses is customized to the target group. For example, the Policy Planning and Management Course for Additional Secretaries focuses on strategic and policy related courses on ICT and e-Governance. Whereas the Special Foundation Training Course for Aged officers focuses on building basic technical skills required to operate digital technologies in governance.

Challenges: The people-related imperatives of rapid digitalization of the economy are different for the Government and the private sector. The country's government continues to face people related challenges on 3 areas:

1. Adoption: Limited motivation to adopt digital skills among select segments of officials due to fear of job losses resulting from increased public sector digitalization. Awareness of benefits of digital skilling is also limited.
2. Service oriented mindset: sometimes, government officials lack citizen-centric as well as service-focused mindset. This is because of the absence of KPI based evaluation culture in public services. Therefore, a mechanism is necessary for providing incentives to promote good performers as well as to penalize insincere performers to redirect and lead them to a service-focused professional career
3. Specialization: While Government organizations have officials with general digital skills, there is a lack officials with specialized digital skills required to operate and develop emerging ICT solutions (e.g., Web design)
4. Future-readiness: While most Government officials are aware of emerging technologies like AI, Robotics, IoT, etc., select segments lack the relevant technical skills and understanding of implications of these technologies on the economy.

At the same time, leaders in the private sector are facing some tough questions as they drive digital transformations. Examples of some pressing concerns of such leaders are:

1. How do anticipate disruption? How do we develop disrupting models?
2. With new emerging digital roles, how do we optimally structure the organization?
3. What does digital mean for how we interact with our consumers, employees, and suppliers?
4. How do we become agile to operate in this digital environment?
5. How do we embed the test and learn mindset? How do we start small and scale fast?

Initiatives to be undertaken by Bangladesh:

Program objectives:			
Digital skilling at all levels of the Government and unlocking digital transformation capability in private sector leadership pool			
Program targets			
Current state	2025	2031	2041
• Digital skilling of Gov't and private sector leadership through modular courses / in-house training	• ~10,000 Gov't officials and private sector C-suITes trained / groomed by DLA • Implement KPI based performance evaluation mechanism • Maturity model-based capacity development	• DLA emerges as national center of excellence for digital skills in public & private sector digital transformation	• DLA emerges as a regional center of excellence in public and private sector digital leadership capability build

Program components	**Objectives**
Competency framework	• Defining required competencies across proficiency levels for all roles
• Maturity Model	• Maturity model design for career-long capacity development
Baseline assessment	• Assessment of critical capability gaps and needs for each official
Curriculum design	• Development of program architecture and detailing out each program
Individualized learning paths	• Deliver customized learning paths to each official
Partner ecosystem	• Deliver outcomes through a network of global and national partners
Enablers	• Enable outcomes through learning management system, Smart Bangla Campaign, program evaluation and operating model / governance mechanism
Extension to private sector	• Extend customized DLA offerings to select C-suite executives across focus industry sectors
Program execution/ ownership	
Lead Agency	• Ministry of Public Administration

Implementing body	• ICT Division
Program contributors	• Cabinet Division • BPTAC, Ministry of Public Administration • BCS Administration Academy, Ministry of Public Administration • Bangladesh Computer Council
High level implementation timeline:	
• **Launch:** 3 months • **Stabilize:** 18 months • **Scale:** 2 years	

Table 30: Implementation overview for Digital Leadership Academy

With civil servants of Bangladesh included as one of the key beneficiary segments of the Digital Leadership Academy, this program will be well positioned to achieve select objectives of the Civil Service 2041 initiative currently envisioned by Bangladesh. As Bangladesh implements this Digital Leadership Academy, the implementing agency should ensure it is suitably embedded into the Civil Service 2041 initiative. The contours of such an arrangement should be evaluated to avoid duplication of resources across both. An overview of Civil Service 2041 Initiative is outlined below:

Objectives: Civil servants accomplishing Digital Leadership Journey are expected to progress in the following areas:

1. Leadership
2. Digital technology skills
3. Data skills
4. Human-centric design

Civil servants will be safe netted by mesh network of collaboration to sharpen actionable insight, competence, autonomy, and purpose that blends into Governorship.

Roadmap: The currently outlined roadmap of Civil Service 2041 initiative is detailed below.

Year	Initiatives	Results	Impact
2023	CS2041, Nothi, Service Process Simplification, Digital Leadership, Civil Service Innovation Lab (CiSIL), Human Centric 4IR Technology Adoption, Innovation Fair Reward & Recognition	50% decisions made and delivered digitally 100% citizen-centric innovations through CiSIL and CS2041	Culture of continuous innovation established for next-generation good governance

2025	CiSIL network with training centers and Government departments Civil service training curriculum reform	75% decisions made and delivered digitally 100% citizen-centric innovations through CiSIL and CS2041 Reward and recognition system institutionalized CiSIL established	
2031	Global branding of Civil Service 2041	Govpreneurship linked with career progression 10% civil servants become Govpreneurs	
2041		Govpreneurs leading nation-building 20% civil servants become Govpreneurs	

Table 31: Currently outlined roadmap for Civil Service 2041 initiative

4.2.17 Smart Planning

2041 vision: Government future plan will be sustainable, effective and timebound, leveraging cutting-edge digital technologies throughout the socio-economic development plan including

- Preparation, processing & appraisal of development project using digital technologies.
- Digital formulation of annual development program.
- Preparing national plan leveraging artificial intelligence tool.
- Digitization of social science research.
- Digitization of Monitoring & Evaluation System.

Challenges:
The government planning system has relied on paper-based, complex and disorganized data. The traditional paper-based planning doesn't allow proper data analysis (Big Data) and preparing reports. For this reason, decision makers face problems to distributing national resources.

Current Progress:
To achieve the vision and address some of the challenges, the government has taken some initiatives for digitalization of planning which are:

- ADP/RADP Management System (AMS) for distributing sector wise annual development budget.
- Disaster and Climate Risk Information Platform (DRIP) that provides necessary disaster and climate risk data and information to carry out disaster impact assessment (DIA).

- Research Management System (RMS) which automates the research process.
- Public Investment Management (PIM) tools for strengthening project appraisal system.

Learnings from other countries:
Bangladesh may acquire valuable lessons from two nations that have significantly advanced planning process through digitalization as compared to global benchmarks.

Singapore	China
Virtual Singapore: A Digital 'Twin' for Planning (Innovation Type: Institutional Pioneer) **Overview** • GIS to model and analyze spatial characteristics • BIM (Building Information Modeling) to design and simulate new developments **Key learnings** • Digital tech can open the scope that improve the planning process of Bangladesh	**"Accelerating Digital Development and Building Digital China"** creating new advantages in the digital economy to accelerating digital development **Overview** • China is already a major player in global data flows • China's digital globalization is just getting started and is likely to have a major impact on the world economy • Sectors and commodities in the China's Dynamic Computable General Equilibrium (DCGE) model **Key learnings** • China is exporting digitally driven planning models which help Bangladesh for smart planning

Initiatives to be undertaken by Bangladesh:
Government must develop and implement a set of key digital technologies to build a world class digital planning system.

Program objectives		
Building sustainable, effective, timebound socio-economic development plan by integration digital and advance tech throughout services.		
Program targets		
2025	2031	2041
• 100% digitized of all initiatives designed or launched	• 100% end-to-end digitization of smart planning • 100% use of various advance digital tech solutions (Artificial Intelligence, Big Data, etc)	• Advance digital tech implemented at scale across smart Planning • Continuous innovation in smart planning

Program components	Objectives
AI Based Feasibility and Impact assessment Management	• An integrated and automated, AI technology based, feasibility and impact assessment software infrastructure needs to be developed for decision making on project selection and national project planning.
AI Based Project Processing, Appraisal & Management System	• Full digitization of Project processing, appraisal, and approval process, centralize database, with processes to build as a decision-making tool
GIS Based Project Management System	• Geographic information systems (GIS) let visualize, analyze, interpret, and understand data to reveal spatial relationships, patterns, and trends, which in turn to effective appraisal of project processing as well as proper national resource management
National Plan Management System	• Digital system for national data management including digitize the long- and medium-term plans, raw data extraction, Data projection/forecasting using econometric model tool, Input Output Table (IOT), Social Accounting Matrix (SAM), Analyze data using Dynamic Computable General Equilibrium (DCGE) Model
e-Delta Plan 2100	• An electronic Delta Plan 2100, BDP tools and data including GIS map, Climate Atlas, Meta Model, Urban Resilience, Blue Gold Wiki
CERT, NOC, SOC etc	• Establishing Computer Emergency Response Team (CERT), Network Operation Center (NOC), Security Operation Center (SOC) and related advance security technology at data center of Planning Division. Upgradation of data center at Planning Division as per advanced digital tech
Skills training Program	• Ensuring full adoption and utilization of new technologies by providing training sessions, digital resources, and ongoing guidance for government workers adopting new tech
Program execution/ownership	
Lead Agency	• Ministry of Planning
Implementing body	• Planning Division
Program contributors	• Planning Division • Planning Commission • Private sector tech partners

High level implementation timeline:
• Launch: 12-18 months • Stabilize: 2-3 years • Scale: 4-5 years

4.3 Smart Society

Smart Society will be about creating an inclusive and collaborative society leading a sustainable lifestyle in a Green Bangladesh. Programs under the same are around inclusive financial ecosystem, Green sustainable Bangla, Digital Tolerance & Culture and a Bangla technology stack for interoperability.

4.3.1 Inclusive Financial Ecosystem

Vision: The National Financial Inclusion Strategy of Bangladesh aims to achieve 100% financial inclusion by 2025, by providing at least one regulated financial service account to all adults by that year. It has identified digitalization and innovation as key thrusts in the journey to sustainable and impactful financial inclusion.

Context: There are 5 key requirements to inclusive financial ecosystem in Bangladesh.

1. Innovative digital financial services that respond to market's needs with good product-user fit
2. High volume of digital financial transactions enabled by interoperability of payment systems
3. A financial regulatory framework that empowers innovation to bank the unbanked
4. Widespread access to telecom networks / internet and mobile devices
5. Adequate financial literacy among users

This program focuses on the first two requirements, as digital technologies play a central role in achieving them. The fourth requirement will be an outcome of 2 other programs in the Master Plan – Universal Internet Access and Smart Device Access.

Challenges: MFS accounts per 1000 adults drastically grew from ~1 Mn 2011 to ~825 Mn in 2020. However, over 50% more than half of the accounts have remained inactive. Recently, the share of inactive accounts has grown from 45% to 67% in the period 2018-2020. The recent trend in inactivity was not likely to be driven by lack of bank deposits as commercial bank deposits in the country grew from 48% to 51% during the same period. This indicates significant headroom for growth of cashless payments in the economy.

Key considerations for Bangladesh: The ICT sector should strengthen current efforts towards financial inclusion through 2 programs:

4.3.1.1 Interoperable Payments Ecosystem

Objective: A common platform for interoperable payments among people, business, and government to scale up digital transactions driven by convenience and lower transaction costs

Current state: Financial inclusion in Bangladesh has been driven by adoption of Mobile Financial Services (MFS). MFS transactions grew by ~40% CAGR from 2012-2020, with P2P, Cash-in and Cash-out emerging as major use-cases.

Bangladesh has acknowledged the potential of interoperable payments to boost digital financial transactions. Binimoy Platform (IDTP) is a joint initiative by Bangladesh Bank and ICT Division to accelerate digital financial inclusion through an interoperable payment platform. Controlled launch of P2P use-cases with 13 platform features is planned in 2022. 15 financial institutions have been onboarded for the controlled launch. 13 additional features including expansion of use-cases to P2B, P2G, B2P, B2B, and G2P are planned for launch in Phase 2.

Learnings from other countries: UK and India took different approaches to payment interoperability; Bangladesh can draw significant learnings from both countries.

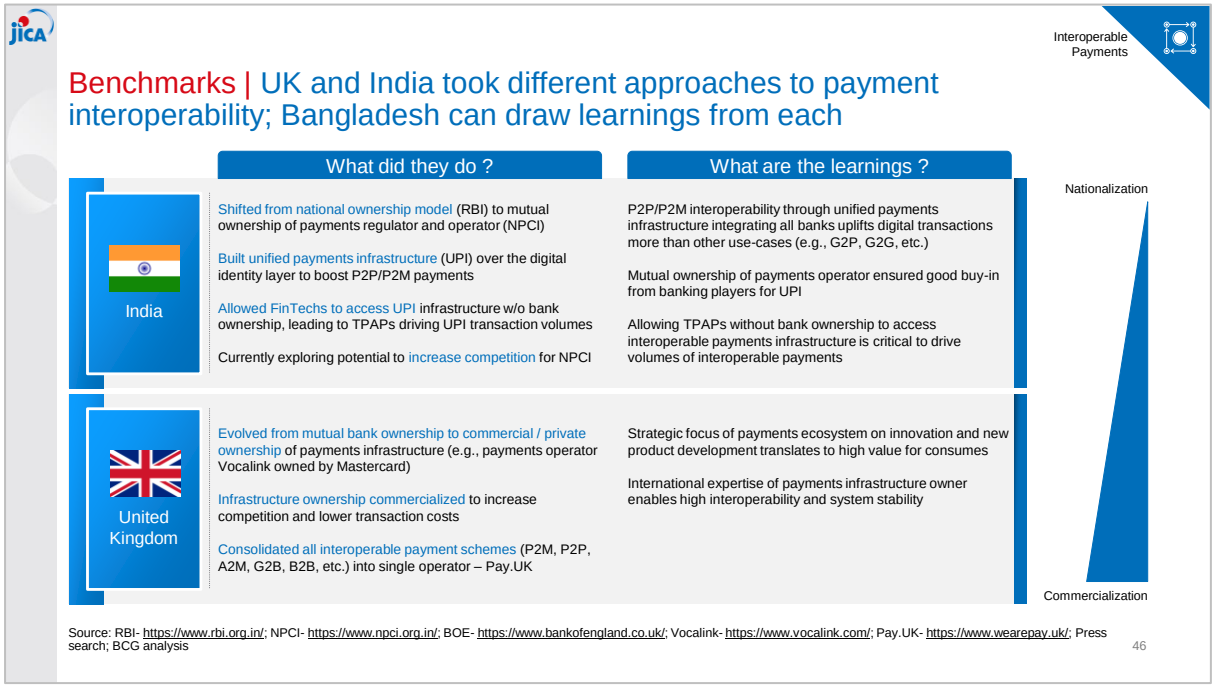


Figure 46: International benchmarks on Interoperable payments ecosystem

Recommendation: With the IDTP project already making significant planned progress, Bangladesh should draw learnings from global benchmarks and continue to action on it.

4.3.1.2 Fintech Accelerator

Context: A unified platform to support FinTech players with an ecosystem of innovation, banking partnerships, funding, and regulatory testbeds, with potential to accelerate growth of FinTech ecosystem in Bangladesh. FinTech startups need more than just regulatory support to achieve scale. There are 4 types of support systems critical to grow FinTech players in an economy:

1. Regulatory support through sandboxes acting as safe spaces for testing innovations
2. R&D and innovation support through access to network of research institutes and scientific communities
3. Funding support through access to incubators, investor, grants, etc.

4. Partnership opportunities for integration of FinTech solutions into traditional financial institutions

Current state: The growth of MFS in Bangladesh has been driven by emergence of multiple FinTech startups in the economy, major ones being bKash, Nagad, Rocket. Achievement of unicorn status by bKash in late 2021 is an early signal of the country's potential to emerge as a regional FinTech hub. Bangladesh Banks has set up the Regulatory Fintech Facilitation Office under its Payments System Department. RFFO has 4 key roles – to address gaps in regulatory knowledge and awareness of FinTech players, understand impact of technologies in the financial services market, apprise the scope of regulatory adaptations to take innovative FinTech solutions to the market and provide opportunity for pilot of FinTech solutions under a controlled environment.

Learnings from other countries: UK, Singapore and Nigeria offer holistic support platforms for FinTech acceleration. Bangladesh should consider best practices from such countries as its shapes a FinTech Accelerator Program.

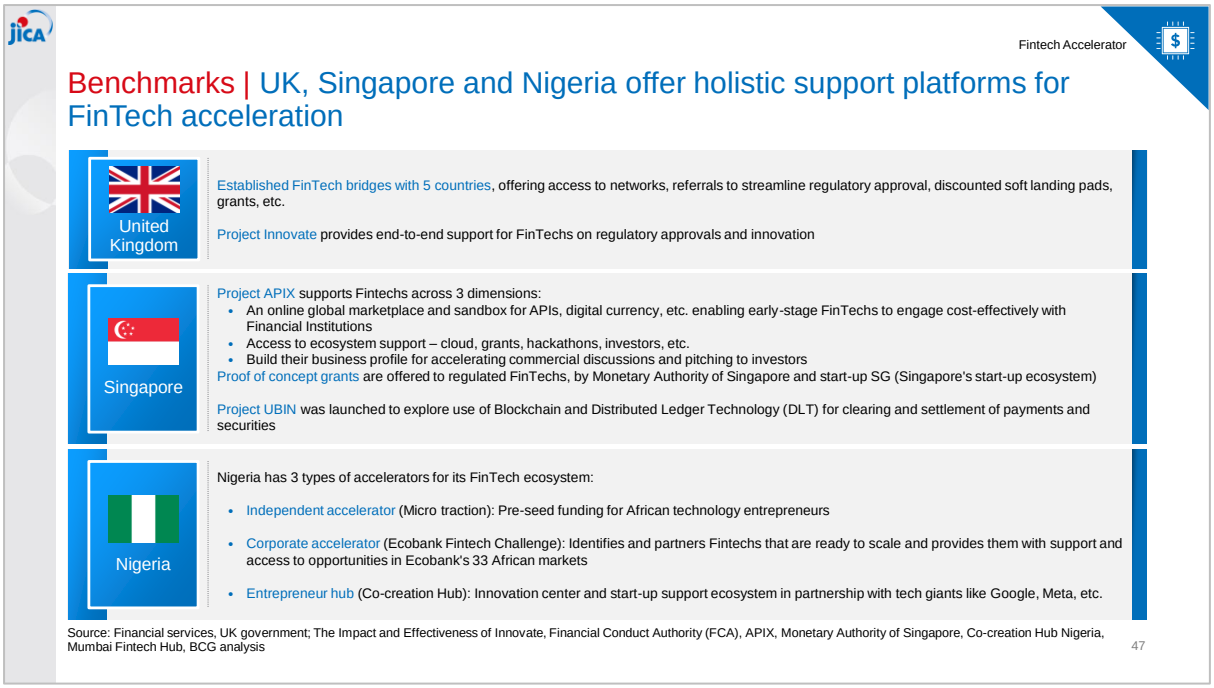


Figure 47: International benchmarks on FinTech accelerators

Recommendation: FinTech Accelerator in Bangladesh should be set up as a unified platform to orchestrate interaction of FinTech startups with 3 key stakeholders and investors. A FinTech Accelerator will play 4 key roles as it orchestrates this ecosystem.

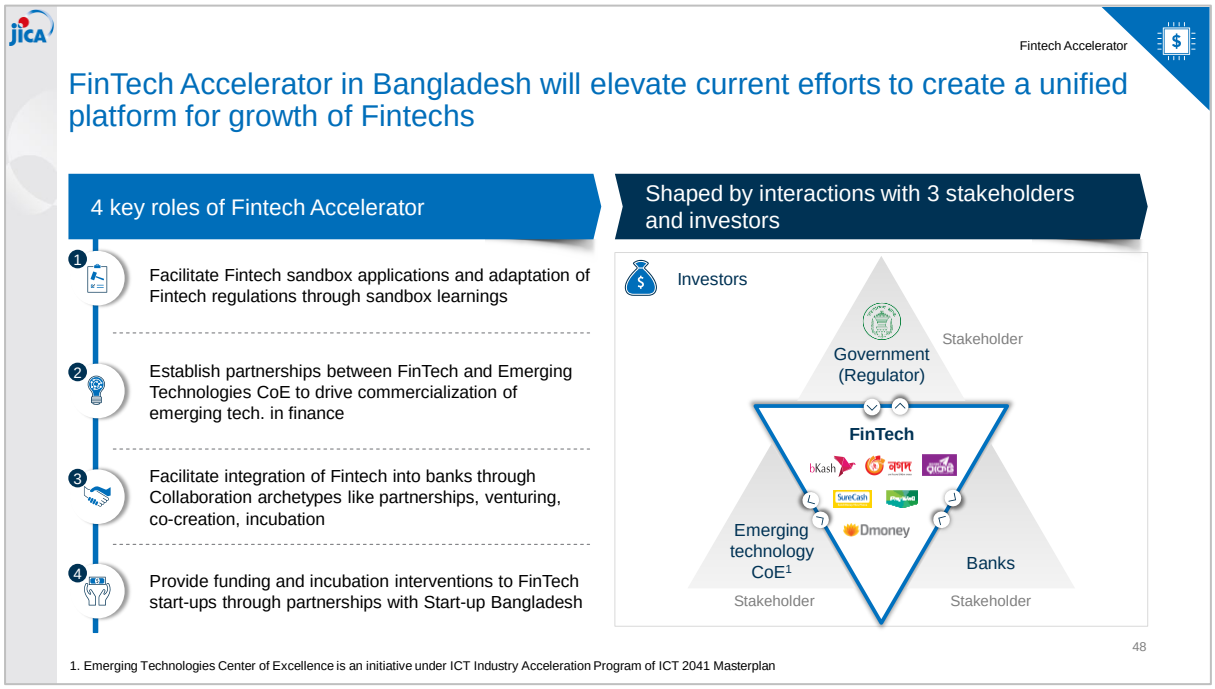


Figure 48: Roles and conceptual design of FinTech Accelerator for Bangladesh

Initiatives to be undertaken by Bangladesh:

Program objectives:			
To create an inclusive financial society driven by digitalization and innovation of financial services			
Program targets			
Metrics	2025	2031	2041
• % Share of digital fin. transactions	• < 50%	• 50%	• 100%
• # home-grown FinTech unicorns	• 2	• 10	• 20
Program components	**Objectives**		
Interoperable Payments Ecosystem	• Scale-up digital transactions by setting up a common platform for interoperable payments among people, business, and government		
FinTech Accelerator	• Setting up a unified platform to support FinTech players with a holistic ecosystem of innovation, banking partnerships, funding, and regulatory testbeds		
Program execution/ ownership			
Lead Agency	• Bangladesh Bank		
Implementing body	• ICT Division		

Program contributors	• Bangladesh Association of Banks • Emerging technologies CoE • Start-up Bangladesh • Micro-finance institutions (e.g., Palli Daridro Bimochon Foundation)
High level implementation timeline:	
• **Launch:** 12 months • **Stabilize:** 2-3 years • **Scale:** 2-3 years	

Table 32: Implementation overview for Inclusive Financial Ecosystem

4.3.2 Green Sustainable Bangla

4.3.2.1 Smart Cities

Context: Smart Cities will help Bangladesh make its citizens, economy, and society more socially, economically, and ecologically sustainable and be more responsive to the needs and desires of its residents, hence, helps improving overall quality of life.

Current Progress: Bangladesh has a "smart city, smart people" campaign in place, but broader strategic thinking is yet to be done. There is a large program ongoing around digitalization of municipality services across the country which has seen significant progress through use cases like implementation of smart waste management, services at doorstep etc. At the same time, organizations like North Dhaka City Corporation have implemented multiple initiatives around Smart traffic, smart surveillance, smart parking, command centers etc. Under this proposed program, the objective will be to design and implement an integrated strategy for Smart Cities with common shared objectives for all the participating organizations.

Bangladesh also has a few key Smart City solutions that have been launched or are under development –

- **Shobar Dhaka** mobile application launched: Through the app, city dwellers can communicate with DNCC directly or report irregularities of the city corporation authorities by sending messages along with location and images
- **Intelligent Traffic System** currently under development (pilot) in partnership with KOICA
  - Piloting underway on Dhaka Mawa Road spanning 39 kilometers
  - Expansion of intelligent traffic system planned for 4,900 kilometers
- **National highways to be under CCTV coverage** to enable Smart Traffic management
  - To be used for services like real-time accident tracking (250 kms of Dhaka Chittagong Highway covered under CCTV)
  - Bloomberg Initiative being engaged under MoU for solutions
- **KOICA has co-developed 5 services:**
  - 4 services close to delivery stage: Municipal certificates, Drain licensing, Smart property management, Water billing
  - 1 service under development: Smart holding tax

- 3 additional modules under development: Integrated waste management (pilot underway), Municipal Committees Compliance and Governance Management (citizen involvement in governance), Social safety network

Key challenges currently being faced in the deployment of Smart City solutions:

- **Lack of digital literacy and awareness programs amongst citizens:** To increase adoption of smart city solutions and services, it is essential that Bangladesh citizens not only accepts a more digital way of doing things but also expect it
- **No performance tracking mechanism for software/digital solutions:** Lack of mechanisms in place that help to track and measure performance of digital solutions deployed to drive data driven decision-making
- **Lack of real-time grievance addressal:** Need for a responsive public grievance redressal system amongst citizens for efficient calibration and delivery of public services
- **Data duplication:** Lack of singular data sources makes it hard for data that needs to be used to be easily available for recall in order to scale or modify technologies after deployment
- **Users, developers, and providers of digital services need to co-create solutions and services:** This is essential for Bangladesh to bring together citizens, corporates, town officials and startups to work together to co-design more efficient solutions

Learnings from other countries: Bangladesh can draw inspiration and learnings from international peers including South Korea, Estonia, and Spain:

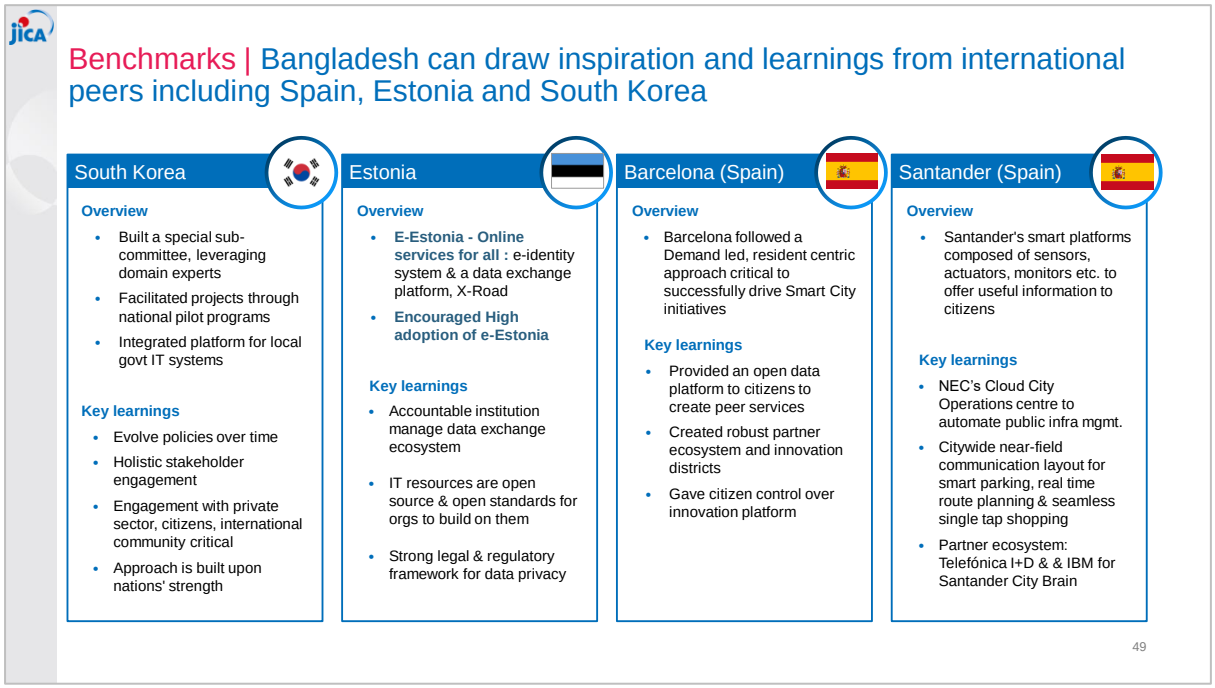


Figure 49: International benchmarks on smart cities

Case Study: Several key learnings from Japan's Toyota Woven City

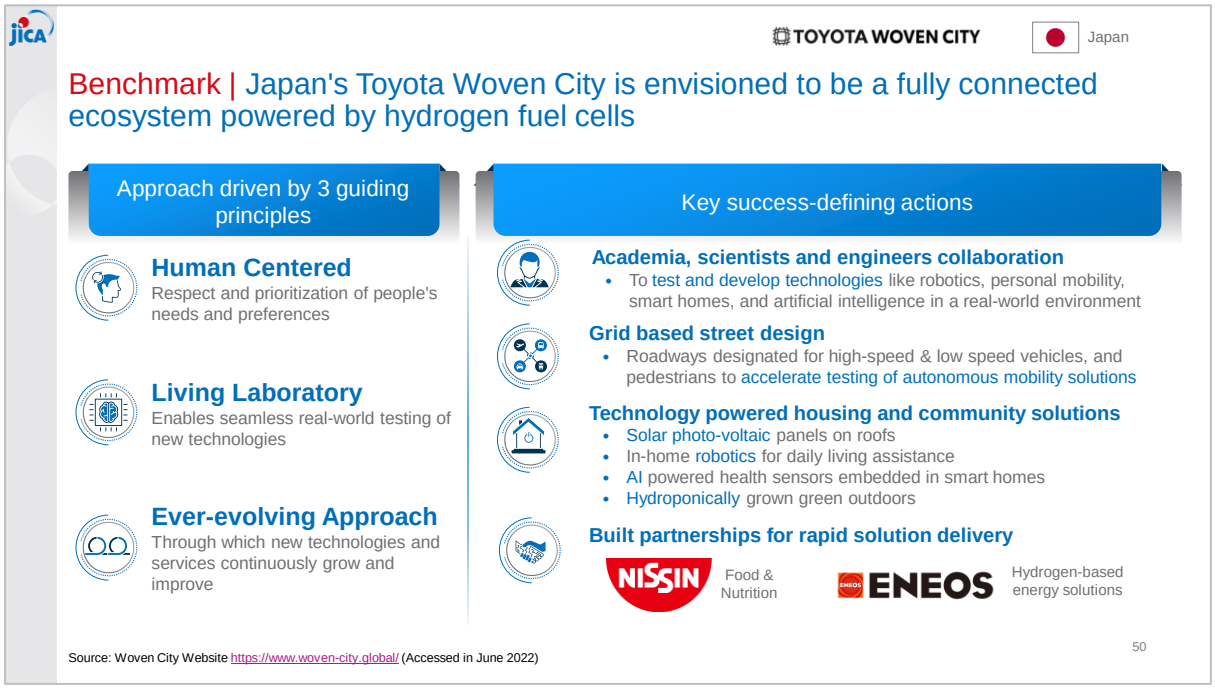


Figure 50: Overview of Japan's Toyota Woven City

Smart City Vision and Implementation:

Bangladesh's Smart City vision and implementation to be anchored around 5 key objectives

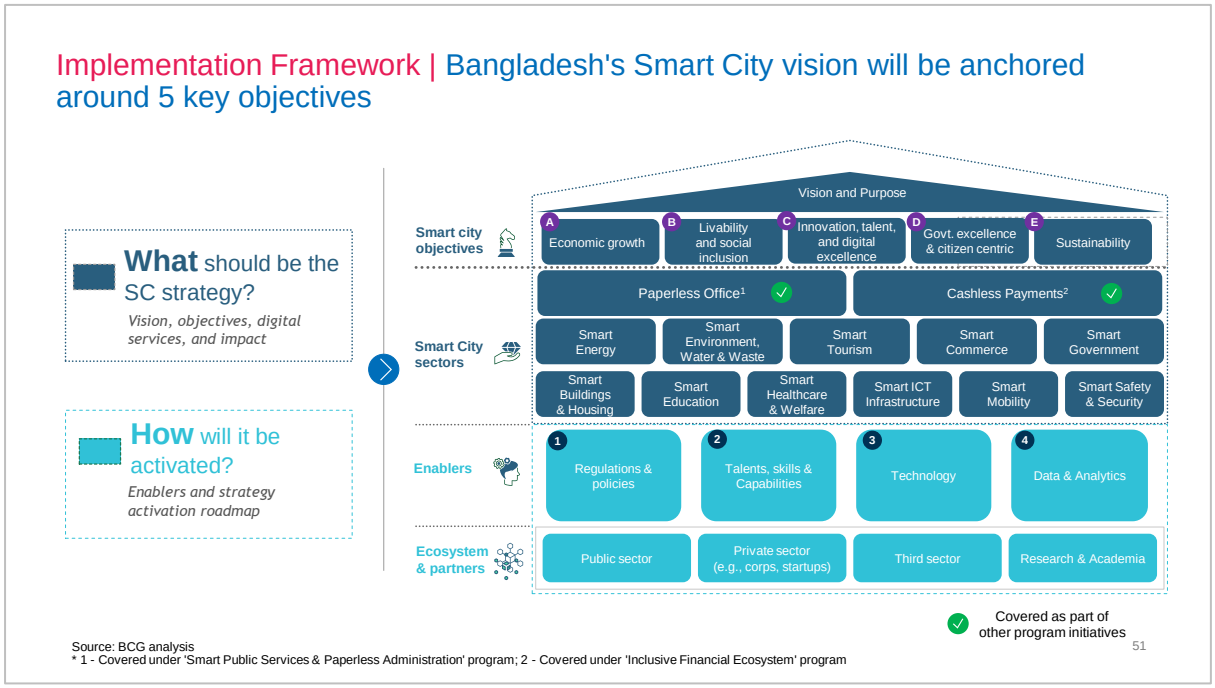


Figure 51: Smart City vision and implementation framework

There are multiple use cases which can be mapped to the different objectives

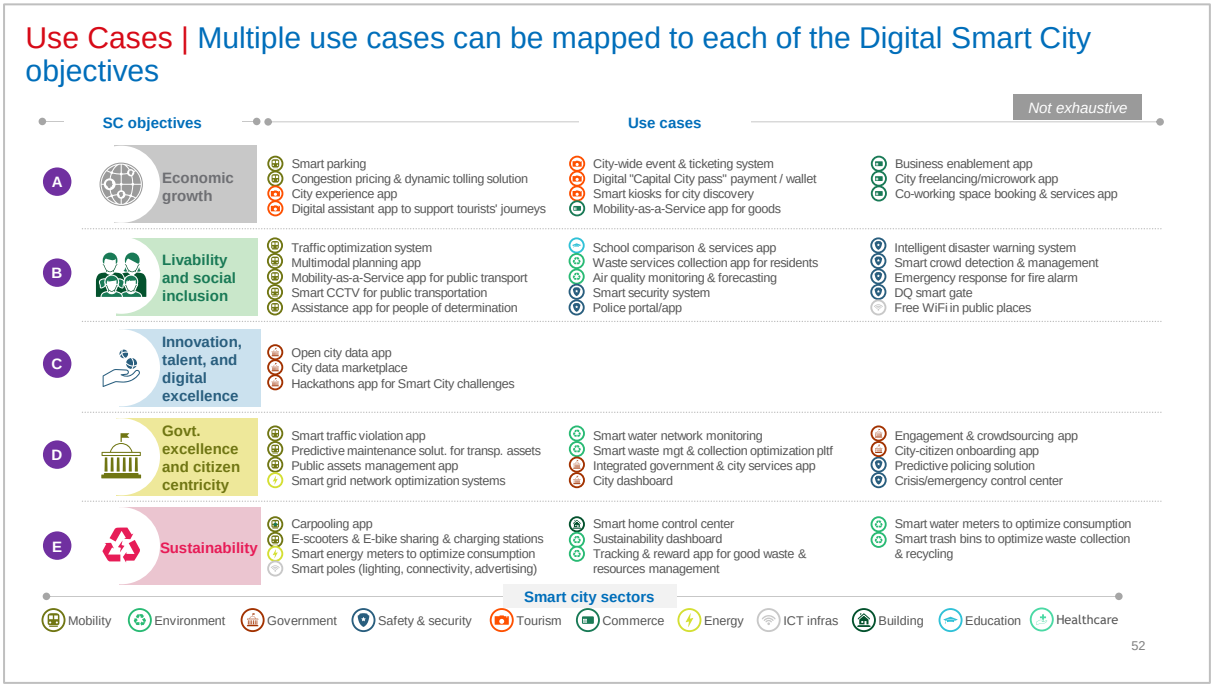


Figure 52: Smart City use cases across sectors

Initiatives to be undertaken by Bangladesh: To accelerate the growth of Smart Cities, Bangladesh must launch a program including several components:

Program objectives:		
Make cities more socially, economically, and ecologically sustainable and respond more effectively to the needs and desires of its residents to improve quality of life		
Program targets		
2025	2031	2041
• Smart city mission program designed and launched with vision and objectives, “Born Digital” cities conceptualized, and pilots initiated • Smart city solution development and trial across entire system	• First batch of smart cities created to be created as lighthouse Smart cities and used as exemplars for future smart city projects	• Multiple smart cities present enabled to leverage smart solutions and use technology, information, and data to improve infrastructure and services.

Components	**Objective**	**Activities**
Regulations & policies	Establishing a clear regulatory framework with tailored SC policies to enable innovation	• Governing body for regulations' advocacy
		• Continuous policy improvement
		• Active deregulation

Technology and Data enablers	Develop common standards for SC technology and data to facilitate interoperability and enable rapid scale-up	• Technology framework • Plug and play Digital services • City infrastructure & assets • Interoperability enablers & data standards definition
Talents, skills & Capabilities	Launch initiatives at a national level to develop and attract digital and SC related capabilities	• Upskill local talent • Attract global talent
Ecosystem and Partners	Foster collaboration across various partners in the SC ecosystem	• Foster collaboration across various partners
Program execution/ ownership		
• Lead Agency	• Ministry of Local Government	
• Implementing body	• Min. of Local Gov't in collaboration with local bodies and ICT Division	
• Program contributors	• Ministry of Posts Telecom. & ICT • Central Government – different Govt. Departments • Municipalities • Mayor offices • RAJUK • City Corporations	
High level implementation timeline:		
• **Launch:** 24 months • **Stabilize:** 4-5 years • **Scale: 10**-15 years		

Table 33: Implementation overview for Smart City

4.3.2.2 Smart Grid

Context: Smart Grid incorporates digital technology into a power grid, to allow two-way flows of information and power. Implementing a Smart Grid project for Bangladesh would help them draw benefits including remote monitoring and control of the power grid, better integration of renewable energy sources, and improved interactions with citizens

Bangladesh can expect 5 key priority outcomes from the implementation of Smart Grid initiative -

- Reliable and resilient supply
- Automated system monitoring & control
- Integrated renewable energy
- Effective customer engagement
- Grid as a platform

Challenges:

Challenges being faced across sub-sectors (Generation, Distribution and Transmission) in achieving the various priority outcomes as listed above -

- Challenges in Generation sub sector: Power interruptions, High frequency variation
- Challenges in Transmission sub sector: Transmission loss, Manual operation of grid assets & limited, visibility, reactive power management, incomplete revenue realization
- Challenges in Distribution sub sector: Power interruptions, inconsistent power quality, manual operation of grid assets & limited visibility, increasing variability of supply, need to improve billing efficiency & non-technical loss etc.

Learnings from other countries: Bangladesh can draw inspiration and learnings from international peers that have implemented Smart Grids like Spain and the USA:

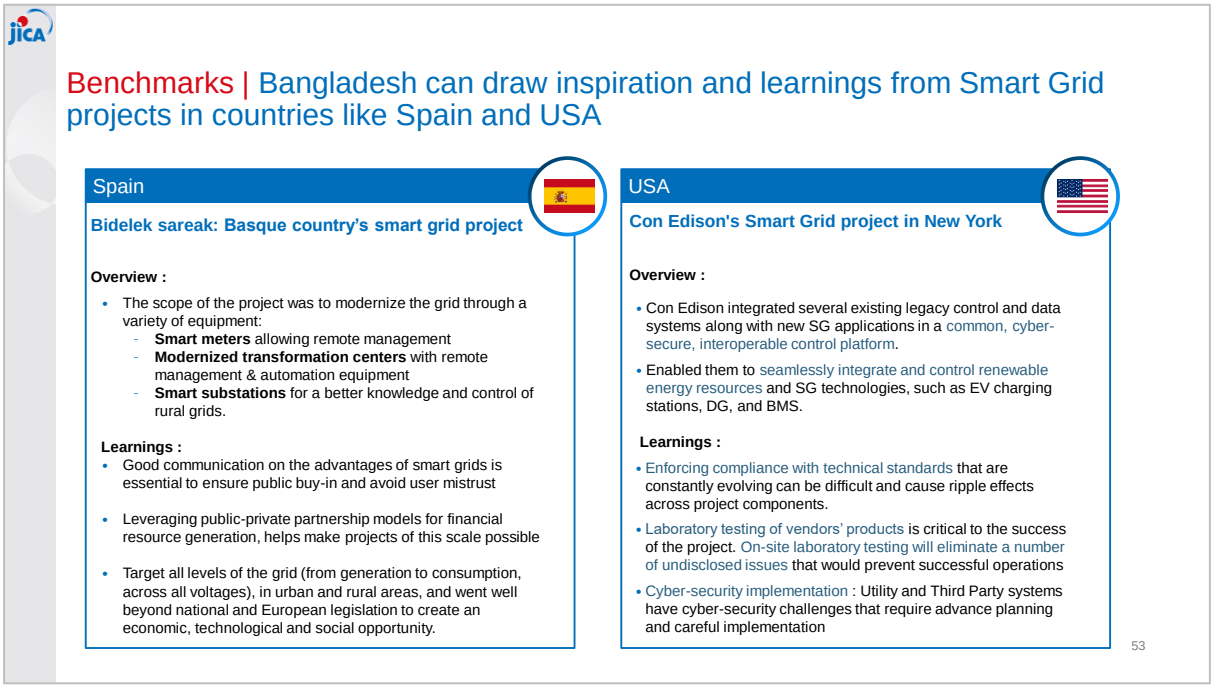


Figure 53: International benchmarks on smart grid

Initiatives to be undertaken by Bangladesh: To implement Smart Grid project, Bangladesh must launch a program including several different components:

Program objectives:		
Economically sustainable power, with low losses, high levels of quality of supply and security of operators, allowing better integration of renewable energy sources, and improved interactions with customers		
Program targets		
2025	2031	2041

• Smart Grid related technologies under development and trial across first batch of targeted Grid utilities • Initiation of automation of targeted grid assets	• Almost fully modernized grid, leading to improvements in quality and reliability of supply, with reduction in network losses and better responses to incidents	• Fully modernized grid with minimization of network losses, decrease in electricity costs and integration of renewable energy

Components	Activities
Generation sub sector initiatives	• Governing body for regulations' advocacy
	• Continuous policy improvement
	• Active deregulation
	• SCADA System Completion
	• GIS Rollout
Transmission sub sector initiatives	• Energy Management System (EMS) integration
	• Automatic Generation Control (AGC)
	• AI-based EAMS installation
	• SCADA System Completion
	• GIS Rollout
Distribution sub sector initiatives	• Advanced Distribution Management System
	• AI-based Enterprise Asset Management System (EAMS) implementation
	• Load forecast system (LFS) Implementation
	• Outage Management System
	• SCADA system rollout
	• Geographical Information System (GIS) rollout
	• Distributed Energy Resource Management System (DERMS)
	• Customer Relationship Management (CRM) implementation
Sector-wide initiatives	• Common data centers and disaster recovery centers
	• Single utility billing system
	• Single CRM platform
	• Unified cyber security solutions
	• National lead for last mile connectivity

Program execution/ ownership	
• Lead Agency	• Ministry of Power, Energy and Mineral Resources
• Implementing body	• Power Division
• Program contributors	• Public: BPDP, APSCL, NWPGC, EGCB, RPCL, CPGCBL etc. • Private: IPPs, SIPPs, etc. • Line ministries (e.g., ICT Division)
High level implementation timeline:	
• **Launch:** 18 months • **Stabilize:** 2 years • **Scale:** 3 years	

Table 34: Implementation overview for Smart Grid

4.3.2.3 Digital Climate Resilience

Context: Climate resilience is a critical element for Bangladesh to solve for the environmental, socio-economic & demographic stresses it will cause. Green growth based on climate-resilience, reduced pollution, and data-driven climate management is a key ambition for Bangladesh.

Over the coming few years climate change in Bangladesh is likely to result in:

- Increased flooding, associated with sea level rise, greater monsoon precipitation etc.
- Increased vulnerability to cyclone and storm surges
- Increased moisture stress during dry periods leading to increased drought
- Greater temperature extremes and increased salinity intrusion

Bangladesh should look to leverage various digital technologies to help them become more resilient as well adapt to the impact that will be created through climate change.

Current Progress: Several notable local Initiatives have been launched by Bangladesh with respect to climate change.

- Mujib Climate Prosperity Plan up to 2030:
  - A strategic investment framework to mobilize finance for renewable energy and climate resilience activities, particularly through international cooperation.
- National Adaptation Plan (NAP)
  - This will provide a summary of Bangladesh's climate change hazards, risks, and vulnerabilities.
  - Success stories/case studies on resilient adaptation options will be included in the NAP.
- Promoting Green Technology
  - Bangladesh Bank launched a refinancing program to encourage environmentally friendly technologies such as solar energy, biogas plants, and Effluent Treatment Plants (ETP).
- Energy Efficiency & Conservation Master Plan to 2030

- Under this plan, the government aims to lower energy intensity (national primary energy consumption per unit of GDP) in 2030 by 20% compared to the 2013 level. During this time, a total of 95 million tons (113 billion m3 of gas equivalent) is projected to be saved.

Challenges: Despite significant progress, there are multiple challenges still faced by Bangladesh some of them being as below

- Lack of Resources
  - Ministry of Environment, Forests, changes and Climate Change (MoEFCC riddled with issues such as lack of capacity, knowledge, and inadequate staffing
- Lack of Technical Data
  - Lack of up-to-date information collection and monitoring is scarce, especially on environmental damage and its current situation
- Lack of local Govt Institutions
  - MoEFCC and other ministries did not put importance on the state of environment management. Prime example is the lack of Local Government Institutions regarding environmental management
- Fiscal and Pricing policies insufficient
  - Current policies do not properly incentivize sustainability e.g., pricing policy subsidizes carbon-emitting fossil fuels that create a further burden on healthcare expenditure. Assessment is required to improve and implement green growth.
- Budgetary spending limited
  - The budget for the MoEFCC and its activities has been trivial. In FY 2020, it was only 0.05% of the GDP.

Learnings from other countries: Bangladesh can draw inspiration and learnings from international peers including Russia and Peru

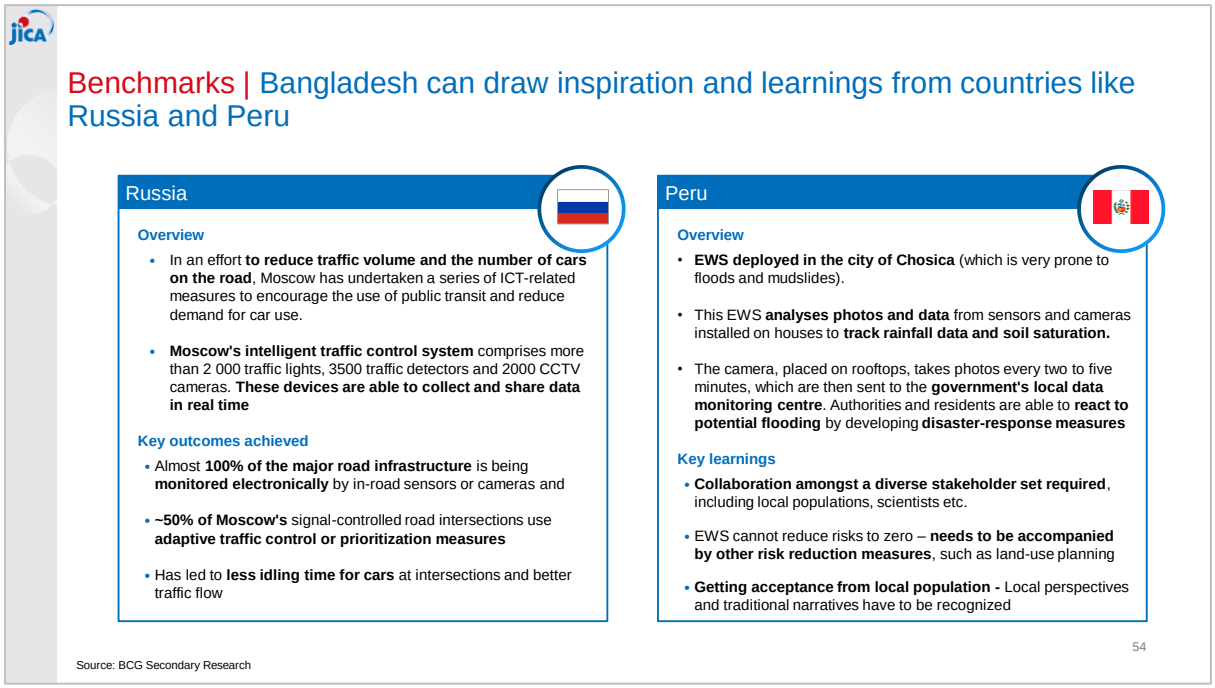


Figure 54: International benchmarks on digital climate resilience

Initiatives to be undertaken by Bangladesh: Bangladesh must launch key initiatives to facilitate digital climate resilience.

Program objectives:		
Leverage smart technologies to tackle climate change, build climate and disaster resilience, and enhance environmental sustainability		
Program targets		
2025	2031	2041
• Mechanisms for effective planning and management • Improved education, awareness, and human and institutional capacity on climate change resilience	• Sophisticated climate tech knowledge and research ecosystem • Climate tech PPPs established to fast-track initiatives in key sectors	• Strengthened resilience and adaptive capacity to climate-related hazards and natural disasters
Components	**Activities**	
Govt. led projects that use digital for climate resilience	• These are initiatives and projects that the Govt. directly leads and executes • e.g., • Using Digital Technologies to establish early warning systems (EWS) and enhance disaster management to circulate weather information • Use of AI and ML to recognize damaged buildings, flooding, impassable roads, and others from satellite photos	
Build climate technology research & knowledge ecosystem	• Build climate tech talent pool (e.g., AI/ML engineers and specialists) who can develop and deploy innovative solutions to climate change issues • Set up research entities in collaboration with industry and academia to accelerate availability of key climate technologies • R&D contracts with private firms targeted sectors where imminent changed is required • Promote knowledge sharing on this topic through collaborations with multilateral agencies (e.g., UNDP) etc.	
Balanced policy tools for climate technology	• Govt should institute a variety of policy tools available at every stage of the technology pipeline • Investment and production tax credits to firms that bring a new climate technology to market • Gov procurement, includes methods such as tendering, reverse auctions that guarantee buyers for newly developed climate technology • Tax credits, rebates, loan guarantees can be granted to purchasers as well as producers of high efficiency applications	

Leverage Public private partnerships	• Public–private partnership (PPP) climate resilience projects may be implemented to fast-track and scale initiatives. • e.g., • Social media companies and the government can collaborate to monitor social media contents to identify activities that can harm the environment and delicate ecosystems, and deplete resources
Program execution/ ownership	
• Lead Agency	• Ministry of Environment, Forests, changes, and Climate Change (MoEFCC)
• Implementing body	• MoEFCC in collaboration with other relevant line ministries and ICT Division
• Program contributors	• Private sector; Academia • Local climate agencies (e.g., BCCT) • International entities (e.g., UNDP) • Other ministries (e.g., Power)
High level implementation timeline:	
• **Launch:** 6-12 months • **Stabilize:** 2-3 years • **Scale:** 3-5 years	

Table 35: Implementation overview for Digital Climate Resilience

4.3.3 Digital Tolerance and Culture Movement

Objective: A nation-wide movement to embed digital hygiene among all citizens in all aspects of daily life. The primary objective will be achieved through 3 sub-objectives:

1. Building citizen awareness on cyber wellness to empower effective evaluation of digital content
2. Educating citizens on basic cybersecurity to drive safe use of digital solutions
3. Embedding digital ethics to drive responsible use of digital solutions

Learnings from other countries: Singapore has orchestrated a nation-wide movement to promote responsible digital citizenship. Bangladesh can draw significant learnings from Media Literacy Council's Better Internet Campaign.

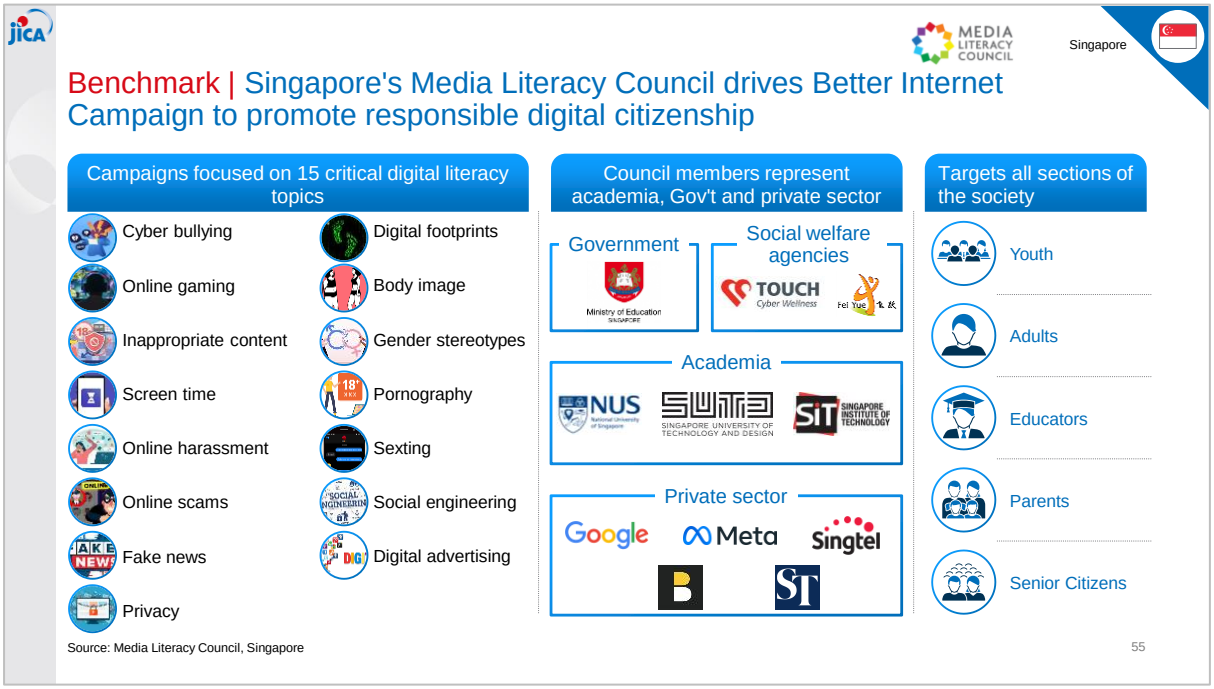


Figure 55: Overview of Singapore's Media Literacy Council

Initiatives to be undertaken by Bangladesh:

Program objectives:	
To embed digital hygiene among all citizens across all aspects of daily life	
Assessment of success	
Shift in responsible citizen behavior on digital ecosystems	
Program components	**Objectives**
Digital hygiene topics	• Prioritize critical digital hygiene topics that are most relevant for Bangladesh
Target segments	• Identification of target segments across all levels of the society
Digital Tolerance & Culture Council	• Setting up a multi-stakeholder council for governing the movement
Monitoring & tracking mechanism	• Setting up a mechanism to monitor emerging digital hygiene topics and track effectiveness of the movement
Delivery channels	• Integration of campaign delivery with Smart Bangla Campaign and a web portal for promotion and advocacy
Partnerships	• Orchestration of partnerships across Government, Civil Society, Academia, and Industry
Program execution Ownership	
Lead Agency	• Min. of Posts, Telecommunications & ICT
Implementing body	• ICT Division

Program contributors	• Ministry of Information & Broadcasting • Local Govt. Division • Civil Society Representatives • Academia • Private sector
High level implementation timeline:	
• **Launch:** 6 months • **Stabilize:** 2 years • **Scale:** 7-8 years	

Table 36 : Implementation overview for Digital Tolerance and Culture Movement

4.3.4 Bangla Stack

Context: Bangla Stack will be the Government's technology ecosystem supporting the design, build and delivery of unified digital services in Smart Bangladesh. The ecosystem will be powered by 3 key elements:

- Digital identities that empower the existing identity systems in Bangladesh
- Digital assets comprising data ecosystems, digital money, etc.
- Digital transactions, for example, digital payments, open exchange of data, etc.

Layers of Bangla Stack: Bangla stack will be the invisible backbone of Smart Bangladesh, spanning 3 layers

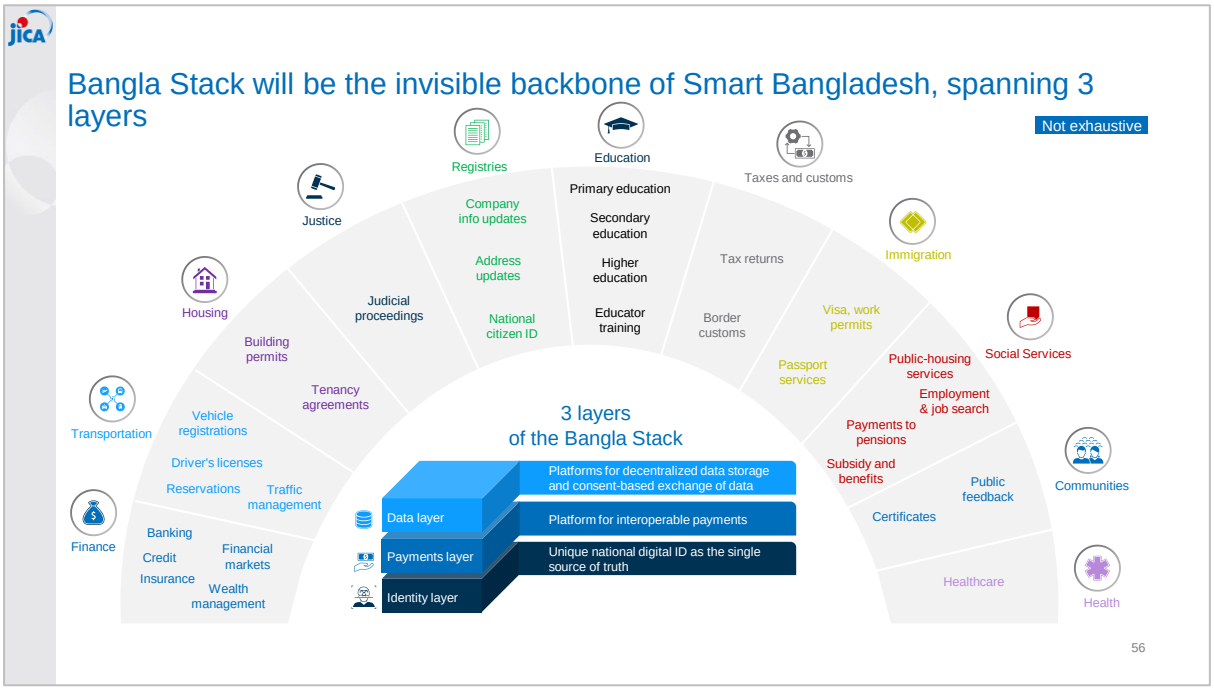


Figure 56: Layers of the Bangla stack

Benefits: Bangla Stack will benefit all participants of Smart Bangladesh. Citizens will experience seamless end-to-end digital user experiences on public and private digital services

and will exercise control on their personal data. Government will benefit from removal of data duplication, interoperable data, and ability to use real time data for governance decisions. Bangla Stack will also enable innovation of digital service providers (e.g., FinTech players) and improve speed to market for digital products due to access to public databases.

Current state and potential: The national e-service bus by Bangladesh National Digital Architecture is well positioned for contributing to the Bangla Stack. While several digital services like Porichoy, e-Pensions, Geo-spatial data service, online recruitment system (ICT Division) are integrated with the e-service bus, there are 3 potential expansion opportunities:

1. Onboarding all government e-services on the bus to enable Smart Government
2. Building additional layers to unlock new application scenarios (e.g., payments, credit, healthcare, talent, etc.)
3. Allow access to private players to accelerate development of standardized service applications

Learnings from other countries: Singapore and Estonia are aspirational north stars; India is a relevant benchmark for Bangladesh.

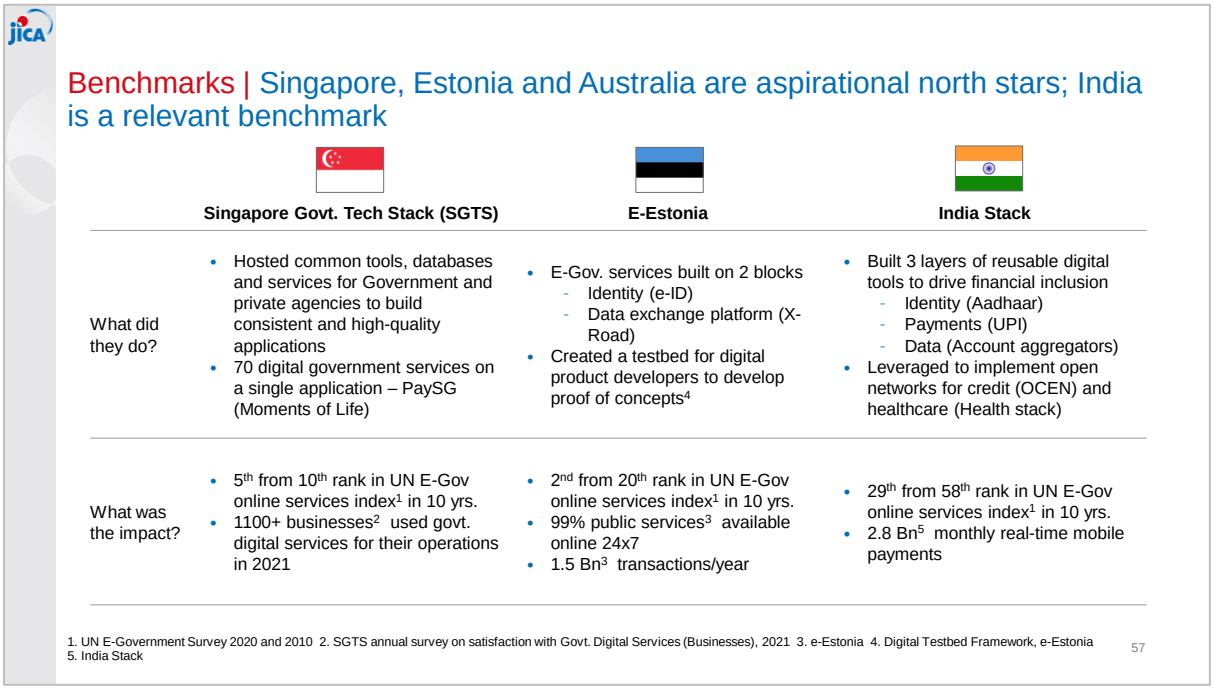


Figure 57: International benchmarks on Government technology stack

Initiatives to be undertaken by Bangladesh:

Program objectives:			
Setting up an ecosystem of reusable and interoperable digital components required to deliver seamless public and private digital services			
Program targets			
Metrics	2025	2031	2041

• % Gov't services on the stack	• 50%	• 70%	• 100%
• % Share of digital financial transactions	• 50%	• 70%	• 100%
• National digital ID authentications	• > 25 Mn	• > 4.5 Bn	• > 12 Bn
• Speed to market for digital services	• 1.5x	• 2x	• 3x

Program components	**Objectives**
National digital ID	• Creation of a "single point of truth" for citizen data by setting up a national digital ID and extension of use cases like authentication, e-KYC, s-Signature
Data exchange ecosystem	• Development and management platforms for decentralized data storage and consent-based exchange of data (e.g., National VAT database owned by National Board of Revenue can be used by private sector credit institutions to roll out cashflow based lending services to SMEs)
Interoperable payments ecosystem	• Building and maintaining of an interoperable payments ecosystem to boost digital financial transactions in the economy
Cybersecurity & Privacy	• Implementation of cybersecurity components as holistic enabler and integral element of the architecture; provide citizens the right to authorize and monitor data usage
API ecosystem	• Creation of a use-case specific API ecosystem to facilitate integrated workflows across services (e.g., e-KYC API call will be used to obtain user identity details from the identity layer)
Program execution/ ownership	
Lead Agency	• ICT Division
Implementing body	• ICT Division / Autonomous body
Program contributors	• Bangladesh Computer Council • Digital Security Agency • Bangladesh Data Center Company Limited • Porichoy • All line ministries of Bangladesh • Bangladesh Bank

High level implementation timeline:
• **Launch:** 12 months • **Stabilize:** 3-4 years • **Scale:** 3-4 years

Table 37: Implementation overview for Bangla Stack

Some implementation considerations: Building and scaling a digital national stack is not easy. It is critical to consider 5 structural learnings:

- Minimalism of attributes is critical for success of digital identities
- The digital identity layer should strengthen existing identities, not replace them
- Map future use-cases and identify early adopters to prove early success
- Autonomy of the implementing agency is key for agility and managing bias
- It is not about building the layers, rather about orchestrating an ecosystem for creation of the layers

4.4 Smart Economy

Smart economy is about achieving a circular economy powered by industry modernization, ICT sector growth, start-up ecosystem build, and enabled by robust technology infrastructure.

4.4.1 4IR Industry Accelerators

Context: Production is already being transformed across the world by fourth industrial revolution technologies such as advanced robotics, additive manufacturing, and augmented reality. While this represents an existential threat for some professions and sectors in Bangladesh, it is also a major opportunity for the nation to increase productivity, stimulate innovation, and to carve out a new role in global value chains. Bangladesh would want to be in a position in the 4IR technology domain where they can achieve 3 objectives:

- Digitally native industry operations e.g., digitalized intelligent supply chain
- Product innovation e.g., nanotechnology enabled fabric
- Industry specific 4IR tech as a revenue generator e.g., Industry specific technology solutions like 3D printing based collaborative design of sweater can be exported

Progress: Bangladesh is already implementing programs to address both opportunities and threats presented by the fourth industrial revolution – targeting industrial growth and upskilling – including:

- Sheikh Hasina Institute of Frontier Technology set to be launched by 2026 as Bangladesh's first frontier technology-based specialized institute focused on biotech, nanotech, neuro-tech, cyber security, AI, IoT etc.
- Sector-specific incentives led by Bangladesh Investment Development Authority across key growth sectors, providing support such as duty-free materials imports and export subsidies
- NiSE job-matching and upskilling platform developed by a2i Program to support matchmaking among youth, skills training providers, and industry

- Future Skills study and report detailing the jobs at risk and new skills required due to automation, and corresponding proposed policy response

4IR Industry Accelerators: Bangladesh must further respond to the opportunity with a set of programs across key growth sectors, with the joint objectives of applying 4IR tech in production, developing a domestic 4IR tech sector, and driving 4IR tech-led product innovation:

Figure 58: Proposed 4IR Industry Accelerator components and key objectives

Focus sectors: Bangladesh must focus efforts on those industries that play a major role in the country's GDP and exports, and which have material scope for value creation through implementation of 4IR technology. Namely, Ready-made garments (RMG) & Textiles, Light Engineering, Pharma, Logistics, and Agriculture:

- Manufacturing contributes the greatest share of Bangladesh's GDP and the majority of exports
- Within manufacturing, RMG & Textiles combined, is the dominant sub-sector, while Light Engineering and Pharma have considerable potential to drive value add through 4IR technologies. Post stabilization of the 4IR Accelerators Program in the RMG & Textiles sector, Bangladesh an evaluate the potential of extending the program to the diversified jute products sector.
- Logistics and Agriculture have less scope for 4IR transformation, but are key sectors supporting national development

Applications of 4IR tech across key sectors: A core set of 4IR Industry Accelerator components (as detailed above) can be tailored to the context of each key sector to stimulate application of 4IR technologies across key activities.

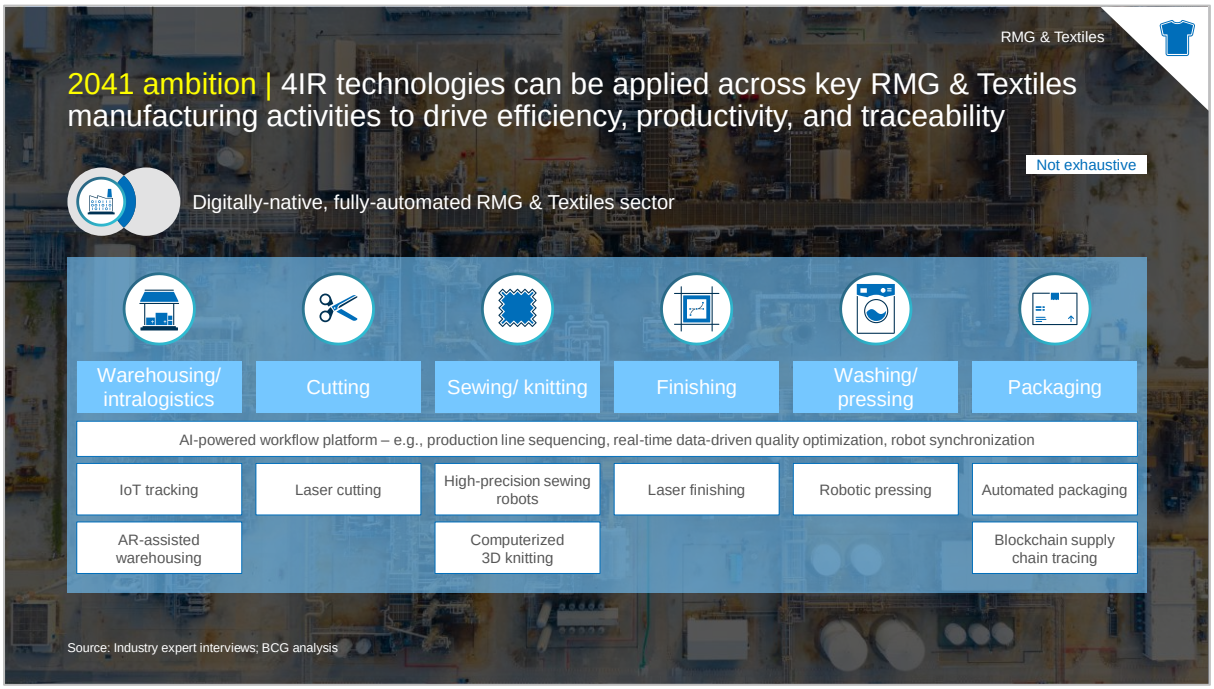


Figure 59: 4IR applications in RMG & Textiles manufacturing activities

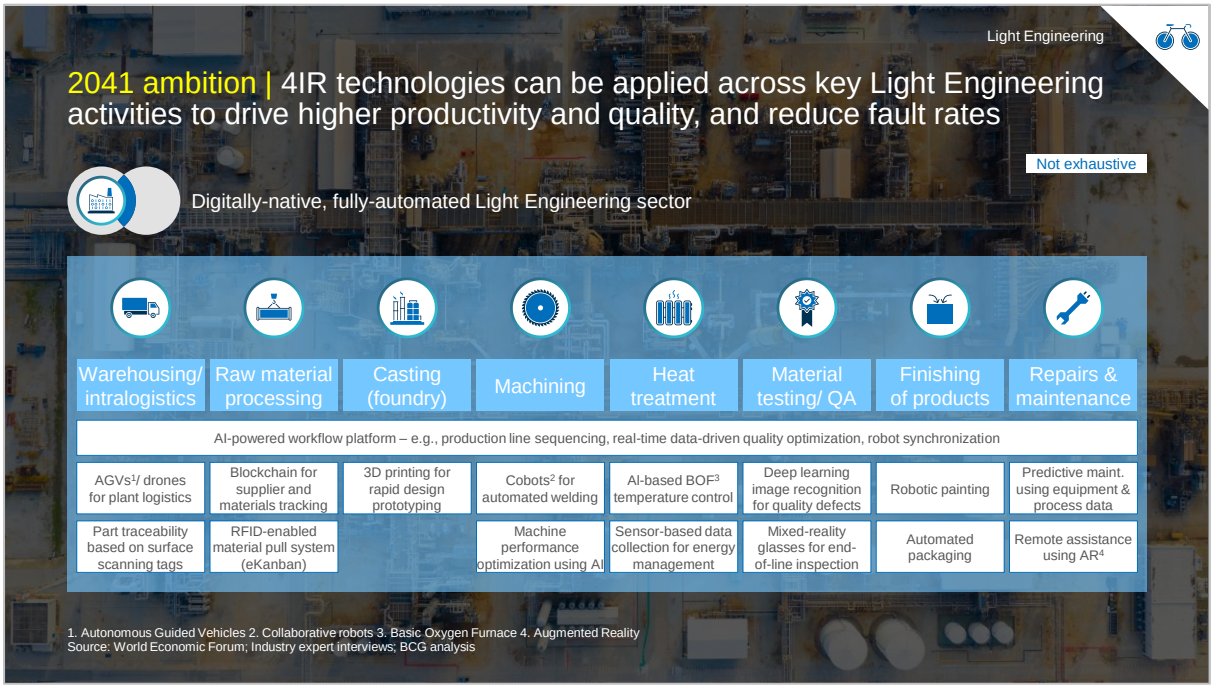


Figure 60: 4IR applications in light engineering activities

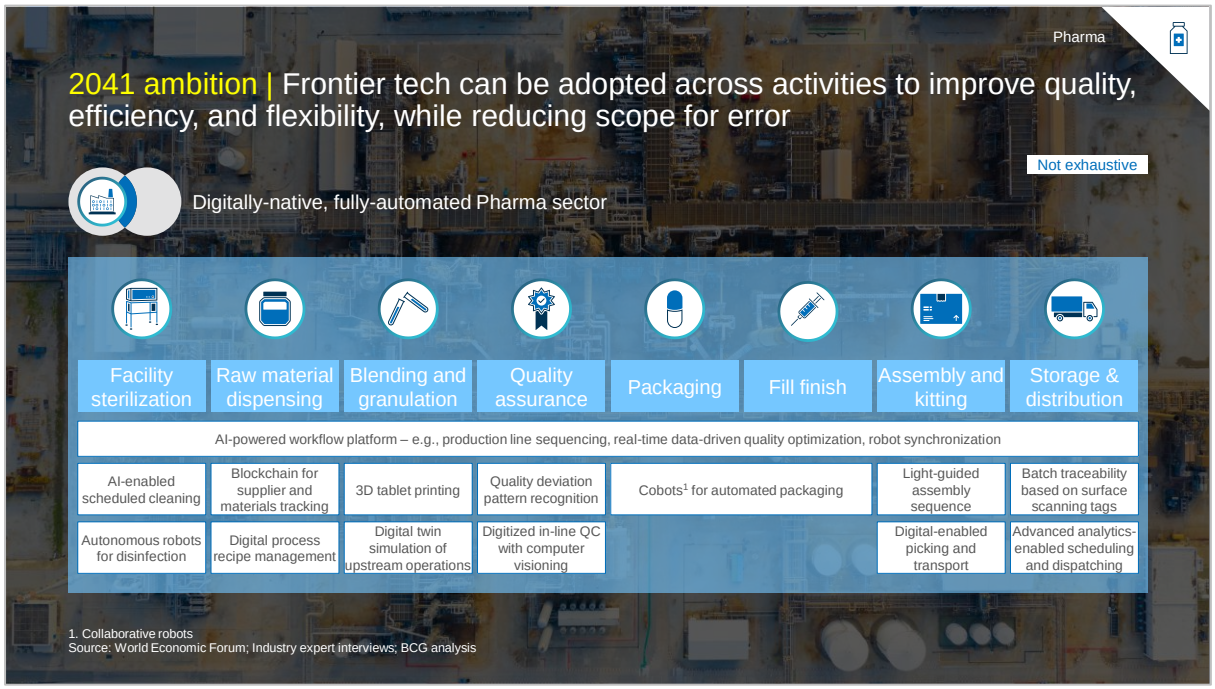


Figure 61: 4IR applications in pharmaceutical sector

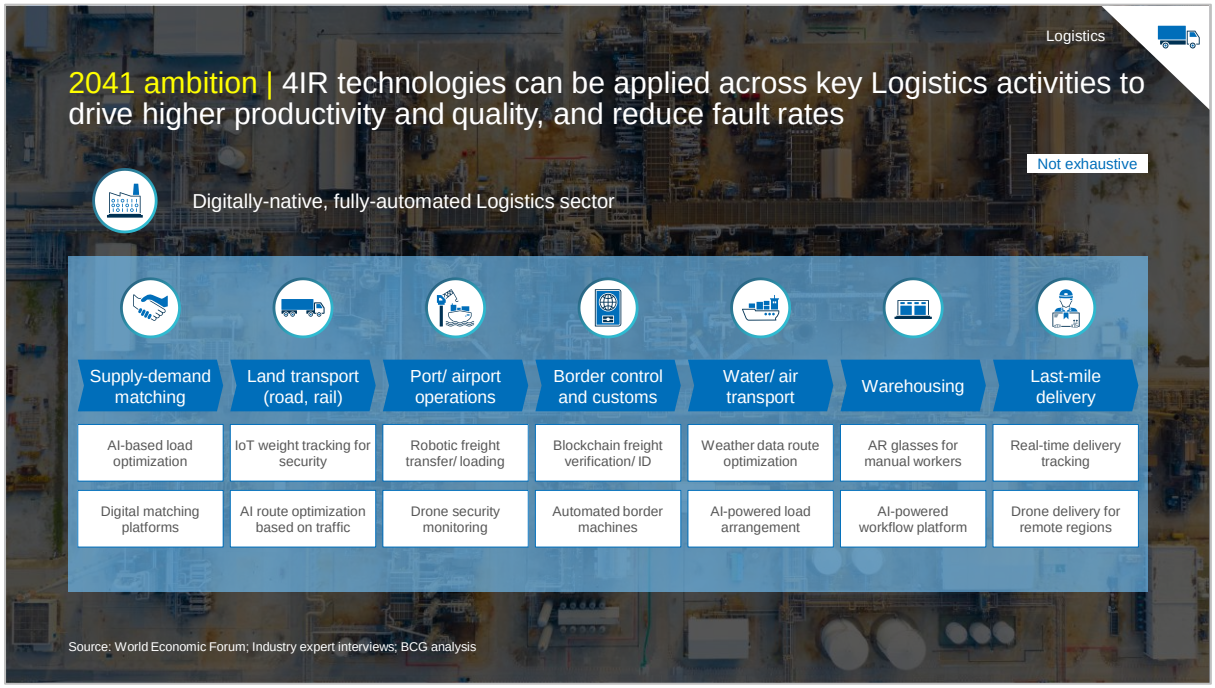


Figure 62: 4IR applications in logistics

Figure 63: 4IR applications in agriculture

Learnings from other countries: Bangladesh can draw inspiration from international peers including South Korea, Singapore, Japan, and Vietnam:

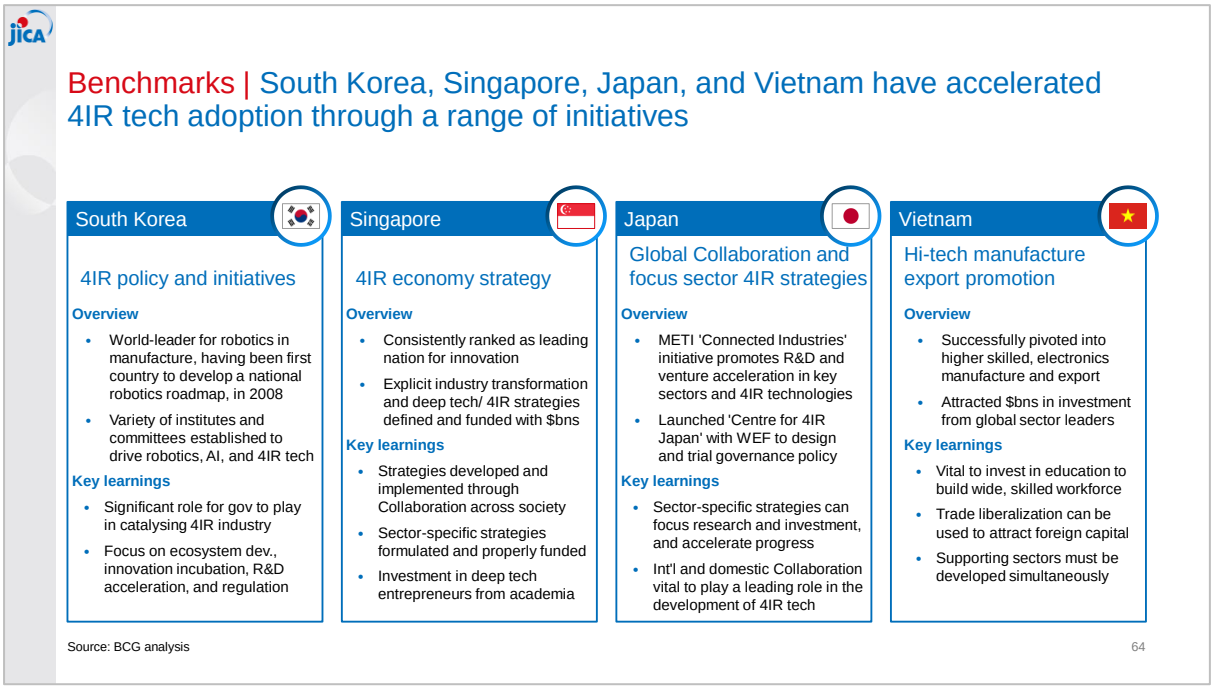


Figure 64: International benchmarks on 4IR industry accelerators

Initiatives to be undertaken by Bangladesh:

Bangladesh must follow a well - orchestrated set of initiatives to achieve their vision 2041.

Program objectives:		
Taking opportunity of new and emerging advanced tech to transform and create new key sectors in Bangladesh		
Program targets		
2025	2031	2041
• All leading players in key sectors having run 4IR trials and rolling out at scale • Nascent domestic production tech specialisms established across key sectors	• Established domestic production tech specialisms across key sectors • Top 40 globally ranked nations for 4IR technology adoption	• All key sectors playing at the tech frontier, in line with international peers • Top 20 globally ranked nation for 4IR technology adoption

Program components	**Objectives**
Ecosystem development	• Increase sharing of knowledge and opportunities to accelerate the development of the ecosystem through conferences and events between academia, public, and private sector
Innovation incubators	• Incentivizing and commercializing new technical innovations and start-ups in the emerging domestic production tech sectors, through funding, advisory, and network building
Growth accelerators	• Supporting the rapid scaling of new and incumbent domestic production tech businesses through funding, advisory, and network building
Export facilitation	• Driving exports of domestic production technology - including hardware, software, and advisory services – through guidance, pitching support, and customer identification
Standards & regulation	• Enabling the development of a domestic production tech industry and widespread adoption of 4IR tech through defined standards and guidelines for businesses, and policy overhaul
Industry incentivization	• Ensuring the affordability of 4IR tech in Pharma for early adopters, and supporting infant production tech sectors through competitively allocated subsidies and tax breaks
Skillset development	• Developing high-skilled 4IR workforces through a set of initiatives including retraining courses, guidelines, and resource, and links into school and academia
Program execution/ ownership	
Lead Agency	• Ministry of Industries
Implementing body	• Ministry of Industries in collaboration with ICT Division

Program contributors	• BIDA • Min. of Finance, Min. of Commerce, Min. of Science and Technology • Academia • Private sector
High level implementation timeline:	
• **Launch:** 18 months • **Stabilize:** 2-3 years • **Scale:** 2 years	

Table 38: Implementation overview for 4IR Industry Accelerators program

4.4.2 ICT Industry Acceleration

Context: Realizing a $50 Bn ICT GDP by 2041, would mean elevating the sector's national GDP contribution from less than 1% to 2-3% by 2041. Government of Bangladesh has triggered actions across financing, talent development, policy enablement, and infrastructure development to build foundations for the ICT sector. A recent steer towards national adoption of emerging technologies is evident from national strategies by ICT Division on Artificial Intelligence, Robotics, Internet of Things, Blockchain, Cybersecurity, and Microprocessor Design.

Baseline and targets: While the current sectoral targets are ambitious, domestic ICT spend has grown slower than projections and ICT exports are limited. This is driven by limited localization of top global IT/IT-ES players, hyper-scalers, and product development giants in Bangladesh and sub-scale local IT/IT-ES firms, with most players operating below 1000 FTE. Bangladesh needs to plan for increasing domestic ICT spend and turbo-charging IT/IT-ES exports.

While domestic spend has grown at ~12% CAGR to $1.5 Bn from 2017 to 2020-21, it falls short of the $2.5 Bn target by $1 Bn. To reach the $5 Bn target by 2025, it is critical to grow domestic ICT spend three-folds faster than the past at ~35% CAGR from 2021 to 2025.

At $400-$600 Mn, net ICT exports contribute only 25-30% of the ICT GDP, as of 2021. Gross IT/IT-ES exports grew at 20% CAGR to ~$1.4 Bn from 2015 to 2020. The sector has set ambitious gross export targets of $5 Bn and $20 Bn by 2025 and 2031. To realize these goals, gross exports should be turbocharged to ~30% CAGR till 2025, followed by a sustained growth of ~25% CAGR till 2031.

Key considerations for Bangladesh: Bangladesh should consider 4 critical questions to drive ICT industry acceleration:

1. How to attract top global IT/IT-ES players to Bangladesh?
2. How to drive systemic ICT export?
3. How to scale-up local IT/IT-ES players?
4. How to build capability in the ICT sector?

ICT Industry Acceleration Program will pivot around 4 key components to address these pressing questions:

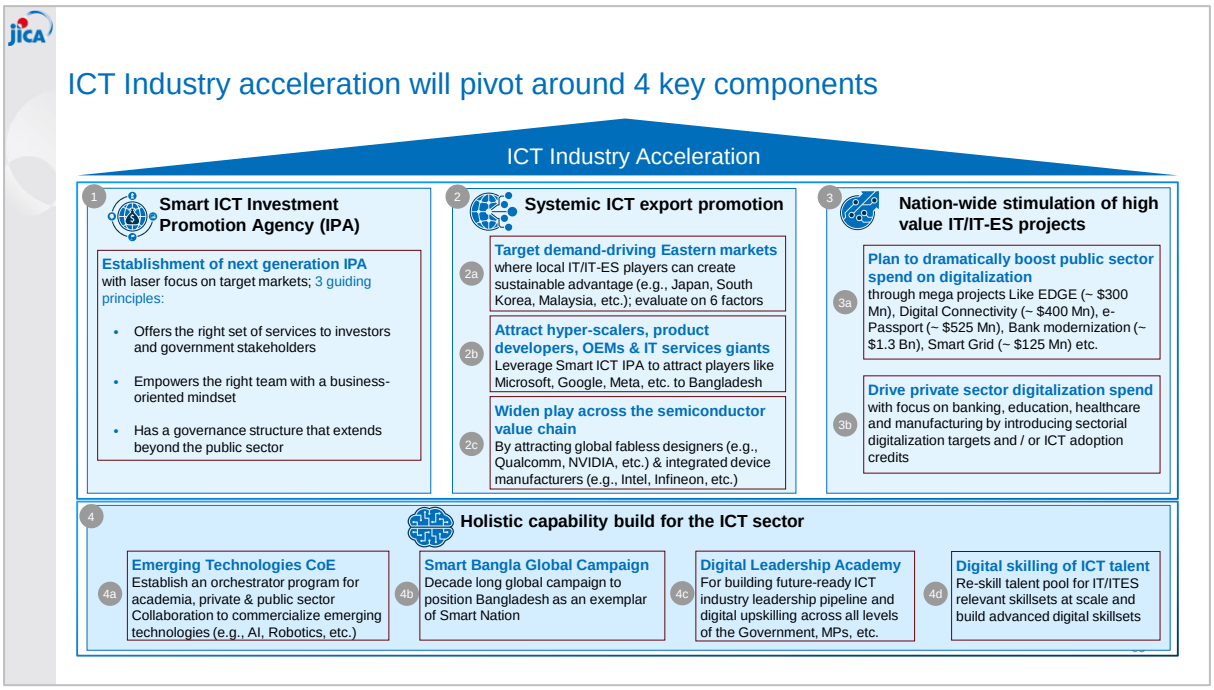


Figure 65: Four key components of ICT Industry Acceleration program

Note: Digital Leadership Academy and Digital skilling of ICT talent (Bangla Digital Skilling) have been covered in detail as separate programs in the Master Plan.

4.4.2.1 Smart ICT Investment Promotion Agency (IPA):

Current state: BIDA is the apex IPA dedicated to attracting foreign investments across all industry sectors in Bangladesh. Five additional IPAs attract area-specific investments; one of them being BHTPA, which is responsible for attraction of foreign and domestic investors in the IT/IT-ES space to be located at High-Tech Park Zones. This signals the beginning of a shift in Bangladesh's IPA ecosystem towards zone-specific agencies.

However, there is a need to streamline investor outreach and elevate investor experience with laser focus on the ICT sector.

Objective: Bangladesh should establish a next-generation IPA with laser focus on target markets to attract foreign investment in the ICT sector. Following will need to be 5 key roles

1. Value proposition development for the ICT sector
2. Investment opportunity development tailored to target investor accounts
3. Investment promotion through national and international offices
4. Deal closures
5. Investor aftercare and feedback to the sectoral investment strategy development process

Three elements will be critical for success of Smart ICT IPA as learned from other best in class practices like Singapore EDB:

1. Offering the right set of services to the right stakeholders – government / developmental stakeholders and investors

2. Empowering and training the right team by embedding talent and best practices from the private sector
3. Setting up the right governance mechanism with overseas offices and global C-suite advisors playing critical roles

4.4.2.2 Systemic ICT Export Promotion

Bangladesh should consider **three actions to turbo-charge ICT exports** by 2025 and sustain accelerated export growth rates till 2041:

1. **Target demand-driving Eastern markets:** From 2006 to 2021, APAC has captured share of global ICT spend from EU and Americas. For Bangladesh, this is has recently translated to an increased share of IT/IT-ES exports in APAC from 7% in 2019 to 28% in 2021. India, Malaysia, Japan, and Australia emerging as key markets in the region. However, there is limited focus on proactively developing exports to Eastern markets. In 2021, proposals for market development from industry associations to Ministry of Commerce have largely focused on USA, Europe, Africa, and Middle East, with Japan as a focus in APAC. The success of B-JET (Bangladesh-Japan ICT Engineers' Training Program), providing three-month training with ICT engineers on Japanese language and business manners targeting the Japanese market, is one of the models that Bangladesh can further promote for systematic ICT export with Japan and other eastern markets.

   Bangladesh should evaluate its potential for creating sustainable competitive advantage in demand-driven Eastern markets like Japan, South Korea, Malaysia, etc. Evaluation should be based on 6 factors:

   - Domestic ICT market size
   - Growth in domestic ICT market
   - Addressable demand whitespace
   - Local competition
   - Language barriers
   - Regulatory barriers

   As a similar example, Ireland leveraged its English language national advantage to position itself as the European hub of US technology giants.
2. **Attract hyper-scalers, product developers and IT services giants to Bangladesh:** With over 60% share of Bangladesh's IT/IT-ES exports to US and EU, western markets remain large destinations. Bangladesh should try to leverage this position of advantage and scale their global campaign to be able to attract hyper-scalers, product developers and IT services giants from western markets to set up operations and delivery centers in Bangladesh (e.g., Accenture, Cognizant, Google, Amazon etc.)
3. **Widen play across the semiconductor value chain:** Bangladesh has identified microprocessor design as a strategic focus area to build its capabilities in the semiconductor value chain. Homegrown players like Neural semiconductor, Ulkasemi play up the value chain with VLSI design capabilities. Local players like Walton and global players in Bangladesh like Samsung, Oppo, Vivo Nokia operate in downstream activities like electronic equipment manufacturing.

   However, Bangladesh's play in the end-to-end semiconductor value chain remains limited. Building capabilities across the semiconductor value chain will be a critical enabler to manufacturing affordable smart devices locally. This advantage will be key to providing access to affordable smart devices to citizens and eventually positioning the country as a regional export leader of affordable smart devices.

To accelerate capability-build across the semiconductor value chain, Bangladesh should try to attract global fabless designers and Vertically Integrated Device Manufacturers (IDMs) to set up local operations across the semi-conductor value chain.

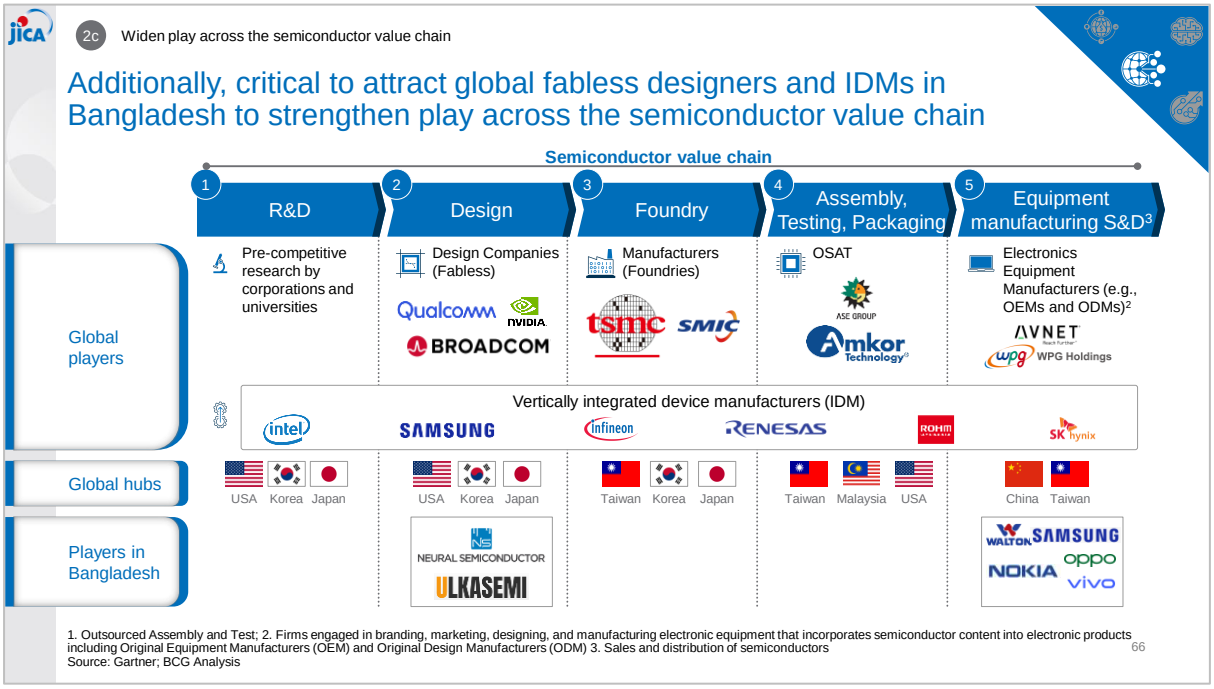


Figure 66: Global semiconductor value chain & current players in Bangladesh

Learnings from other countries: Taiwan has consistently retained its position as a top destination for semiconductor manufacturing (fabless foundry, Assembly, Testing and Packaging). As of 2020, at $1.9 Bn at PPP, Taiwan's public sector spend on semiconductor manufacturing has been the highest amongst its peers like Korea ($1.3 Bn at PPP) and USA ($1 Bn at PPP). Taiwan's spend is projected to lead US and Korea till 2030. As a result, while other semiconductor manufacturing hubs like South Korea, USA, Japan, Europe have lost share of global capacity by 4 to 25 basis points since 1990, Taiwan has retained over 20% of global manufacturing capacity over the period and is projected to sustain its position till 2030.

4.4.2.3 Nation-wide Stimulation of High-value IT/IT-ES Projects

Elevating domestic ICT spend will lead to creation of high value IT/IT-ES projects in the economy. Such projects would potentially upscale local IT/IT-ES firms and attract global IT/IT-ES players into Bangladesh. Bangladesh should adopt a 2-pronged approach to stimulate high-value projects in the sector:

1. Plan to dramatically boost public sector digitalization spend through a pipeline of mega digitalization projects like EDGE, Digital Connectivity, e-Passport, Smart Grid, etc.
2. Drive private sector digitalization spend with focus on key sectors like banking, education, healthcare, and manufacturing through sectoral ICT adoption targets or credits.

4.4.2.4 Emerging technologies Center of Excellence (CoE)

Context: Global leadership of nations in emerging technologies has been a result of their strategic national priorities. For example, USA's position as a global leader in AI is driven by

its long-lasting priority to achieve global military advantage. Israel's position as a global cybersecurity hub is an outcome of heavy spending by its government on defense to ringfence the nation from its legacy of adverse geopolitical conditions.

However, leadership in emerging technologies is not limited to being a global leader. There are 3 leadership archetypes in emerging technologies:

1. **National enabler:** These countries focus on promoting nation-wide adoption of emerging technologies for national socio-economic growth and development (e.g., Singapore's AI strategy focuses on developing and deploying scalable AI solutions to benefit its citizens)
2. **Specialist:** They create ecosystems to stimulate innovation in focus areas of select emerging technologies to serve the international scene (e.g., AI strategy of France aims to position the country as a world leader in AI research and innovation)
3. **Global leader:** They lead globally by growing an industry around select emerging technologies across the value chain. Such ambitions are driven by alignment with their geopolitical priorities or strong national advantages. For example, China's AI strategy aims at positioning the country as a global leader in all fields associated with the AI industry.

Current state and potential: Bangladesh has crafted national strategies on 6 emerging technologies – AI, IoT, Robotics, Blockchain, Cybersecurity, and Microprocessor Design. Most of these strategies have clear sectoral focus on application of these technologies. The current emphasis of the national emerging technology strategies is on national adoption, through focus on key sectors across each technology. This potentially maps Bangladesh to the leadership archetype of a 'National Enabler'.

However, Bangladesh has a strong potential of developing sector-specific emerging technology solutions that will potentially be relevant for adoption in other developing economies. Hence, Bangladesh should target to transition to emerge as a 'Specialist' in prioritized emerging technologies.

The Sheikh Hasina Institute of Frontier Technologies is an ambitious project planned to foster academic R&D and commercialization of frontier technologies. However, besides academia, there is a need to bring together multiple stakeholders and capabilities to drive systematic and accelerated commercialization of emerging technologies.

Design of Emerging Technology CoE: An emerging technology CoE will be an orchestrator program to complete the commercialization cycle of nationally relevant emerging technologies by bringing together national stakeholders of the public sector and national and global partners in academia and private sector.

Figure 67: Proposed framework for Emerging Technologies CoE in Bangladesh

Learnings from other countries: Alan Turing Institute of United Kingdom is a best-in-class CoE for AI and data science in all aspects bringing together Universities like Cambridge, Govt entities like Office for National statistics, Ministries and think tanks, Corporates like Intel and Microsoft, Investors & not-for-profit organizations.

4.4.2.5 Smart Bangla Global Campaign

Objective: Smart Bangla Global Campaign will be long term global campaign to shape global perception of Bangladesh as an exemplar of smart nation.

Current state: Digital Bangladesh movement has positioned Bangladesh on the global radar as an emerging digital nation. Key personalities of Bangladesh have embedded themselves across globally prestigious platforms like WEF, World Bank, ASOCIO, ILO, ITU, TED, etc. driving the Digital Bangladesh agenda. Additionally, multiple other initiatives have aimed at attracting global interest towards Digital Bangladesh. For example, global trade fairs (Digital World 2020, WCIT 2021) were hosted in Dhaka, World Bank Funded Strategic CEO outreach program engaged 300+ companies in 15 roadshows, Digital Bangladesh web platform was launched to attract investments in the ICT sector, Analyst reports and value proposition brochures were published to improve investor perception.

However, realizing Smart Bangladesh vision by 2041 will require turbo-charging existing global outreach. There is potential to elevate FDI from Bangladesh's top IT/IT-ES export destinations in the west and emerging eastern technology driven markets. A nation-branding approach is critical to systematically shape global perception of Bangladesh as a smart nation.

Learnings from other countries: Bangladesh can draw significant learnings from Vietnam's proactive positioning as an Asian technology hub that resulted in inward investments from global technology giants. Costa Rica is an exemplar of how small economy with high exposure to natural disasters adopted a strong nation branding strategy to boost its tourism industry, exports, and FDI.

Figure 68: Vietnam's approach towards positioning itself as an Asian technology hub

Campaign Strategy: Globally, major economies are perceived as exemplars across key mega themes. For example, while Germany and Japan are exemplars of Industry 4.0, Estonia and Finland are perceived as digital societies. Demark and Luxembourg have crafted their global image as leaders in sustainability. USA, Russia and China have used their military strengths to be perceived as world powers. Iceland and New Zealand have positioned themselves as some of the world's most peaceful countries.

As Bangladesh crafts Smart Bangla Global Campaign, it is critical for the country to identify its most relevant national strengths and anchor its image against a mega theme. A coherent nation-branding strategy will be the foundation of the campaign.

Smart Bangla Global Campaign will focus on 6 key actions supported by enablers and channels.

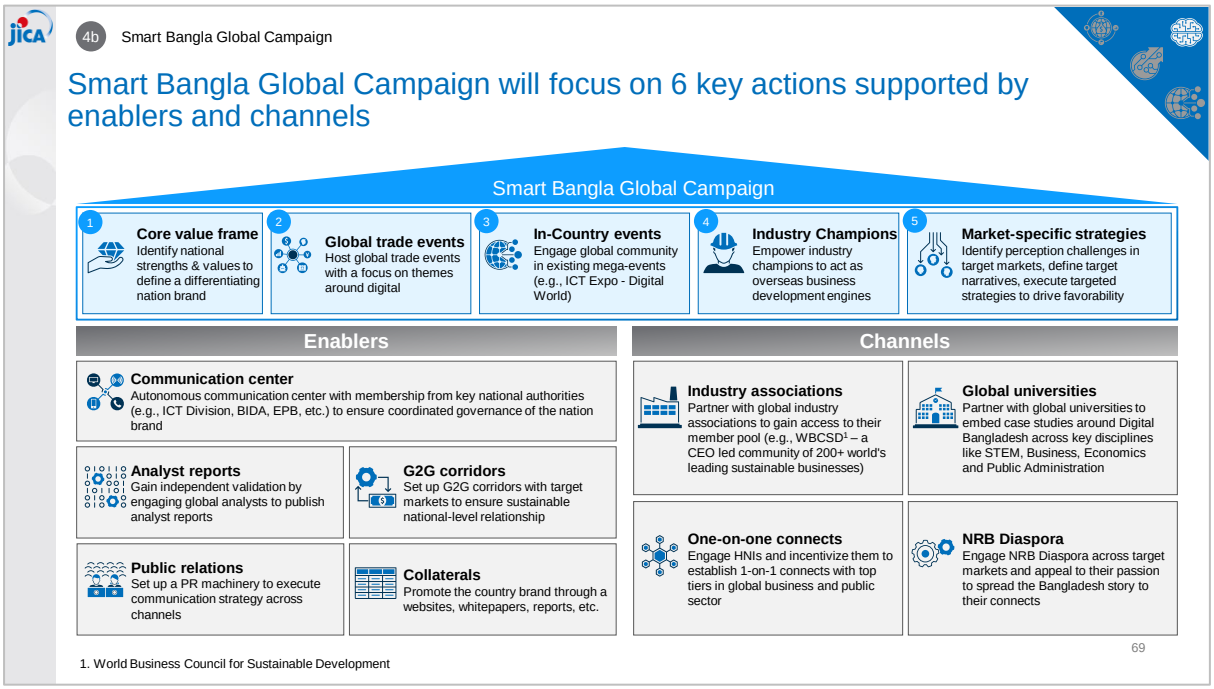


Figure 69: Key components of Smart Bangla Global Campaign

Initiatives to be undertaken by Bangladesh:

Program objectives:			
To position Bangladesh as an ICT hub by uplifting domestic market spend, boosting exports and attracting foreign investments in the sector			
Program targets			
Metrics	2025	2031	2041
• ICT GDP contribution	• $5-7 Bn	• $20+ Bn	• $50 Bn
• ICT gross exports	• $5 Bn	• $20 Bn	• $35-40 Bn
Program components	**Objectives**		
Smart ICT Investment Promotion Agency	• Creation of a next generation IPA serving investors and government stakeholders to drive FDI growth in the ICT sector		
IT/IT-ES export promotion	• Systematically boost IT/IT-ES exports by focusing on demand-driving eastern markets and attracting global tech. giants in Bangladesh		
Semiconductor value chain development	• To emerge as a regional semiconductor industry hub and enable local production of affordable electronic equipment		
Domestic ICT spend acceleration	• Creation of big-ticket ICT projects for local IT/IT-ES firms by accelerating public and private sector ICT spend		

Emerging technologies Center of Excellence	• Orchestrate an ecosystem of public sector, private sector and academia to drive local adoption of emerging technologies and position Bangladesh as a specialist internationally
Smart Bangla Global Campaign	• Decade long global campaign to shape global perception of Bangladesh as an exemplar of smart nation
Program execution/ ownership	
Lead Agency	• Ministry of Posts, Telecommunications & IT
Implementing body	• ICT Division
Program contributors	• BCC, BHTPA, BIDA, SHIFT • BASIS, BACCO, BCS, eCAB • Line Ministries • Regulators (e.g., Bangladesh Bank)
High level implementation timeline:	
• **Launch:** 12 months • **Stabilize:** 2 years • **Scale:** 3-4 years	

Table 39 : Implementation overview for ICT Industry Acceleration

4.4.3 Startup Bangladesh

Context: Growing the Startup Ecosystem will help Bangladesh achieve several key objectives of Vision 2041 such as 'Industrialization and Trade' through creation of more jobs and lowering of unemployment, 'Urban Transition' through the reallocation of wealth raised by entrepreneurs to fund their ventures, 'Innovation Economy' as Startups indirectly help in subsidizing R&D costs of a country and 'Human development' as Startups help younger employees become versatile in many skills

Current Progress: Several notable local Initiatives have been launched to broaden the Bangladesh Startup Ecosystem limited few of which are as below –

- Startup Bangladesh Limited (SBL) - This is a cabinet approved state-owned venture capital company formed in 2019. Aim of the company is to encourage foreign direct investment in the country by transforming the innovative ideas of Startups in Bangladesh into businesses.
- Anchorless Bangladesh is an early-stage venture investment fund focused on advancing the local Startup ecosystem and the brilliant founders behind transformative ideas
- Biniyog Briddhi is an impact investment catalytic program backed the embassy of Switzerland with the mission to empower impact enterprises
- IDEA (Innovation Design & Entrepreneurship Academy) supports creation of an Accelerator and its ecosystem. Helps teams offer mentoring, funding, co-working spaces, marketing, and legal support to selected startup entrepreneurs.

Challenges: Despite significant progress, there are multiple challenges still faced by Bangladesh some of them being as below:

- Unfavorable global brand perception
- Less conducive local investment system
- Education system and talent pool unable to cater to the ecosystem
- Slow scale up of incubators/accelerators
- Inability to repatriate funds generated through exits

Learnings from other countries: Bangladesh can draw inspiration and learnings from international peers including Israel, Ireland, and India:

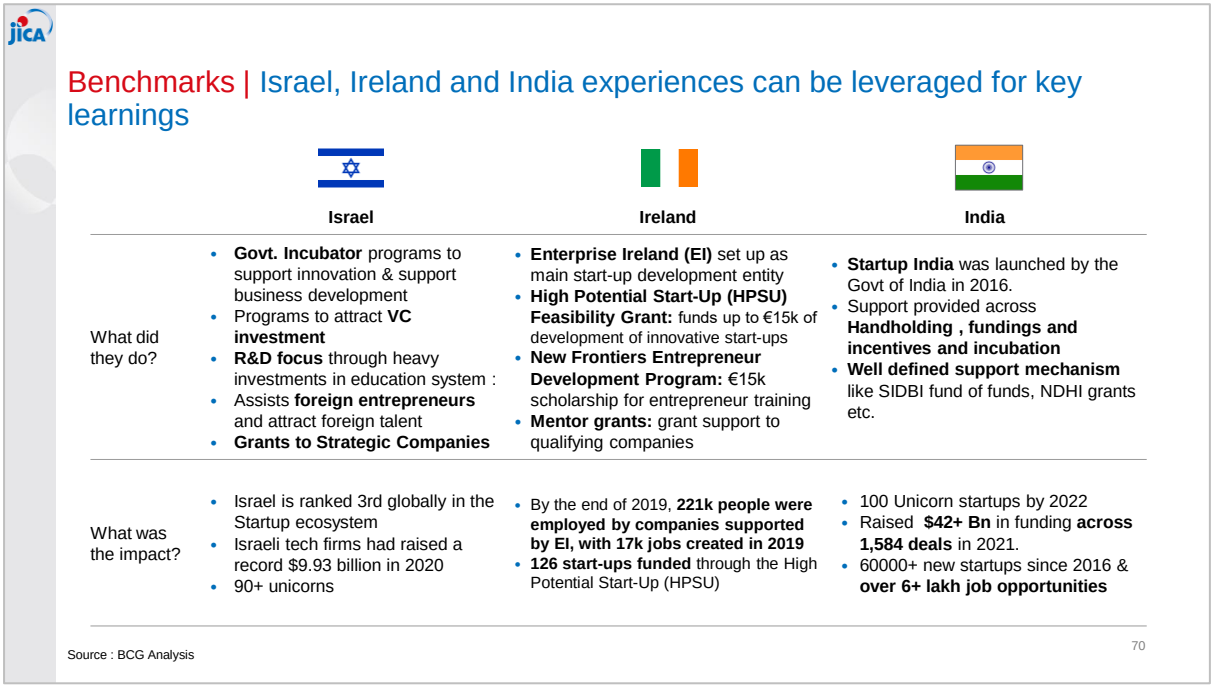


Figure 70: International benchmarks on Start-up ecosystems

Initiatives to be undertaken by Bangladesh: To accelerate the growth of the Startup ecosystem, Bangladesh must launch a program including several components:

Program objectives:				
Build a preeminent startup hub in Bangladesh to drive innovation and diversify the local economy, while generating attractive financial returns				
Program targets				
Metrics	Today	2025	2031	2041

• % Contribution of Startup economy to GDP	• NA	• <5%	• 5-8%	• 8-10%
• Global Startup ranking	• 93	• Within 50	• Within 30	• Within 10
• Number of unicorns	• 2	• 10+	• 50+	• 100+
Program components	**Activities**			
• Talent Pool: Opportunity to hire employees at an early stage	• Leveraging Open Innovation Models such as Hackathons • Entrepreneurial case studies and their dissemination			
• Funding/Capital: Availability of companies that manage venture capital	• Fund of funds: Inject capital investment directly or through partnerships • Creation of Angel Investing Networks • Corporate Venture Capital: Encourage corporates to invest in Startups • Create advocates from influential NRBs to reach prospective investors			
• Favorable Regulations: Legal and regulatory context to ease operations	• Fast-Tracking patent examination • Ease of re-patriation of funds • Easing Startup Setup and Exit processes. • Expediting Visa processes • Global Traders Program; Market Readiness Assistance			
• Start up support: Supporting orgs, suppliers & related industries	• Enable acceleration of infrastructure establishment • Incentives for startups to avail incubator facilities • Data access & incentivization for use case development			
• Access to addressable markets: Connection with other hubs, suppliers, industries etc.	• Formation of global/local alliances technology and innovation hubs • Provide soft landing for local start-ups in foreign hubs/countries			
Program execution/ownership				
• Lead Agency	• ICT Division			
• Implementing body	• Startup Bangladesh Ltd			
• Program contributors	• IDEA • Relevant Ministries, e.g., MoF • Industry Bodies			
High level implementation timeline:				

- **Launch:** 6 months
- **Stabilize:** 18 months
- **Scale:** 2-3 years

Table 40: Implementation overview for Startup Bangladesh

4.4.4 Smart Commerce

The e-commerce sector in Bangladesh is projected to be ~$8 Bn (in revenues) in 2022 and is projected to grow at 22-23% CAGR during 2022-2025. The sector has seen emergence of multiple e-commerce startups viz. Chaldal, ClickBD, Daraz, NEO Bazaar, etc. The Government of Bangladesh has taken considerable steps to drive growth of domestic and cross-border e-commerce. Ministry of Commerce, Bangladesh, launched the National Digital Commerce Policy, 2018. Pursuant to the policy, the Ministry of Commerce formulated Digital Commerce Operation Guidelines in 2021 with the aim to inject accountability, liability, and transparency into e-commerce businesses. The guidelines have defined the contours of delivery timelines, consumer rights, prohibitions and requirements on products and services, marketplace registration, and records & payment processing.

ICT Division will play a critical role in achieving select objectives of the National Digital Commerce Policy, 2018. In this regard, multiple programs of the Smart Bangladesh ICT 2041 Master Plan will play an enablement role in driving achievement of the objectives of the National Digital Commerce Policy, 2018. Relevant requisite pre-conditions for smart commerce businesses have been identified and mapped to programs of the Smart Bangladesh ICT 2041 Master Plan, as outlined below. However, it is critical to note that with evolving policy landscape around digital commerce in Bangladesh, Smart Commerce Program, with contribution from Ministry of Commerce, should continue to map ICT 2041 Master Plan programs to the enabling factors of such policies.

Program objectives:		
Enablement of select relevant objectives of the National Digital Commerce Policy to drive acceleration of smart commerce ecosystem in Bangladesh		
Program targets		
2025	2031	2041
• ~50% of relevant programs of ICT 2041 Master Plan contributing to achievement of select relevant objectives of emerging digital commerce policy landscape	• All relevant programs of ICT 2041 Master Plan contributing to achievement of select relevant objectives of emerging digital commerce policy landscape	• Smart commerce business ecosystem in Bangladesh powered by outcomes of Smart Bangladesh ICT 2041 Master Plan
Pre-conditions for Smart Commerce	**Enabling Smart Bangladesh ICT 2041 Master Plan Programs**	

• Widespread affordable internet connectivity	• Universal Internet Access Program
• Scalable technology stack	• Government Cloud and Data Center
• Seamless user experience and digital signatures	• Bangla Stack • ICT Policies (Emerging technologies policies e.g., AI)
• Digital payments and awareness of cashless transactions	• Interoperable Payments Ecosystem and FinTech Accelerator (under Inclusive Financial Ecosystem Program)
• Access to financing	• Startup Bangladesh
• Safe online environment for women in f-commerce	• Digital Tolerance and Culture Movement
• Digitally skilled and equipped e-commerce consumers	• Digital Curriculum • Bangla Digital Skilling • Smart Device Access
• Consumer privacy and security	• ICT Policies (Data privacy and cybersecurity)
Program execution/ ownership	
• Lead Agency	• ICT Division
• Implementing body	• ICT Division in collaboration with Ministry of Commerce
• Program contributors	• e-CAB, • e-Commerce industry players
High level implementation timeline:	
• **Launch:** 6 months • **Stabilize:** 3-4 years • **Scale:** 3-4 years	

Table 41: Implementation overview of Smart Commerce

4.4.5 Technology and Infrastructure Backbone

4.4.5.1 Universal Internet Access – Internet Infrastructure

Context: Improving internet access is a key enabler to achieve several key elements of Bangladesh's Vision 2041 – it helps in providing macroeconomic stability by contributing to GDP growth as well as supporting innovation by driving enhanced learning outcomes as well as supporting development of Startups and SMEs.

Progress: Bangladesh has a variety of initiatives completed or are underway to develop universal digital access – such as the National IT Backbone (infoSarker 1, inforSarker 2 and infoSarker 3) helping them achieve –

- Rapid expansion in connectivity (driving internet penetration to 38% of households over the last 5 years)
- Provide healthy internet quality and performance

Challenges: However, there are challenges that still need to be addressed –

- Relatively low internet penetration (at 38% of households) compared to top ICT countries
- Low service levels, high dependency on few submarine cables (2) and imported bandwidth
- High tariffs lowering affordability - Mobile internet cost almost 2 times higher than best in class countries like Australia, Japan etc.
- Low number of datacenters affecting costs as well as national data security

Ubiquitous internet access: It will be necessary to enable multiple Smart Bangladesh to use cases

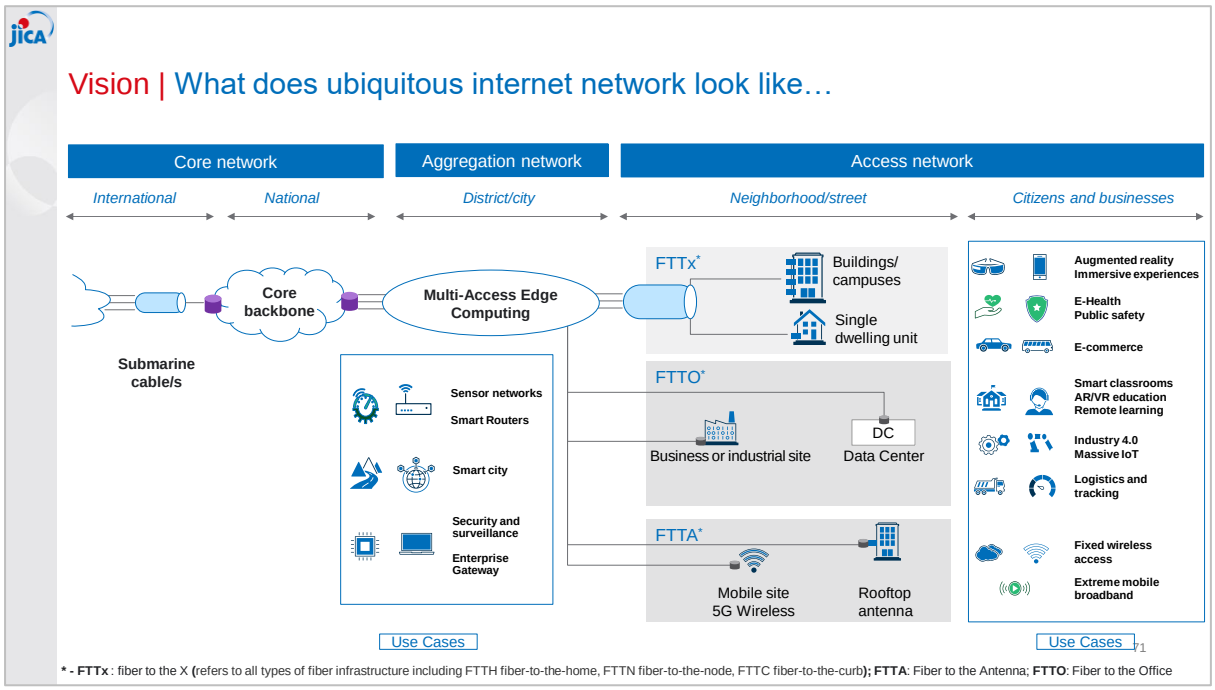


Figure 71: Vision of use cases enabled by Universal Internet Access

Learnings from other countries: Bangladesh can draw inspiration and learnings from international peers including USA and India:

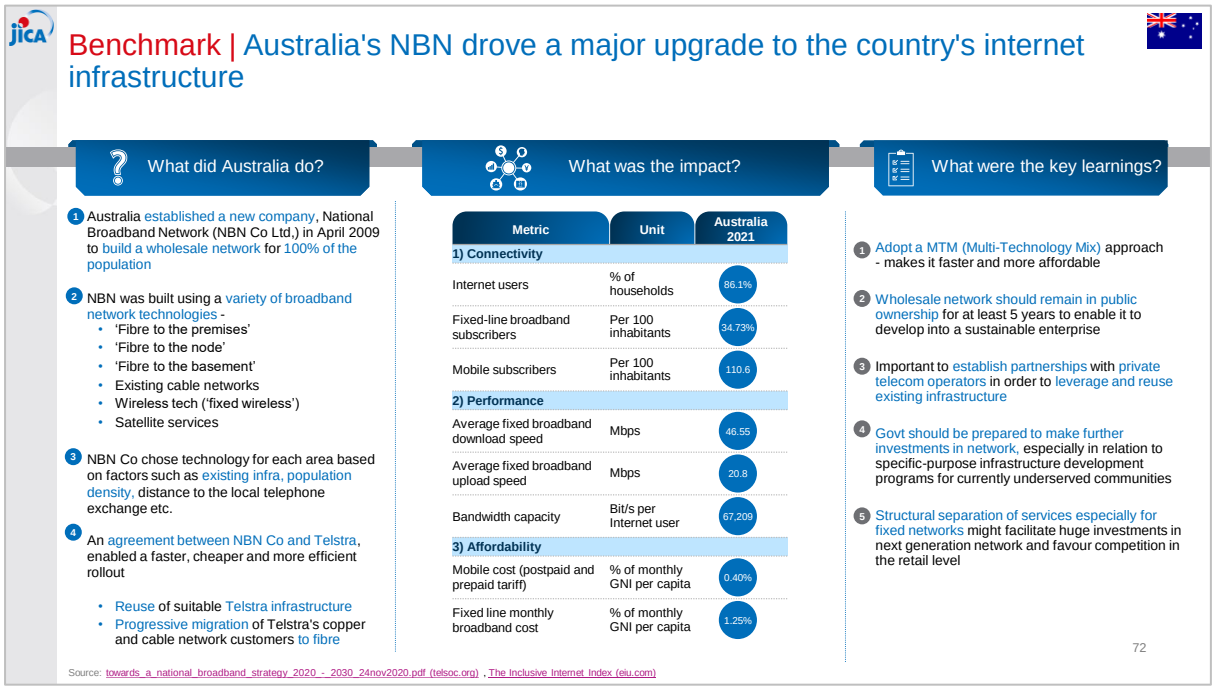


Figure 72: Overview on universal internet access in Australia

Program: 2 key programs to be considered to strengthen universal internet access further

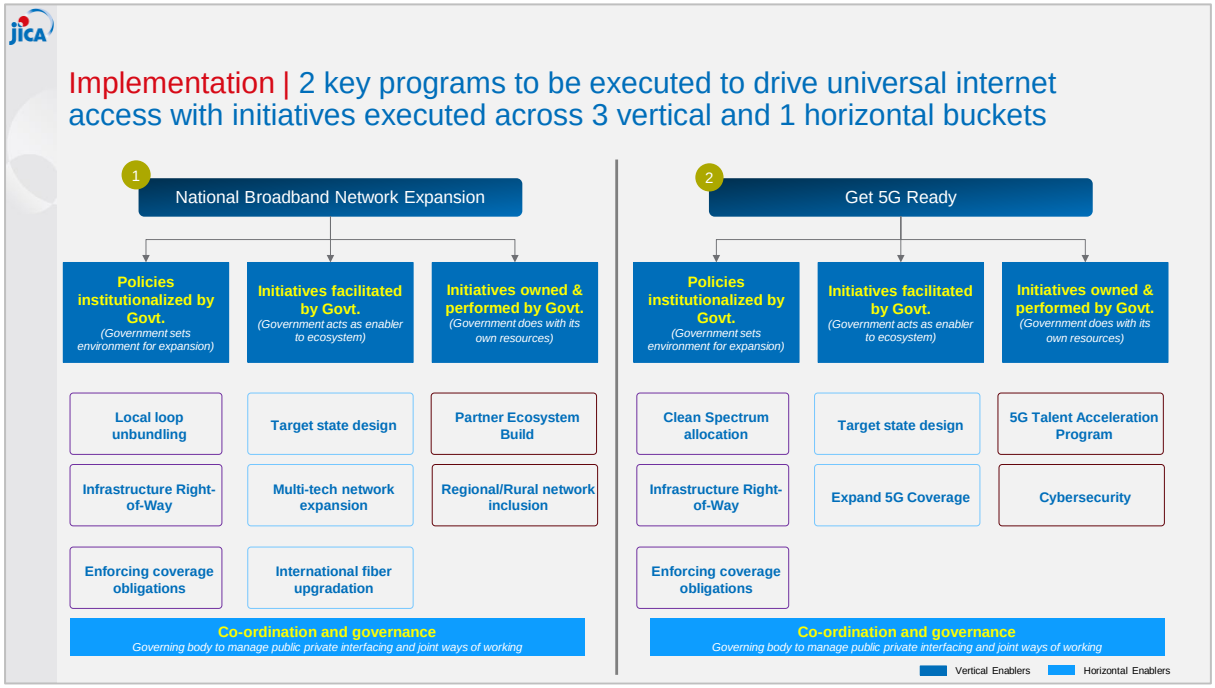


Figure 73: Proposed universal Internet access program components for Bangladesh

Initiatives to be undertaken by Bangladesh:

Program objectives:
To provide ubiquitous, high-quality, high-speed broadband that is affordable to all in Bangladesh

Program targets				
Metrics	Today	2025	2031	2041
• Internet penetration • (% of households)	• 38%	• 60%	• 100%	• 100%
• Broadband subscribers • (% of population)	• 5%	• 40%	• 70%	• 100%
• Broadband download speed (mbps)	• 50 mbps	• 150 mbps	• >250 mbps	• >250 mbps
• 5G Network Coverage	• NA	• 80%	• 100%	• 100%
• Mobile network cost • (% of monthly GNI)	• 3%	• <1%	• <1%	• <1%

Program components	Objective	Initiative
National Network Backbone Expansion	To improve overall connectivity (internet penetration, number of broadband/mobile subscriptions) and reliability (service levels, dependency on submarine cables and imported bandwidth)	• Local loop unbundling
		• Infrastructure Right of Way
		• Coverage Obligations • Target state design
		• International Fiber Upgrade
		• Multi tech expansion
		• Partner Ecosystem Build
		• Regional/Rural network inclusion
Get 5G Ready	To unlock benefits of 5G technology and enable development of new business models and advanced applications, fostering business innovation and economic growth	• Clean Spectrum allocation
		• Infrastructure Right of Way
		• Coverage Obligations
		• Target state design
		• Expand 5G Coverage
		• 5G Talent Acceleration Program
		• Cybersecurity policies
Program execution/ ownership		

• Lead Agency	• ICT Division – BCC
• Implementing body	• BCC
• Program contributors	• Bangladesh Submarine Cable Company Limited • Telecom. Service providers
High level implementation timeline:	
• **Launch:** 12 months • **Stabilize:** 3-4 years • **Scale:** 3-4 years	

Table 42: Implementation overview for Universal Internet Access program

4.4.5.2 Government Cloud and Data Centers

Context: With the impending data explosion in Bangladesh due to several factors such as increase in internet penetration, expanding Govt e-Services, smart city initiatives etc., it is becoming increasingly important for Bangladesh to create its own scalable and flexible cloud infrastructure.

Current Progress: Bangladesh has taken initial steps to offer cloud services with large scope to shift government services to the cloud –

- 2 National Data Centers: Bangladesh has two national data centers, one of which is Tier III and the other is Tier IV, where all data generated by the GoB is stored
- Partnership with Cloud Hosting Service Provider: Bangladesh Data Center Company Limited (BDCCL), has entered an arrangement with Oracle to provide sovereign-hosted cloud services to the Bangladesh government
- Private sector data center services: Many small to medium-sized private sector firms own data centers with few providing cloud services as well

Challenges: Bangladesh needs to facilitate and support three basic imperatives necessary for scaling up cloud

- Enabling data/privacy regulations: Lack of Intellectual Property (IP) and data privacy laws to protect both users and IT firms
- Availability of cloud trained talent pool: Require training to be more efficient at cloud operation and management
- Uninterrupted power supply: To receive certifications (e.g., tier 3 or tier 4) and act as reliable sources of power

Learnings from other countries: Bangladesh can draw inspiration and learnings from international peers including UK and India:

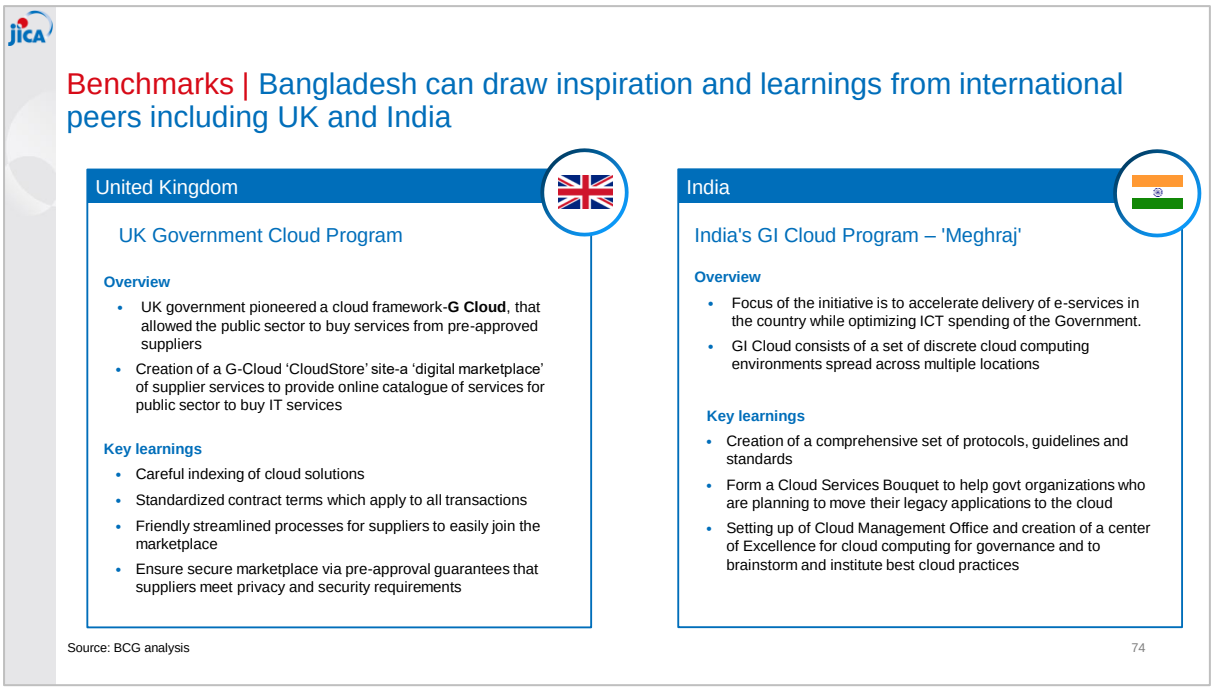


Figure 74: International benchmarks on Government cloud and data centers

Initiatives to be undertaken by Bangladesh: To accelerate the growth of the cloud ecosystem, Bangladesh must launch a program including several components:

Program objectives:		
Accelerate delivery of e-services in the country while optimizing ICT spending of the Government		
Program targets		
2025	2031	2041
• >50% of Departmental systems moved to cloud • Key set of government cloud service providers empaneled • Cloud SLA, MSA & Procurement Guidelines published	• >80% of Departmental systems moved to cloud • Essential Govt. products/ services available on Government App store	• 100% of Departmental systems moved to cloud • Essential Govt. products/ services available on Government App store

Program components	**Objectives**
Create a cloud deployment strategy	• Establishing a clear strategy around the cloud offerings across different deployment and service models
Create Pro-Cloud Regulatory Conditions	• Develop cloud-relevant data privacy regulation, and raise awareness among relevant staff

Cloud First policy	• Mandate public sector organizations to fully evaluate potential cloud solutions, before considering other options when procuring new services
Form a Cloud Services Bouquet	• Careful indexing of cloud solutions to assist the Government Organizations in selecting appropriate Cloud services from the plethora of offerings of CSPs
Empanelment of Cloud Service Provider partners	• Partner with players like AWS, Google, Microsoft to provide cloud services as per the Services Bouquet
'Digital Marketplace' for cloud services	• Digital marketplace for cloud services, from which government agencies may procure advanced cloud supported services.
Data Center scale up assessment	• Assess current National Data centers for future scalability and define strategy for having scalable DC-DR infrastructure
Cloud Security Certifications	• Mandating a security certification for government cloud computing to help agencies better recognize security adequacy and confidently approach cloud computing
Program execution/ ownership	
Lead Agency	• ICT Division
Implementing body	• BCC, BDCCL
Program contributors	• Cloud Management Office (CMO), Architecture Management Office, Cloud COE, Expert Group etc.
High level implementation timeline:	
• **Launch:** 6 months • **Stabilize:** 18 months • **Scale:** 3-4 years	

Table 43: Implementation overview for Government Cloud and Data Centers

5 Smart Bangladesh: ICT Master Plan 2041 Implementation Considerations

Extensive discussions were held with different stakeholders in Bangladesh on the current challenges and learnings from previous implementation exercises in the country. Global experts and learnings were also studied on the typical success factors and pitfalls for such large-scale national transformation programs. It has emerged that there are key considerations to be kept in mind across 4 different topics as mentioned below:

1. Governance of the large-scale technology led transformation
2. Investments and policies
3. Technology
4. Skilling and talent development

Governance considerations

Governance has emerged as the most critical topic to be kept in mind when embarking on a large scale, multi-year (or multi-decade) national transformation journey. Some of the key considerations to be kept in mind and potential mitigations are as below. The governance consideration has been detailed out on Chapter 6.

Key considerations	Potential mitigation
• Critical to have a nation-wide digital awareness program • Creation of a common governing taskforce is the most critical success factor • After launch, necessary to integrate Master Plans into cross-ministerial agenda • Agile way of working in public sector departments is a necessary need of the hour • Alliance with partners and vendor governance need to be centrally managed • A clear definition required for "What Success looks like"	• Set up of a centralized governance body with top level mandate and playing following key roles - Ministry, academia, industry, international co-ordination - Delivery of common platforms - Strategy-architecture-standards definition - Uniform stakeholder experience design support - Budget planning and tracking - Quality assurance - Procurement and vendor governance • Active and immediate implementation of the Smart Bangla Campaign – scale like Meena campaign or birth control campaign • Digital leadership academy set up to embed new ways of agile working in govt. departments

Table 44 : Key governance considerations

Investment and policies considerations

Having the right policies and investment decisions in place are critically important to the success of such large-scale programs. Some of the key considerations to be kept in mind and potential mitigations are as below:

Key considerations	Potential mitigation
• Critical to ensure citizen data safety and cyber security as digitalization scales • Regulatory frameworks need to be updated quickly and dynamically to enable new technologies • Regulatory support needed by startups for fund repatriation, fintech regulations, exit support • Technology IP valuation support and protection polices need to be in place • Data hosting polices to be reviewed and revised to allow more flexibility • Massive investment in public service digitalization but E2E high quality experience missing	• Accelerated review and formation of cyber, data protection polices and IPR, follow best in class practices by EU countries, Japan etc. • Immediate intervention and collaboration with startups to define eased out regulations on exit, repatriation – ICT division and MoF to collaborate with Bangladesh Bank for fintech policy review • Set up a programmatic quality assurance and improvement program for public service digitalization under the central governing agency

Table 45 : Investment and policy considerations

Technology considerations

Multiple considerations need to be kept in mind from a technology perspective. Some of the key considerations to be kept in mind and potential mitigations are as below:

Key considerations	Potential mitigation
• Guidelines on development standards and methodologies, infrastructure utmost necessary • Integrated service delivery architecture connected to BNDA critical, standardization across ministries critical • Interoperability and fungibility of data critical for success of large-scale projects • Need to emphasize on low-cost smartphones and data • Sanity and quality of underlying registration data, ID date etc. not sufficient to run advanced use cases • Scalability of infrastructure to host large scale solutions is limited	• Accelerated design and ideation of the Bangla stack and Universal digital ID – explore quick out of the box solutions like MOSIP • Make guidelines and standards definition and adherence control a top priority agenda of the central governance agency • Drive incentivization and funding programs, internet partnership ecosystem aggressively for achieving smart devices and internet affordability • Build scalability through "Bongo-Cloud" – partner with DC and Cloud Service Providers to increase scalability & speed to market

Table 46 : Technology considerations

Skilling and talent development considerations

Skilling and talent development will be critical to the success of the program and there are key considerations to be kept in mind.

Key considerations	Potential mitigation
• Universities have not been able to embed emerging tech in curriculum • Academia digital upskilling is a key concern • Limited demographic dividend window is a key factor to be kept in mind while planning for upskilling • Lack of a unified version of skills competency framework • Quality control and outcome orientation of current skilling programs need to be elevated much further • Special emphasis on digital ethics and online behavior within digital or training curriculum • Definition of "outcomes" in outcome-oriented curriculum is not standardized	• Demand driven skills and competency framework for training program planning – define the tech priorities of Bangladesh first • Initiatives like citizen skilling across all levels of society, Digital Leadership Academy etc. to be made top priority to capture demographic dividend • Introduce digital ethics and online behavior as fundamental parts of the primary and secondary digital curriculum + drive through Smart Bangla campaign • Collaborate and drive a top mandated program with University Grants Commission to unlock Outcomes aligned to national goals and to drive faster adoption of revised curriculums

Table 47: Skilling and talent development considerations

5.1 Implementation Strategy

Each program will go through 4 phases of evolution over varying durations of time which are **Launch**, **Stabilize**, **Scale** and **Excel.**

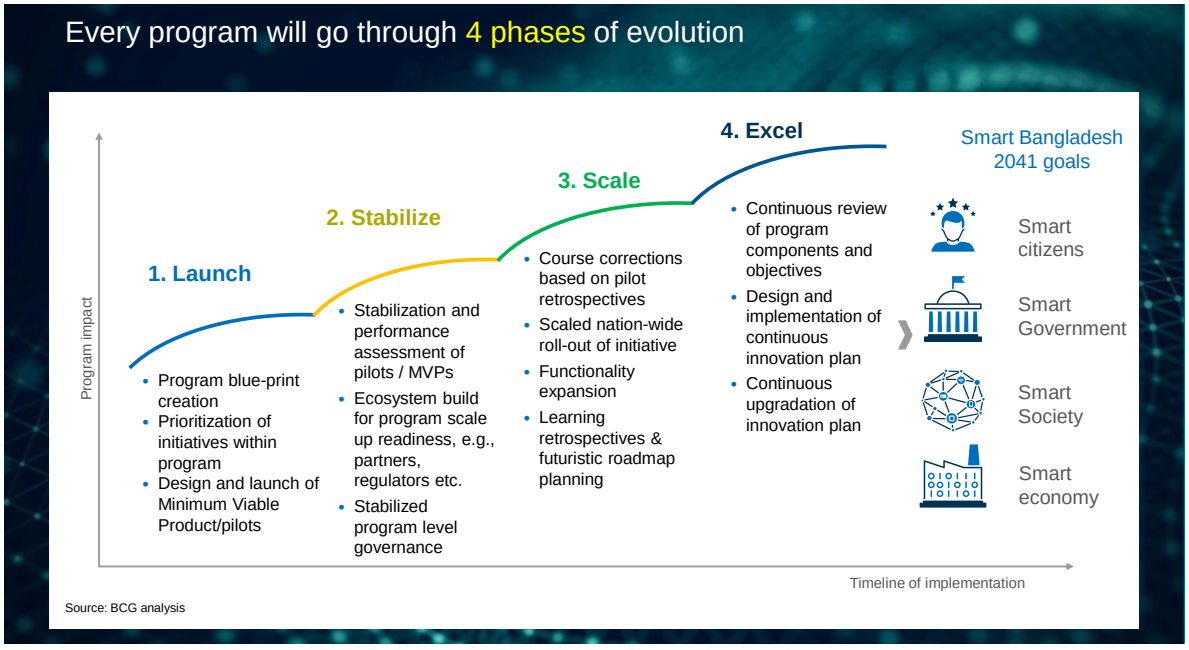


Figure 75: Evolution phases for each program

These programs, through the evolution, will be fulfilling their respective goals for short-term (2025), mid-term (2031) and long-term (2041). This has been depicted in the below table

Change Pillar	Program L1	Program L2	2025 target	2031 target	2041 target
Smart Citizen	Universal digital ID	Universal digital ID	Stabilized national digital ID in place >30% Digital ID adoption	>80% Digital ID adoption 3-6% of GDP value impact	100% Digital ID adoption >10% of GDP value impact through national digital ID adoption
	Citizen upskilling	Digital curriculum	100% of primary and secondary age children with access to digital literacy education World-class digital curriculum with approval of domestic and international educators and businesses	100% of primary & secondary children pursuing outside-of-the classroom digital learning All teachers trained in digital technology	Sufficient ICT-trained graduates per year 2x top 30 globally ranked university for computer science
		Bangla Digital Skilling	All sections of the society accessing digital skilling programs and technology led jobs on a unified portal	A society that is skilled to use and innovate smart solutions	A society empowered to live in and shape an innovation economy powered by future waves of frontier tech.
		Smart device access	All initiatives designed and launched	100% of citizens with a 4G+ smart phone Zero gender gap in access to smart devices	100% of citizens with access to multiple hi-tech smart devices
	Digital Collaboration Platform	Digital Collaboration Platform	Active and diverse participation, with multiple public services launched annually	10x active community platforms with 0.5m+ active users each Active and diverse participation, with multiple policies implemented annually	30x active community platforms with 1m+ active users each
	Smart Bangla Campaign	Smart Bangla Campaign			

Change Pillar	Program L1	Program L2	2025 target	2031 target	2041 target
Smart Government	Smart Healthcare	Smart Healthcare	100% citizens accessing health info directly via public health portal 100% access to digital health records 100% of professionals, facilities, procedures, and drugs in registry	100% access to telemedicine 100% digital insurance claims 100% of public hospitals with ERP Health data collected remotely via smart devices (e.g., wearables) 100% health worker attendance rate	AI/ predictive analytics used to pre-diagnose conditions Robotics widely used in treatment
	Blended Learning	Blended Learning	100% of teachers trained in Blended Learning 100% of curriculum available digitally 100% of schools applying formative assessment	100% of students with access to Blended Learning 100% of schools actively making lessons available online 100% of schools with required digital tools	3x domestic EdTech unicorns
	Smart Land Management	Smart Land Management	Solutions under development and trial across entire system Private partnerships formed to accelerate tech	Digital solutions implemented E2E 100% coverage of citizens and regions	World-leading land records system 4IR technologies employed at scale
	Smart Postal Service	Smart Postal Service	Basic B2C and internal processes digitized across majority of postal service Private partnerships established	All services fully digitized, end-to-end Advanced digital tech under trial across postal service	Top 40 globally ranked postal service Advanced digital tech widely used at scale across postal service
	Smart Agriculture	Smart Agriculture	Core components of smart agriculture developed	Historical data fully digitized and made available Broad range of private sector	100% of farmers leveraging smart agri solutions 4IR tech used at scale across

Change Pillar	Program L1	Program L2	2025 target	2031 target	2041 target
			All newly generated info in the sector digitized	solutions built on top of smart agriculture technologies	agricultural sector
	Smart Judiciary	Smart Judiciary	100% of new cases digitized All initiatives designed or launched	100% end-to-end digitization of judiciary system Various advanced digital tech solutions under trial Case backlog eliminated	Advanced digital tech implemented at scale across judicial services
	Smart Borders	Smart Borders	Basic B2C and internal processes digitized across majority of border services More bilateral agreements established	All services fully digitized, end-to-end Advanced digital tech widely used at scale to automate trade	Fastest clearance system in South Asia
	Smart Transportation	Smart Roadways	Digital use-cases identified and prioritized across the roadways value chain and industry and academia partnerships established	High impact digital use-cases rolled out and adopted across the roadways value chain	Smart roadway solutions adopted at scale across roads and bridges of Bangladesh and Bangladesh emerges as a regional leader in smart roadway solutions
	Smart Transportation	Smart Railways	Digital use-cases identified and prioritized across rail infrastructure, rolling stock and rail operations, and academia partnerships established	High impact digital use-cases rolled out and adopted across rail infrastructure, rolling stock and rail operations	Smart railway solutions adopted at scale across Bangladesh railways and Bangladesh emerges as a regional leader in smart railway solutions
	Smart Tax	Smart Tax	10% tax to GDP ratio 30% of taxable individuals paying tax 35% direct tax share of tax revenue	14% tax to GDP ratio 55% of taxable individuals paying tax 40% direct tax share of tax revenue	20%+ tax to GDP ratio 100% of taxable individuals paying tax 50% direct tax share of tax revenue

Change Pillar	Program L1	Program L2	2025 target	2031 target	2041 target
	ICT Policies	Data privacy and cyber security	Draft policies and updates made to cybersecurity, data protection, emerging tech areas AI legal committee formed	Implementation of National Data protection 0 data breaches WEF/IPR ranking jump	Concrete detailed policies and corresponding governance created for cybersecurity, emerging tech areas and economic incentivization areas
	National e-procurement marketplace	National e-procurement marketplace	GMV equivalent to 0.5% of GDP >50% of public procurement expenditure processed through e-Marketplace	~2-3% - GMV as percentage of GDP >5% in exchequer savings annually	>5% GMV as percentage of GDP 10-15% exchequer savings annually
	Digital Job Platform	Digital Job Platform	Existing job portals integrated on Digital Job Platform Jobs across key Gov't bodies and select private sectors offered on the platform Platform accessed by all digitally ready sections of the society	Nation's one-stop job matchmaking and gig economy portal Jobs across all Gov't bodies and private sectors on the platform Accessibility extended to the digitally passive sections	All sections of the society accessing nation-wide job and freelancing opportunities on a single platform
	Smart Social Safety Net	Smart Social Safety Net	Digital technologies under development and trial across all social safety net use cases	100% of required cash transfers with digital option	End-to-end digitized social safety net ecosystem, enabling world class disaster resilience
	Public Service Excellence & Paperless Administration	Public Service Excellence & Paperless Administration	100% of civil servants equipped with required digital tools Service transformation strategy defined for	100% of documents digital 100% awareness amongst citizens	100% of public services available online with 95%+ citizen satisfaction

Change Pillar	Program L1	Program L2	2025 target	2031 target	2041 target
			every digital public service 100% awareness within government		
	Police Modernization	Police Modernization	Solutions under development and trial across entire system Data being actively used to generate insights	100% process re-design and E2E implementation 100% coverage of frontline officers and communities	Leading police force leveraging smart technologies in service provision and combating crime
	Digital Leadership Academy	Digital Leadership Academy	~10,000 Gov't officials and private sector C-suITes trained / groomed by DLA	DLA emerges as national center of excellence for digital skills in public & private sector digital transformation	DLA emerges as a regional center of excellence in public and private sector digital leadership capability build
Smart Society	Inclusive Financial Ecosystem	Interoperable payment ecosystem	50% of finance transactions digital, at least 2 fintech unicorns	100% of finance transactions digital, at least 5 fintech unicorns	100% of finance transactions digital, at least 5 fintech unicorns
	Green Sustainable Bangla	Smart Cities	Smart city mission program designed and launched with vision and objectives Smart city solution development and trial across entire system	First batch of smart cities created to be created as lighthouse Smart cities and used as exemplars for future smart city projects	Multiple smart cities present enabled to leverage smart solutions and use technology, information, and data to improve infrastructure and services.
		Smart Grid	Smart Grid related technologies under development and trial across first batch of targeted Grid utilities Initiation of automation of	Almost fully modernized grid, leading to improvements in quality and reliability of supply, with reduction in network losses and better responses to incidents	Almost fully modernized grid, leading to improvements in quality and reliability of supply, with reduction in network losses and better responses to incidents

Change Pillar	Program L1	Program L2	2025 target	2031 target	2041 target
			targeted grid assets		
		Digital Climate Resilience	Mechanisms for effective planning and management Improved education, awareness, and human and institutional capacity on climate change resilience	Sophisticated climate tech knowledge and research ecosystem Climate tech PPPs established to fast-track initiatives in key sectors	Strengthened resilience and adaptive capacity to climate-related hazards and natural disasters
	Bangla Stack	Bangla Stack	50% of smart gov services on stack, 1.5x speed to market for digital services	70% of smart gov services on stack, 2x speed to market for digital services	100% of smart gov services on stack, 3x speed to market for digital services
	Digital Tolerance & Culture Movement	Digital Tolerance & Culture Movement			
Smart Economy	4IR industry accelerators	4IR industry accelerators	All leading players in key sectors having run 4IR trials and rolling out at scale Nascent domestic production tech specialisms established across key sectors	Established domestic production tech specialisms across key sectors Top 40 globally ranked nation for 4IR technology adoption	All key sectors playing at the tech frontier, in line with international peers Top 20 globally ranked nation for 4IR technology adoption
	ICT industry acceleration	Smart ICT Investment promotion agency	$5+ Bn ICT economy	$ 20+ Bn ICT Economy	$50 Bn ICT economy

Change Pillar	Program L1	Program L2	2025 target	2031 target	2041 target
	Startup Bangladesh	Startup Bangladesh	Contribution of startup economy to GDP: 5% Global Startup Ranking: Within 50 Number of unicorns: 10+	Contribution of startup economy to GDP: 5-8% Global Startup Ranking: Within 30 Number of unicorns: 50+	Contribution of startup economy to GDP: 8-10 % Global Startup Ranking: Within top 10 Number of unicorns: 100+
	Smart Commerce	Smart Commerce	~50% of relevant programs of ICT 2041 Master Plan contributing to achievement of select relevant objectives of emerging digital commerce policy landscape	All relevant programs of ICT 2041 Master Plan contributing to achievement of select relevant objectives of emerging digital commerce policy landscape	Smart commerce business ecosystem in Bangladesh powered by outcomes of Smart Bangladesh ICT 2041 Master Plan
	Tech and Infrastructure Backbone	Universal Internet Access	Connectivity - Internet penetration: 60% of households Broadband subscribers: 40% of population Performance – Broadband download speed: 150 Mbps 5G Network Coverage: 80% of population Affordability – Mobile phone cost: <1% (of monthly GNI) Fixed broadband cost: <1% (of monthly GNI)	Connectivity - Internet penetration: 100% of households Broadband subscribers: 70% of population Performance – Broadband download speed: >250 Mbps 5G Network Coverage: 100% of population Affordability – Mobile phone cost: <1% (of monthly GNI) Fixed broadband cost: <1% (of monthly GNI)	Connectivity - Internet penetration: 100% of households Broadband subscribers: 100% of population Performance – Broadband download speed: >250 Mbps 5G Network Coverage: 100% of population Affordability – Mobile phone cost: <1% (of monthly GNI) Fixed broadband cost: <1% (of monthly GNI)

Change Pillar	Program L1	Program L2	2025 target	2031 target	2041 target
		Government Cloud and Data Center	Departmental systems moved to cloud (%): >50% Key set of cloud set providers empaneled Cloud SLA, MSA & Procurement Guidelines published	Departmental systems moved to cloud (%): >80% Essential Govt. products/ services available on Government App store	Departmental systems moved to cloud (%): 100% All Govt. products/ services available on Government App store

Table 48: Program-wise short term, mid-term, long-term objectives

To achieve these goals, there are a set of programs which should "launch" immediately, while there are a few which will start in the short to mid-term & a few which will launch slightly later than mid-term. However, there duration required for "Stabilize" and "Scale" will be different for different programs. The timeline view for each of the programs is given in Section 4 of this document.

We have followed the following guiding principles for the Master Plan implementation roadmap design

1. **Every program is important:** Each program helps achieve one or more goals of Smart Bangladesh 2041; hence, no specific guard-rail-based prioritization
2. **Capacity constraints currently not considered:** Programs spread across multiple divisions / agencies
3. **Sequence of "launch" to be based on 3 key factors**
    I. **Impact:**
        - GDP / Exchequer savings impact: Impact on national GDP or national exchequer savings
        - Societal impact: Benefits accrued to all levels of the society
        - Enablement impact: Extent to which the program is a key enabler of other programs
        - Speed to impact: Speed to delivery of values aligned to key Smart Bangladesh objectives

    II. **Readiness:**
        - Starting point: Maturity of existing initiatives or planning to be built on
        - Funding: Ease or availability of funding for the program, e.g., through initiatives like EDGE

    III. **Control:**
        - Degree of control of ICT Division on the program

5.1.1 Evolution Roadmap for Smart Citizen Programs

Below is a high-level view of how the different programs can evolve through the 4 phases

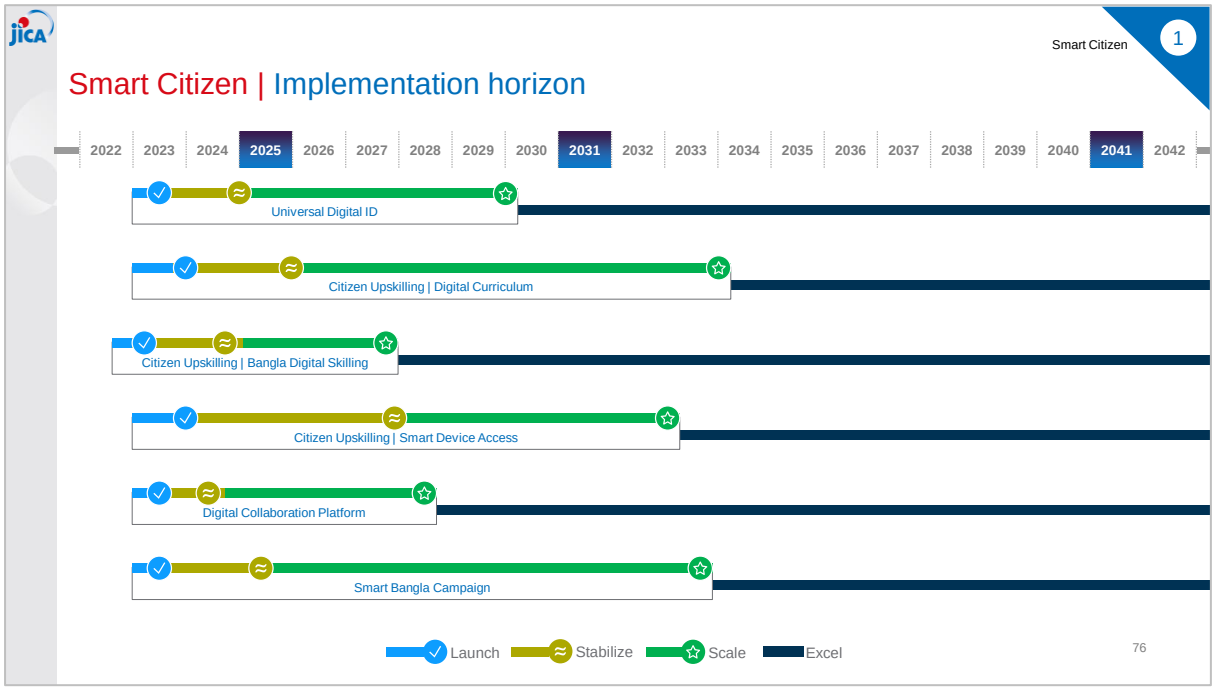


Figure 76: Evolution roadmap for Smart Citizen programs

5.1.2 Evolution Roadmap for Smart Government Programs

Below is a high-level view of how the different programs can evolve through the 4 phases

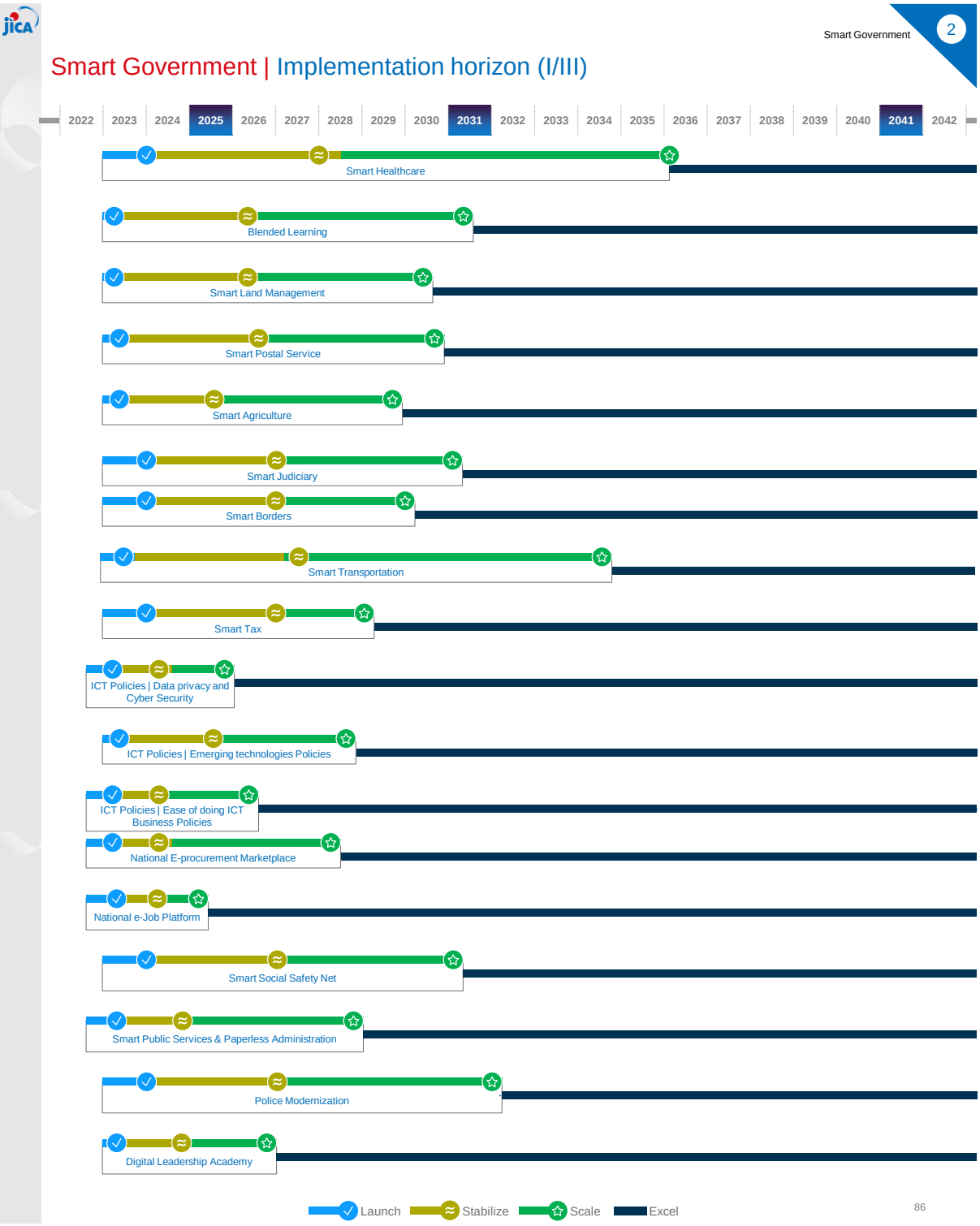


Figure 77: Evolution roadmap for Smart Government Programs

5.1.3 Evolution Roadmap for Smart Society Programs

Below is a high-level view of how the different programs can evolve through the 4 phases

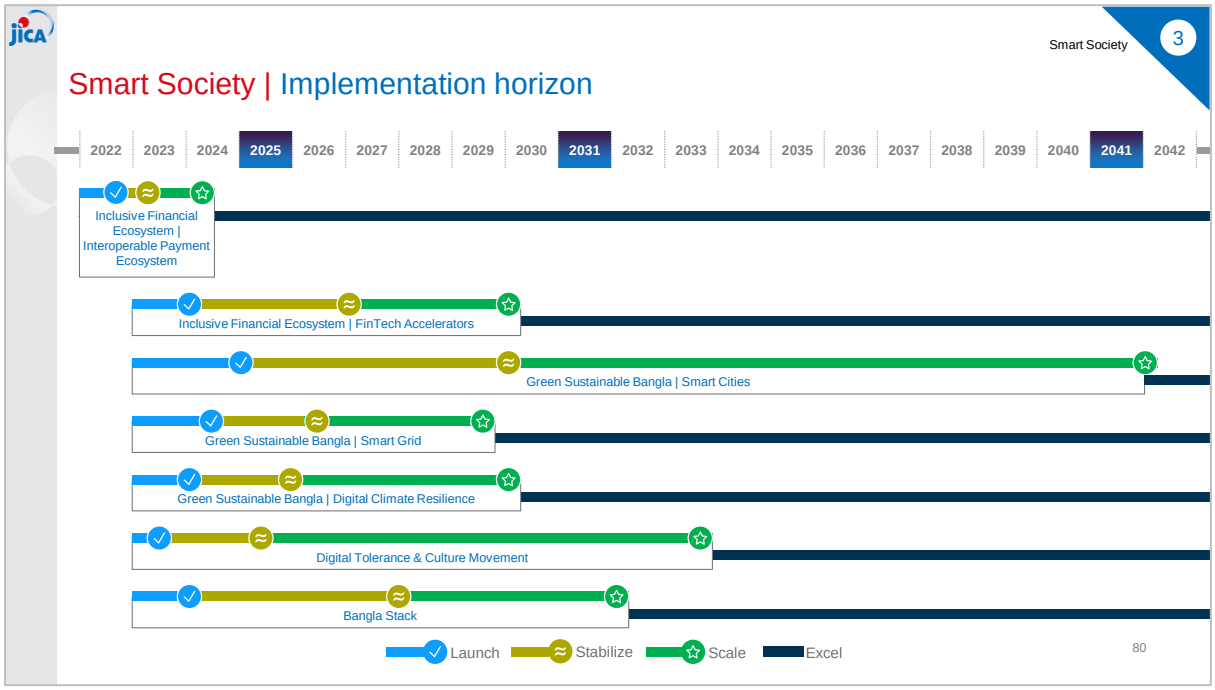


Figure 78: Evolution roadmap for Smart Society programs

5.1.4 Evolution Roadmap for Smart Economy Programs

Below is a high-level view of how the different programs can evolve through the 4 phases

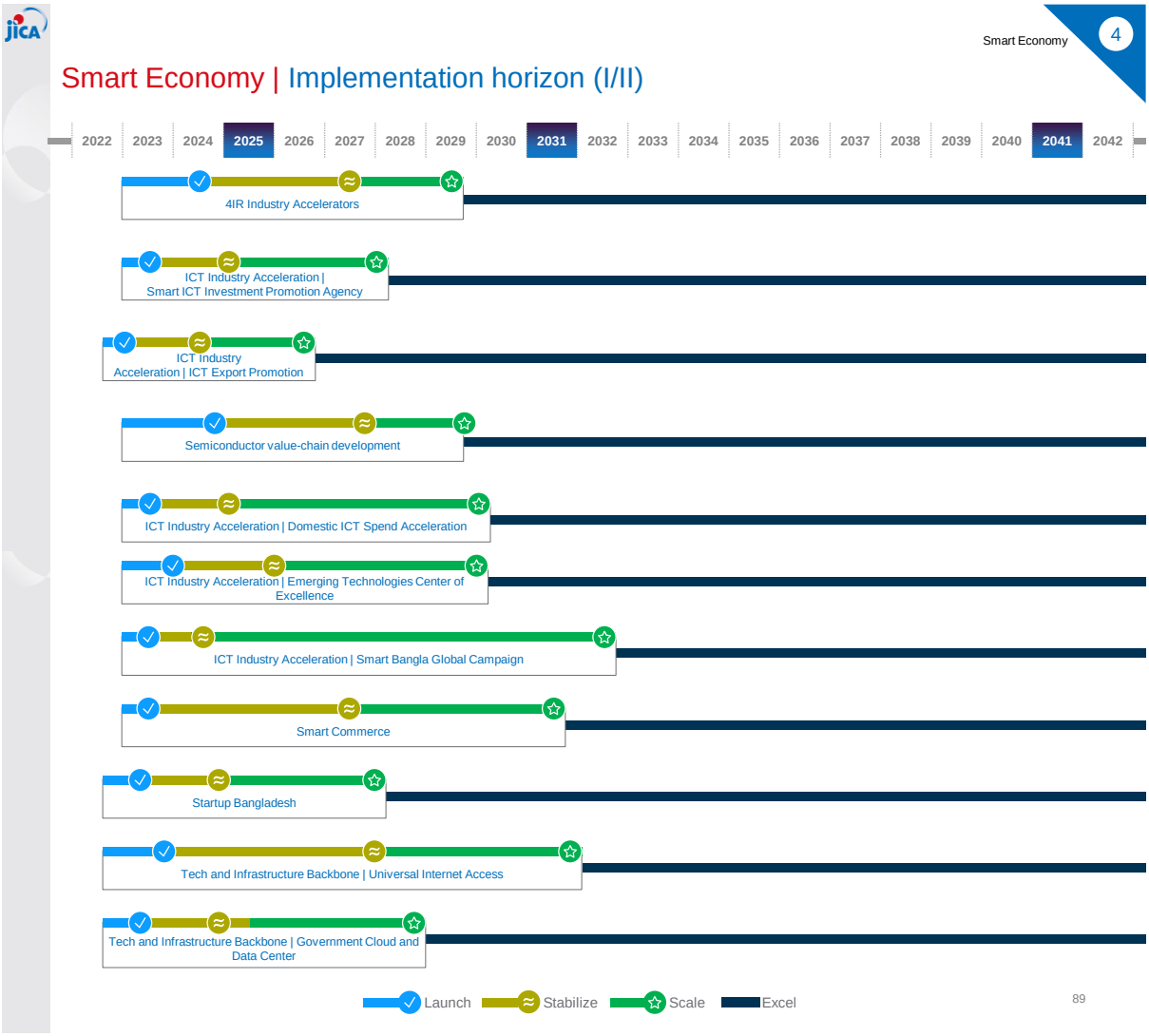


Figure 79: Evolution of Smart Economy programs

5.2 Role of PTD in Smart Bangladesh: ICT Master Plan 2041

Preamble

The development agenda beyond 2021 is the “Vision 2041”, where Bangladesh has been envisaged as a developed country. Vision 2041 aims to attain ‘Smart Bangladesh’ by 2041. To realize the vision, Bangladesh will have to maintain an average growth rate of 9.02 percent in the 20 years following 2020.

Digital technologies are input and enablers for development in every sector of a smart society and smart economy. Furthermore, a smart society and smart economy demand smart citizen and smart government. An International Telecommunication Union (ITU) study shows that an Increase in the digital ecosystem development index of 1 percent yields an increase of 0.26 percent in labor productivity, and 0.23 percent in total factor productivity [1]. Dependence on traditional natural resources and product-based labor-intensive economy is no longer feasible to achieve the dream of 2041. In the era of the fourth Industrial Revolution, integration with the global innovation-driven knowledge economy is the main challenge to be encountered in the upcoming days. We are approaching towards a new wave of change in industry, education, healthcare, agriculture, energy usage, trade, social welfare, and service sectors. All the sectors of the economy must be smart enough to overcome the development challenges of the future.

The Draft ICT Master Plan emphasizes on the services, citizen upskilling, digital content, smart health care and education, etc. from an application point of view. To achieve these targets, a comprehensive plan is essential which aims to

- ✓ Connect the citizen and institutions;
- ✓ Integrate all the digital services of the Government and Private sectors;
- ✓ Ensure seamless digital superhighway as infrastructure;
- ✓ Ensure smart devices for all citizens at an affordable price;
- ✓ International connectivity through satellite, terrestrial, and submarine cables;
- ✓ Formulate a comprehensive regulation and standardization framework.

This report emphasizes the strategies and plans to be implemented by the Government for digital infrastructure and services to meet the development needs during 2021-2041.

Inter-dependency of ICTD and PTD

Post and Telecommunications Division (PTD) harnesses the physical and infrastructural layers. However, PTD has some functionality in application levels as well as in extending digital services for citizens directly and enabling other institutions for digitalization. In the present knowledge-based society, the infrastructure and applications are merged to a greater extent. Smart applications and software must be supported by smart and seamless digital connectivity. Besides, the private sector dominates the ICT and telecommunication industry; hence, regulation and standardization are pivotal to facilitate and control the market for the quality of the products and services. Moreover, supply side for smart devices and network elements must be developed both in private and public sectors.

In this context, a cohesive approach is essential to integrate the necessity of seamless connectivity, robust telecommunication infrastructure, manufacturing devices and regulation framework to the programs formulated in the draft ICT Master Plan.

This section aims to identify the missing links between the Hardware (Smart Ecosystem of ICT infrastructure & services) and Software (applications/ITES) to prepare a complete action plan for Smart Bangladesh.

The Role of PTD and ICTD for Smart Bangladesh

Information and Communications Technology (ICT) was first incorporated in 2002 with the Ministry of Science and Technology and was renamed as the "Ministry of Science and Information & Communications Technology". To keep pace with the changing world, Government emphasized ICT, and a new ministry was created for ICT as the Ministry of Information & Communication Technology on 4 December 2011. Later, realizing the interdependency between the Ministry of Posts and Telecommunications and the Ministry of ICT, the Government merged two ministries to form the Ministry of Posts, Telecommunications and Information Technology on 10 February 2014. Then onwards, the ministry started to operate with two separate divisions: the Posts and Telecommunications Division (PTD) and the ICT Division (ICTD), with segregated allocations of business.

Segregation of responsibilities

ICT Division is assigned primarily to Software or applications part (software), while PTD is given the responsibility to build the telecommunications infrastructure and services (hardware), such as internet, access network, international and domestic connectivity, and to regulate the telecommunications sector. The salient responsibilities articulated in the allocations of business of the government of the two divisions are listed in Table below

The salient responsibilities of PTD and ICTD

Posts and Telecommunications Division	ICT Division
• Telecommunications related infrastructure development including Network Equipment, Access Networks, National and International Long Distance Data Transmission Networks, Communication SatellITes and Satellite Ground Stations (Serial: 9). • Over the Top application services using Telecommunications Networks (Serial: 10). • Telecommunications resources including Radio Frequencies, Telephone Numbering, IP Addresses, Country Code Top Level Domains, and Identification Numbers used in Telecommunications/Data Networks (Serial: 11). • Matters relating to Safety and Security of the Telecommunications Networks and elements along with their usages/applications, Cyber Security (Serial: 12). • Matters relating to investment in the Telecommunications sector (Serial: 13).	• Commercialization of ICT services and formulation of guidelines for making those easily accessible to the people, and monitoring of its implementation (Serial: 5). • Undertaking any other measures needed for the promotion of ICT and making its services available at the doorsteps of the citizen (Serial: 9). • Providing assistance to other Ministries/Divisions for the promotion of E-Governance, E-Infrastructure, E-Health, E-Commerce and similar other areas (Serial: 10). • Taking initiatives on bridging the Digital Divide (Serial: 11).

Building Smart Bangladesh:
Role of PTD

• Promote Research and Development (R&D), Human Resource Development and Entrepreneurship Development in the Posts and Telecommunications sector (Serial: 15).	

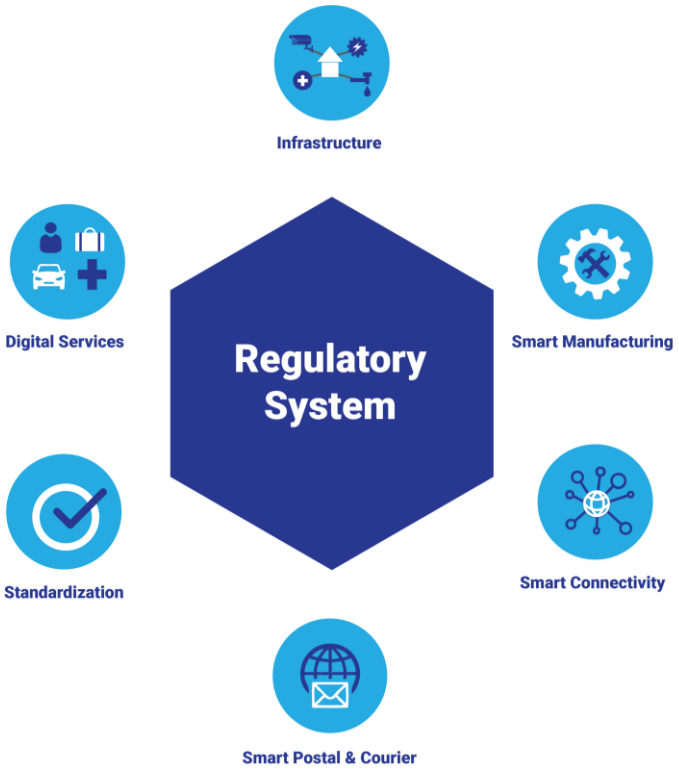
So, it is evident that the hardware/infrastructure part of Smart Bangladesh is the responsibility of PTD, and the software/applications part is the responsibility of ICTD. So, the role of PTD is indispensable in the ICT Master plan that aims to build Smart Bangladesh.

Pillars of Change for Smart Bangladesh

The four pillars as mentioned in the draft ICT Master Plan 2041 (section 2.4, Figure 9) includes:

- ✓ Smart Citizen
- ✓ Smart Government
- ✓ Smart Society
- ✓ Smart Economy

Smart Government leads to Smart Citizen, Smart Economy and Smart Society, and PTD contributes significantly in this area. These pillars of change demand for a smart ecosystem of ICT infrastructure and services which will be harnessed by PTD to a great extent. Seamless connectivity backed by robust telecommunication infrastructure, regulation and standardization, digitalization of service delivery, access to quality internet, local production of smart devices, etc. are the building blocks of such Smart Ecosystem (Figure 1).



Building Smart Bangladesh:
Role of PTD

Role of PTD to the Smart Ecosystem

As per the allocation of business, the Posts and Telecommunications Division (PTD) harnesses the connectivity and infrastructure of the smart ecosystem both in the public and private sectors. It includes a range of telecommunication services and service providers, such as:

- ✓ ISPs (Internet Service Providers)
- ✓ IIGs (International Internet Gateways) Service Providers
- ✓ NIX (National Internet Exchanges) Service Providers
- ✓ IGWs (International Gateway Exchanges) Operators
- ✓ MNOs (Mobile Network Operators)
- ✓ e-Commerce through e-Courier and mailing operators
- ✓ Smart Postal Services
- ✓ NTTN (Nationwide Telecommunication Transmission Network) Operators
- ✓ ITC (International Terrestrial Cable) Operators
- ✓ IPTSPs (Internet Protocol Telephony Service Providers)
- ✓ ICX (Interconnection Exchange)
- ✓ PSTN (Public Switched Telephone Network) Service Providers
- ✓ Submarine cable Operator
- ✓ Satellite Services Provider

Moreover, the production of digital devices, such as laptops, handsets, optical fibers, copper cables, power cables and ducts for fiber networks, etc. are under PTD as per the allocation of business. Although, Government facilitates an integral part of the capital-intensive telecommunication infrastructure and remote connectivity, the private sector (mobile operators, ISPs, NTTN Operators, etc.) dominates the present telecommunication industry. Such ecosystem necessitates a comprehensive regulation, cybersecurity, standardization, and policy guidelines for the telecommunication industry. BTRC under PTD is the regulator to regulate the total telecommunication ecosystem.

The optical fiber network constitutes the backbone of Smart Bangladesh. Smart government, smart citizen and smart society are wholly dependent on the
services provided by the digital infrastructure and service providers, such as mobile operators, ISPs, and other telecommunication service providers, both in the public and private sectors. All these infrastructures and connectivity through fiber, mobile, ISP, ICX, submarine cable, and satellite communication constitute the Digital Highway.

The industry 4.0 emphasizes high-speed, low-latency broadband internet connectivity for smart citizens. The Government is focused on building the necessary telecommunication infrastructure to achieve this quality internet connectivity for all. The Mobile Network Operators (MNOs), both in the private and public sectors, are facing challenges in investing in capital-intensive broadband networks throughout the country. The NTTN operators in the public and private sectors are extending their robust high-capacity nationwide telecommunication network for the MNOs. At present Bangladesh Telecommunications Company Limited (BTCL), under PTD is implementing two projects to meet the future need of 4IR. These projects will build a seamless high-speed 5G transmission network and 5G enabled IP network for cloud hosting and other upcoming technological demand. In parallel, the piloting of 5G is initiated by Teletalk Bangladesh Limited, the state-run mobile operator of Bangladesh. Grameen Phone (GP) also trialed 5G in all divisional cities. All these efforts under PTD will develop the platform for Smart Bangladesh infrastructure and connectivity. PTD has been taking all these initiatives to build the smart ecosystem for Smart Bangladesh as per the allocation of business.

Internet Penetration for Smart Citizen

Internet penetration is critical to attain the smart citizen program, for instance, Universal Digital ID (Sec 3.1.1.), Citizen Upskilling (3.1.2), smart device access (3.1.2.3), etc. are mentioned in the Draft ICT Master Plan. Inclusive and affordable internet access to the citizen, especially to the marginalized community, is inevitable to achieve smart citizens. Ensuring high internet penetration across the country is the principal responsibility of PTD.

Digital services and internet for Smart Government

ISPs and MNOs, both in the public and private sectors, contribute actively toward digital services by providing internet access and infrastructure. Some of these essential digital services provided by the stakeholders under PTD are mentioned below:

Smart Education: PTD is already facilitating Digital services through state-run Teletalk Bangladesh Limited. Digital Services of Teletalk in the education sector include:

- ✓ Delivery of paperless public examination result through web and SMS services;
- ✓ Archiving of public examination results for all education boards;
- ✓ SMS/Web-based Digital Services of admission processes for universities, schools, and colleges.

BTCL under PTD is facilitating Wi-Fi internet in 587 Government Colleges and Training institutions. With the success of this project, more 450 Government Colleges are in the pipeline for internet connectivity.

In this perspective, in the blended learning framework (3.2.2, Table 15), BTCL and Teletalk can facilitate the substantial connectivity needs.

Smart Health Care: The draft ICT Master Plan proposes an inclusive healthcare system as an objective for the program component 'Accessible Telemedicine' (Sec. 3.2.1, Table 13). BTCL has already connected 340 Upazilla Health Complex, 137 Community Vision Centre to support e-health and telemedicine facilities in remote areas. So, BTCL can play essential roles as program contributors.

Smart Agriculture: Being a riverine country, our fisheries play an active role in our economy. In the future, like the developed countries, fisheries can be made smart with the help of satellite images. Moreover, Smart Land Management (3.2.3) requires satellite land-zoning. Bangladesh Satellite Company Limited (BSCL) under PTD can contribute actively as a program contributor in smart agriculture (3.2.5, Table 18) as mentioned in the ICT Master Plan.

Smart Postal Service: Digital post centers are developed for service delivery to the marginalized communities. Every Post office will have a digital postcode. People could get postcodes by inserting locations like road numbers and village names. Digital letter box and parcel locker will be set up in the populated areas so that the recipient can collect their product at their convenient time. An automatic notification will be sent to the recipient while any parcel is delivered in the box. Besides, a standard address format will be introduced. Mail will be sorted by an automated sorting machine. Every letter or parcel will have an identification number (Barcode) so that recipients can easily trace and track their mail. Department of Post can contribute to the implementation level of smart postal service (3.2.4, Table 17).

Smart Judiciary: For the online petition platform and e-Courtroom system (3.2.6, Table 19), PTD can contribute actively as a network provider through its ISPs and NTTN service providers.

Smart Border: Currently, BTCL is providing fiber optic connectivity to all the land customs stations and e-passport offices by establishing required connectivity networks. Smart border requires very sensitive and secured network that can be facilitated by BTCL (3.2.7)

Digital Job Platform: Teletalk maintains a Digital Job Platform for jobs in the public sector. Teletalk can be included as a program contributor in the Digital Job Platform (3.2.10, Table 23).

Contribution of PTD towards a Smart Society

Mobile Financing Services (MFS)**:** MFS has grown extensively in Bangladesh, especially during the COVID-19 Crisis; it contributes a lot. All the MFS, e.g., Bkash, Nagad (by Bangladesh Post), Rocket, etc. contribute to a digital society.

Smart City for a Smart Society: Smart City requires robust interconnectivity among different services of a city ranging from smart home, smart transportation, smart grid, etc. This interconnection can be facilitated by NTTN operators, Mobile operators, and satellite communication. For instance, satellite images can be utilized for urban planning while smart housing, transportation, and smart grids stand on NTTN and Mobile connectivity. Manufacturing of IoT devices in local industry will stimulate smart city development.

Smart Grid: Smart grid (3.3.2.2) requires a Geographical Information System (GIS). BSCL can help providing GIS using its upcoming satellite services.

Digital Climate Resilience: The contribution of BSCL can be counted on providing satellite photos from its satellITes or affiliates. With the help of AI (Artificial Intelligence) and ML (Machine Learning) damaged buildings, flooding, and impassable roads can be identified (3.3.2.3).

Universal Internet access: proper planning of back-up communication during a natural disaster is not prepared yet. To overcome the challenge, adequate planning of backbone connectivity can be made, which may include satellite communication as an optimized back-up.

In addition, Bangladesh Satellite Company Limited (BSCL) has taken an initiative to launch Earth Observation SatellITes. Alongside satellite communications, this Earth Observation Satellite will be able to provide a vital role in developing smart agriculture, fisheries, city planning, and disaster monitoring, including flood, drought, landslide, forest fire, deforestation, coastal monitoring and so on.

Smart Economy

In the contemporary world, telephone and internet connectivity for individuals and businesses are considered the main factor in driving growth. However, the position of Bangladesh is 73 (score 30) out of 79 countries in the Global Connectivity Index 2020 (Huawei Global Connectivity Index, 2020). The index suggests a substantial leapfrogging in connectivity to achieve the desired productivity goals. Recent technology trends implicate that connecting machines, processes, and the environment is critical to future growth. As such, a robust, high speed, and low-latency network is the cornerstone for economic development, productivity, and Smart Economy.

Contribution to the GDP and Foreign Direct Investment: The sectoral share of posts and telecommunications services on GDP over the last 10 (ten) years is running together with the country's economic growth.

The direct contribution of Posts and Telecommunications in GDP

Fiscal Year	GDP (Crore Taka)	GDP Growth Rate	GDP From Post and Telecom (Crore Taka)	Sectoral Growth Rate (Posts and Telecom) (%)	Sectoral Share (%)
2010-11	646,342	6.46	13,964	13.77	2.26
2011-12	688,493	6.52	16,327	16.92	2.48
2012-13	729,896	6.01	17,906	9.67	2.56
2013-14	774,136	6.06	19,618	9.56	2.64
2014-15	824,860	6.55	20,816	6.11	2.63
2015-16	883,540	7.11	22,233	6.81	2.62
2016-17	947,900	7.28	23,785	6.98	2.61
2017-18	1,022,437	7.86	25,339	6.53	2.58
2018-19	1,105,793	8.15	27,397	8.12	2.58
2019-20	1,144,597	3.51	29,586	7.99	2.68

Source: Bangladesh Economic Review, 2022; Finance Division, Ministry of Finance.[2]

The telecommunication sector achieved a substantial portion of the country's total Foreign Direct Investment (FDI) over the past 14 years (Table 3). Continuous investment is crucial in the communication industry due to very fast changes in communication technologies and customer demands. To keep the digital communication infrastructure aligned with the national development goals, an adequate inflow of FDI must be maintained. It is obvious that major investments come with new technologies as the technology life cycle and benefits from them can ensure the investors' return on Investment (ROI).

FDI in Telecommunication and Computer Software & IT sector

Calendar Year	Total FDI (Million USD)	FDI in Telecom Sector (Million USD)	FDI in Computer Software & IT Sector (Million USD)	Share of Telecom+ Computer Software & IT in total FDI (%)
2008	1086.31	641.39	0.42	59.08
2009	700.16	250.14	1.83	35.99
2010	913.32	359.82	4.97	39.94
2011	1136.38	180.99	3.1	16.20
2012	1292.56	374.97	12.16	29.95
2013	1599.16	324.39	37	22.60
2014	1551.28	226.75	10.38	15.29
2015	2235.39	254.58	8.26	11.76
2016	2332.72	572.76	22.05	25.50
2017	2151.56	229.64	83.55	14.56
2018	3613.3	219.87	26.26	6.81
2019	2873.95	208.35	41.75	8.70

2020	2563.58	259.7	35.26	11.51
2021	2895.56	158.82	38.61	6.82

Source: Bangladesh Bank, FDI Report (July – December 2021) [3]

The Draft ICT Master Plan illustrates ICT Industry acceleration (3.4.2) with a focus on Smart ICT Investment Promotion Agency, Systematic ICT export promotion, Nationwide stimulation of high-value IT/IT-ES projects, etc. But Smart Economy remains incomplete if the GDP contribution and FDI in the telecommunication sector are not considered. Nevertheless, investment and projects in the telecommunication sector contribute to ICT growth

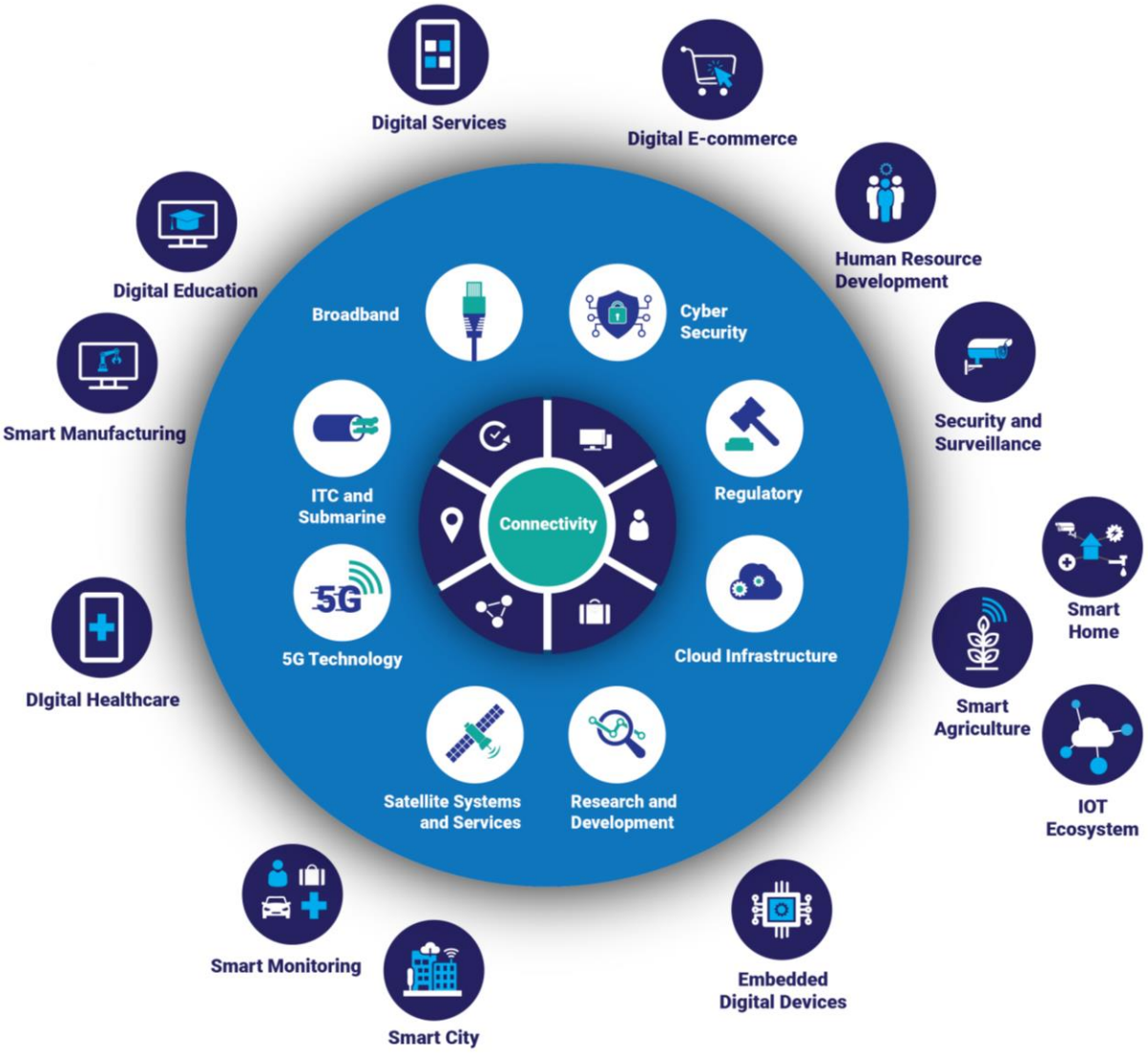
Recommendations

In the era of 4IR, the convergence of technology is inevitable. It will blur the boundary among digital, physical, and biological systems. In this context, the ICT Master Plan should include supply side components, e.g., network, devices, internet, deployment of 5G, and new technological demands in cloud computing, IoT and M2M (machine to machine) ecosystem, international connectivity (submarine, satellite, and terrestrial cables), research and development, etc. It will lead to citizen upskilling and economic growth. The regulation and legal framework need to be agile and redesigned to meet future needs.

It is noteworthy that substantial elements in the ICT sector and the components of the ICT Master Plan are subject to the regulation of BTRC. This plan should determine and define the regulatory framework and roadmap. Furthermore, standardization will be central for interoperability and integration in the new arena. ICT Master Plan has not adequately covered these crucial issues.

Strategic components for Vision 2041: Smart Bangladesh

ICT Master plan is essentially an indispensable tool to attain Vision 2041: Smart Bangladesh. The plan has primarily focused on applications or software. However, to achieve the goal of Smart Bangladesh, along with application or software, following holistic ecosystem can be considered such as meaningful connectivity, network, access to fixed broadband internet, enabling 5G and beyond, regulatory framework, cyber security, etc.



Smart Bangladesh Ecosystem- Connectivity as foundation.

Access to Fixed Broadband

Fixed Broadband internet will be the enabler for connectivity. The households, public institutions (such as educational institutions, clinics, libraries, religious institutions, government offices) and businesses in rural and remote areas should be connected to a high-speed digital network. The high-speed wireless connectivity will complement the fixed broadband network to build a robust nationwide network.

NTTN Services

High speed, seamless robust domestic network across the country will be very critical in near future. The NTTN operators will play an integral role in harnessing the high-speed and low latency 5G connectivity across the country.

Deployment of 5G

5G will cater the challenge of 4IR. By 2025 new mobile broadband technology, '5G' will be deployed throughout the country. 5G is not only about providing high-speed connectivity to individuals or businesses but also a revolutionary technology envisioned to eliminate the boundaries of access, bandwidth, performance, and latency limitations on connectivity. 5G infrastructure is a prerequisite for the program components mentioned in the draft ICT Master Plan.

Public cloud infrastructure

The implementation of the ICT master plan tremendously depends on cloud infrastructure. Cloud computing has a potential market in the near future. But conserving privacy and security of data should also be ensured. Likewise, other sectors, the cloud computing market should also be rationalized both in the public and private sector, conformed to an integrated data security policy.

IoT and M2M Ecosystem

The applications of the Internet of Things (IoT) and Machine to Machine (M2M) communications will change the digital experiences. IoT technologies combined with cloud infrastructure offer the opportunity for the various actions of the ICT master plan: smart manufacturing, smart city development, smart agriculture, blended education, smart citizen, connected homes and many more.

Indigenous Manufacturing

Promoting Indigenous Manufacturing is recommended strongly to contribute to the value chain. IoT devices will play a significant role in implementing Smart Bangladesh. Indigenous manufacturing of Infrastructure elements like high-quality optical fiber cable and HDPE duct, etc. and smart devices will promote the local industry and reduce dependency on global market. It, in turn, strengthens Smart Economy.

Digital Security

Cybersecurity should be strengthened and eventually, transformation towards digital security is essential. The policy framework must address the future need.

Multimodal International Connectivity

The enormous demand for international bandwidth will be required in the future. Multimodal connectivity for international communication is recommended through undersea cables, terrestrial cables, and Satellite Communication. Satellite will connect the inaccessible areas. These forms of connectivity will pivot the bandwidth demand for substantive ICT applications.

Research and Development

Bangladesh lacks in this sector substantially. The extent to which infrastructure and digital services are developed, digital literacy has not grown at the same pace. Research and development on infrastructural knowledge-driven innovation and up-skilling of citizens are essential.

Standardization

The emergence of new innovations and technologies in the digital arena requires regular adaptation of new standards. It is the pre-requisite to ensure interoperability, security, and coherence and local manufacturing of digital products. A suitable testing infrastructure should be established for carrying out conformance testing, certification and to aid in the development of new products and services. State-of-the-art testing labs and infrastructure should be suitably positioned throughout the country to make them available.

Human Resource Development

To meet the future demand of large pool of human resources with high digital skill, the digital transformation of the education system from the pre-primary level is very much necessary. Alongside this, it is needed to modernize the existing institutes with state-of-the-art facilities and an appropriate pool of resource persons. At the same time, industry-academia collaboration will be required to prepare the working forces ready to take on challenges for the new order of the technology horizons. A National Institute for research and Human Resource Development in digital communications and services should be established where the contribution from experts should be incorporated.

Cashless Economy

By now, the cashless transaction has gained popularity. It will proliferate into a smart economy in the next two decades. MFS, Digital banking will transform using Fintech, blockchain technology, etc. Draft ICT Master Plan needs to incorporate the stake of infrastructure and connectivity in accelerating growth in this area.

Transformation of Legal and Regulatory Framework

The transformation from communication provider to a digital service provider is evident in the upcoming days. It must be driven by innovation and local solutions. It essentially demands transformation of the regulatory framework. With the convergence of technologies and different sectors encouraged and facilitated by digital technologies, the entire legal framework needs to be adjusted and overhauled in many aspects. It would be led by the changes incorporating digital activities and transformation in every sector. The diminishing boundary between physical, virtual, and biological worlds suggests that a complete overhaul would be required in existing legislations to address the emerging activities in the digital platforms. The regulatory framework needs to be agile based on technological need. ICT plan should incorporate the regulation and legal framework necessary for all the proposed applications.

Reforming Institutional Framework

Due to the regulatory and institutional convergence, every public institution will also be affected by the regulatory regime. The institutional reforms will have to carry forward in a much more drastic and innovative way.

6 Smart Bangladesh: ICT Master Plan Governance Guidance

As described in Section 3.1, Bangladesh has made significant progress towards digital modernization through the Digital Bangladesh Program. The Smart Bangladesh ICT 2041 program is a complex multi-year multi-stakeholder transformation journey, and it will be essential to put an effective centralized governance structure in place as described in above section

6.1 Organizing for Success – Setting the Context

There are typically a few common reasons why governments fail to successfully execute large scale modernization programs, some of which are also applicable to Bangladesh. Some of these reasons are as below

- There is no common language about digital or an overarching digital strategy to guide a whole-of-government approach
- Numerous digital strategies have been developed separately, which are inconsistent and often duplicative
- This causes duplicated effort, fragmentation, and other inefficiencies during delivery of work programs

Governments across the globe have modernized their approach towards technology led transformation over time

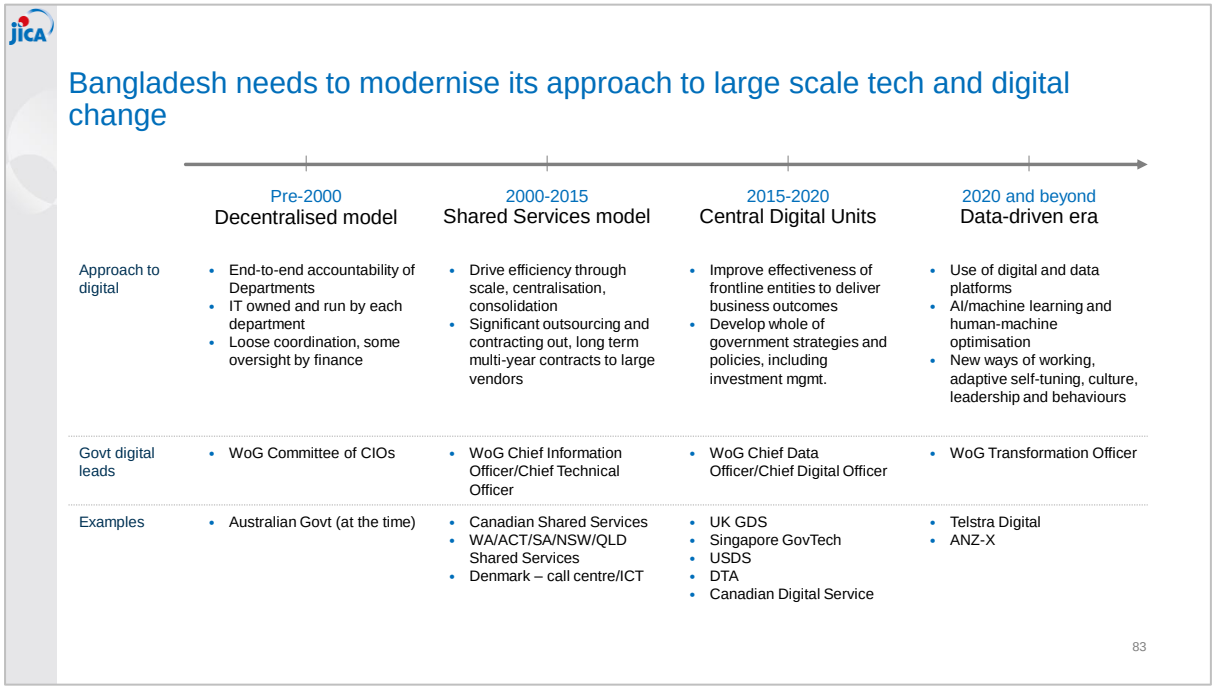


Figure 80: Implementation approaches taken by international governments

6.2 Learnings from Other Governments

- **Many more digitally mature jurisdictions have created central agencies to drive value from digital and technology**
  - Many of these jurisdictions have seen demonstrable benefits from establishing central agencies, including public savings and service improvements
  - Jurisdictions that have created the most successful digital agencies have also seen marked increases in digital e-government capability
- **A variety of central digital units were explored to learn about best practice and to find key insights for the state**
  - Eight key success factors emerged for the design of successful central digital entities, which relate to the digital functions undertaken by the agency and the governance of the agency. These are as below

    Roles
    - Setting digital strategy and standards
    - Delivering common platforms and data sharing
    - Vesting digital spend control with center
    - Leading collaboration with industry and academia

    Governance
    - Senior political sponsorship
    - Central organizational location in government
    - Cross government digital and technology decision making forum
    - Experienced executive and practitioner leadership

  - Although the detailed organizational structure of centralized digital unit has varied widely across jurisdictions, most exemplars have demonstrated a common focus on digital strategy, standards, applications, and skill-building
- **Digital units can be designed to reflect government emphasis on different strategic objectives**
  - Prioritizing customer centricity increased customer satisfaction in New South Wales, Australia
  - Management of spend controls in the UK helped drive significant ICT cost savings
  - Re-engineering procurement in the Australian federal government has increased the number of contracts awarded to SMEs

Eight central digital units were studied to translate the lessons of their experience into a Bangladesh context.

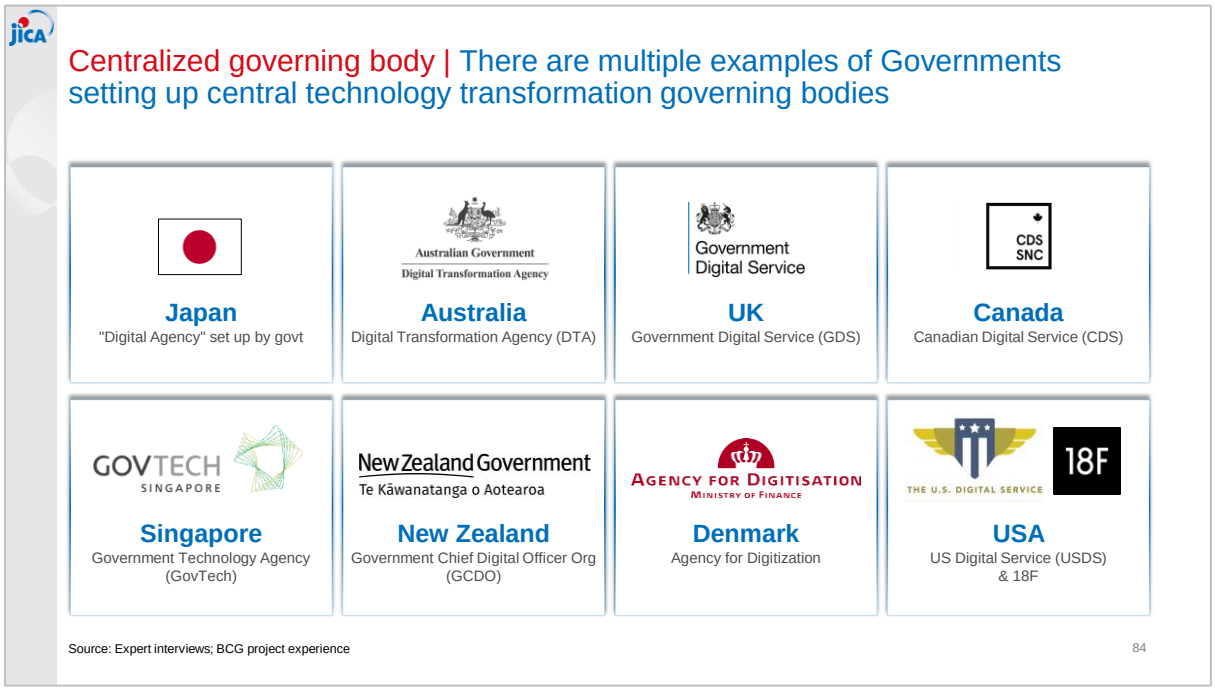
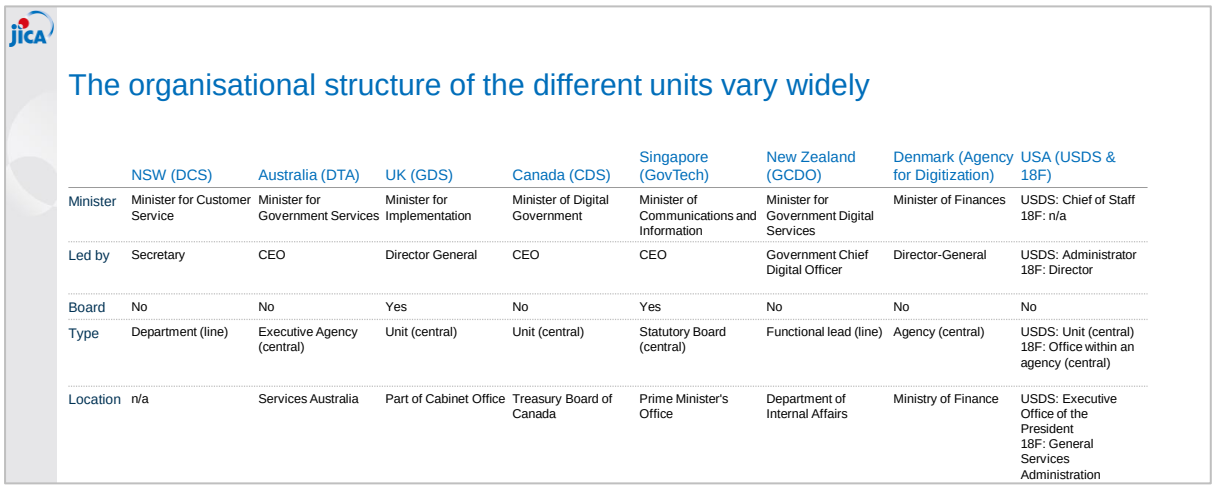


Figure 81: Central digital units benchmarks

The organizational structures of these units vary widely with the specific country context.



The organisational structure of the different units vary widely

	NSW (DCS)	Australia (DTA)	UK (GDS)	Canada (CDS)	Singapore (GovTech)	New Zealand (GCDO)	Denmark (Agency for Digitization)	USA (USDS & 18F)
Minister	Minister for Customer Service	Minister for Government Services	Minister for Implementation	Minister of Digital Government	Minister of Communications and Information	Minister for Government Digital Services	Minister of Finances	USDS: Chief of Staff 18F: n/a
Led by	Secretary	CEO	Director General	CEO	CEO	Government Chief Digital Officer	Director-General	USDS: Administrator 18F: Director
Board	No	No	Yes	No	Yes	No	No	No
Type	Department (line)	Executive Agency (central)	Unit (central)	Unit (central)	Statutory Board (central)	Functional lead (line)	Agency (central)	USDS: Unit (central) 18F: Office within an agency (central)
Location	n/a	Services Australia	Part of Cabinet Office	Treasury Board of Canada	Prime Minister's Office	Department of Internal Affairs	Ministry of Finance	USDS: Executive Office of the President 18F: General Services Administration

Figure 82: Organizational structure of benchmarked digital units

There are multiple benefits which have been realized by countries from having a central digital transformation agency, some of them being as below:

- **Strong digital vision and prioritization** - A roadmap for digital is vital to support fundamental processes such as transforming legacy systems, streamlining Machinery of Government process, cyber security support, shift to the cloud
- **Efficient 'enterprise' of government** - Centralization where it makes sense (e.g., core/common platforms and assets; procurement). Line agencies should remain accountable for and control service delivery to retain existing customer expertise
- **Informed decision making and investment management** - Refreshed investment management approach could reform current investment model which skews focus toward new spend

- **Realistic ambition** - Prudently ensuring that gov't savings are not double counted will generate genuine further savings

6.3 Directional Way of Thinking for Bangladesh

Bangladesh needs to think about setting up the central governance agency in phases and carefully craft the organization structure for the same.

6.3.1 Role of Central Governance Agency

The central agency for Smart Bangladesh ICT transformation will co-ordinate the government's approach to digital and ICT, simplify the technology environment and improve value for money, transforming the experience for citizens and businesses. The agency will be aiming to achieve this through 4 key levers

- A more coordinated approach
  - Develop one Whole of Government (WoG) strategy and roadmap for digital and ICT, aligning the siloed strategies and approaches across different ministries and agencies
  - Review and help reprioritize annually, bringing transparency to performance of outcomes delivered by ICT spend
  - Drive coordinated, integrated and proactive planning, delivery, and management of digital and ICT initiatives
- Simpler, more interoperable technology environment
  - Simplify the technology operating environment and remove duplication in platforms and products
  - Ensure there is a high level of interoperability between departments
  - Facilitate secure, seamless, and continuous data sharing across government
- More efficient management of ICT spend
  - Maximize efficiency in the Government's ICT spend
  - Ensure ICT programs are set up for success to avoid the cost overruns in the ICT project in the last 5-7 years
  - Maximize WoG buying power across a set of agreed categories for the government's external ICT spend, and providing opportunities for the local digital economy
  - Mandate use of core / common platforms where appropriate, and run these centrally
- Supporting Government to transform the citizen and business experience
  - Develop WoG standards for customer experience; centrally coordinate life events that cut across departments; lead voice of user research

The agency will focus on supporting various departments and key agencies to deliver the Smart Bangladesh vision and will majorly play a role in **seven functions**:

- Strategy, policy, architecture, and governance: Set overarching WoG digital & ICT strategy & governance (inc. data, architecture & cyber) and create authorizing environment to drive change; provide architecture support to priority initiatives
- Delivery of common platforms: In line with WoG digital strategy, deliver WoG platforms and support departmental and agency migration to common platforms

- Customer experience (citizens and business): Develop WoG design standards for customer experience, centrally coordinate life events that cut across departments; lead voice-of-user research
- Data and analytics: Set standards and governance for data storage, quality, capture and security across WoG and policies on data sharing; provide analytics support to priority use cases
- Capability building & innovation: Provide thought leadership on how to drive digital capabilities across government, collaborating with departments and providing assurance for digital programs
- ICT & digital procurement, efficiency & digital economy: Extend WoG procurement of ICT; lead program of initiatives to capture WoG efficiency opportunities and reform procurement approach to support digital economy
- Investment management & assurance: Co-authorize funding decisions for digital and ICT investments with Department of Treasury via a new approach to investment management; provide early-stage initiative input & ongoing, low overhead assurance

6.3.2 Benefits of a Central Governance Agency

The central governance agency will have massive potential to deliver benefits in 4 key areas.

Improving citizen's experience with government

- Through the creation of central digital strategy and standards, the agency could deliver significant benefits for citizens
- Technological reform can support the development of consistent, simple, user-friendly interactions with government and helping citizens fulfil their needs from the gov't with minimal friction

Enhancing quality of the Gov’t experience through improved efficiency and efficacy

- New ways of working can ensure that the work of the government is quick to respond to change, implemented faster and more cost effectively
- Central coordination of standards and architecture will simplify the digital landscape of the state and the re-use of components and platforms will accelerate delivery through reduced development timelines at a reduced cost
- Creating a single vision for the digital future of the gov't enable collaborative and coordinated delivery
- Improving the experience for gov't employees and developing of digital capabilities through training programs across the gov't and driving a culture of digital and innovation

Driving cost efficiencies across government

- The digital agency can support the ICT cost by
  - Developing a more commercial WoG approach to procurement, which could unlock substantial savings every year at full run rate
  - Identifying and implementing transformative initiatives e.g., deploying core and common platforms and reengineering complex business processes
- In addition, the agency's stronger assurance of ICT projects could save significant future costs

- The speed of unlocking these benefits is directly linked to how quickly a team can be set up and the relevant commercial constraints
- The agency benefits will ramp up over time, expected to reach full scale and stabilize in year 5

Helping grow the small/medium digital economy

- We identified eight opportunity areas for government to better support the local digital economy, with potential for the agency to help ease of accessing procurement for digital businesses; strategy for targeted SME engagement; government capability to engage with the technology sector and improving ease of navigation for services used by digital businesses

6.3.3 Roadmap for The Central Agency to Evolve

The agency will be evolving over **4 phases** as described below:

- Mobilization phase (6+ months): Alignment on role of the agency, set up governance and funding
- Phase 1: Launch (6-24 months): Build credibility across the ministries through incremental delivery of success
- Phase 2: Establishment (Y2-Y4): Expand the role of the agency
- Phase 3: Scale (Y4+): Scale the delivery capability of the agency

This report will include a brief overview of what needs to happen in the **mobilization phase**

Administrative actions:

- Statement of expectations - Develop statement of expectations to enable authorizing environment for the agency
- Set-up funding and budget process: Secure pre-budget funding for set-up via cabinet and participate in budget process to secure longer-term funding
- Authorizing environment engagement: Preliminary engagement with all components of the agency governance and authorization to articulate role of both the body and the agency
- Organization design and role fulfilment: Design of the agency organization at a structural level and begin fulfilment of roles, additionally shifting defined entities into the umbrella of the agency

Delivery actions:

- Set up strong, visible communications: Begin consistent, visible communications telegraphing the actions of the agency and its mission, vision, and plans – used as a lever to attract talent and set a culture from the organization
- Stand up a first, world class, delivery team: Stand up a best-in-class team of select quality people as soon as feasible to telegraph a change in WoW and delivery
- Source a physical space to co-locate: Begin co-locating the agency as soon as possible, in order to build a culture distinct from the gov't and to enable efficient delivery and new ways of working
- Unblock legislative barriers: Identify any key legislative barriers and blockers to the role of the agency and develop solutions to enable the actions of the agency in the first phase

7 Appendix

Appendix A is attached as a separate document.

7.1 Appendix A – Details of all programs

7.2 Appendix B – List of all documents studied and referenced

Smart Citizen

- Universal Digital ID
  - MOSIP: Open Digital Ecosystem (ODE) Case Study, Omidyar Network, BCG
  - The Trust Imperative: Why customer experience in government matters, BCG
  - Identification for Development (ID4D) Annual Report, 2018
  - Privacy by Design: Current Practices in Estonia, India, and Austria, ID4D
  - e-Estonia Facts, Dec 2021
  - Unique Identification Authority of India, Annual Report 2019-20
- Citizen Upskilling
  - Post Covid-19 Jobs and Skills in Bangladesh, a2i
  - ACMP 4.0
  - Competency standards, NASSCOM
  - Talent NODE: Open Digital Ecosystem (ODE) Deep Dive, Omidyar Network India, and BCG
  - UN World Population Prospects 2019
  - FutureSkills PRIME, NASSCOM
  - SSG Skills Report, SkillsFuture
- Smart Bangla Campaign
  - Measure Well-Being to Improve It: The 2019 Sustainable Economic Development Assessment, FICCI and BCG
  - Bangladesh National ICT Household Survey
  - Strategy & Roadmap of BCC for Strengthening IT/ITes Industry of Bangladesh, LICT
  - Strategic Priorities of Digital Bangladesh
  - Bangladesh Your Next ICT Destination, LICT and BCG

Smart Government

- Smart Healthcare
  - National Health Stack: Strategy and Approach, NITI Aayog, India
  - Leapfrogging to a Digital Healthcare System: Re-imagining Healthcare for Every Indian, BCG
- Blended Learning
  - a2i Future of Education Team: Digital Education Ecosystem
  - Futures of Education in Bangladesh: Envisioning 2041
  - Digital Bangladesh: Digital Services for All

- The Future of Technology Education: How Governments can Help Close the 21st Century Skills Gap, BCG
- Smart Bangladesh 2041, Digital Bangladesh

- Smart Agriculture Stack
  - Agri NODE Deep Dive, Omidyar and BCG
  - Digital Farmer Profiles: Reimagining Smallholder Agriculture, USAID
- Smart Judiciary
  - Annual Report 2019-20, Family Court of Australia
  - International Journal for Court Administration, Vol. 8
  - A Closer Look at the Courts of Denmark, Danmarks Domstole
  - Quality and Innovation Programme: Modernisation of the judiciary and supervision, de Rechtspraak
  - Rule of Law Index 2021, World Justice Project
- Smart Borders
  - Digital Borders: Enabling a secure, seamless and personalized journey, WEF
  - The Known Traveller: Unlocking the potential of digital identity for secure and seamless travel, WEF
- Smart Tax
  - Internal Revenue Service Data Book 2021, IRS
  - Goods and Services Tax Network (GSTN) India, Omidyar and BCG
  - Addressing the Tax Challenges Arising from the Digitalisation of the Economy, October 2020, OECD
- ICT Policies
  - The National Cybersecurity Strategy of Bangladesh
  - Cyber Property Rights, Its Present Status and Challenges: Bangladesh Context, International Journal on Emerging Technologies
  - Tax Alert May 2016, KPMG
- National Procurement e-Marketplace
  - GeM Handbook, Ministry of Commerce & Industry, India
  - GeM of a marketplace, IBEF
  - Assessment of Bangladesh Public Procurement System, World Bank
- Bangla Gig Platform (-Job Marketplace)
  - Freelance Forward 2020, UpWork
  - The Global Gig-Economy Index, Payoneer
  - Dimensions of F-commerce in Bangladesh: Scope, Challenges and Recommendations, University of Dhaka
  - Labour Force Survey Bangladesh 2016-17, BBS
  - Unlocking the Potential of the Gig Economy in India, BCG
  - World Employment and Social Outlook: The role of digital labour platforms in transforming the world of work, ILO
  - Skills for Decent Employment, a2i
- Police Modernization
  - The Digital Policing Journey: From concept to reality, Deloitte
  - Police Life, Singapore Police Force

- Singapore Police Force Annual Report 2017

Smart Society

- Inclusive Financial Ecosystem
  - National Financial Inclusion Strategy Bangladesh
  - Accelerating G2P Payment Digitization, a2i
  - Interoperability of Digital Finance in Bangladesh: Challenges and Taking-off Options, UNCDF and Institute for Inclusive Finance and Development (InM)
  - Digital Financial Services Supervision in Bangladesh, afi
  - The Impact and Effectiveness of Innovate, Financial Conduct Authority (FCA)
  - X-Road: An Interoperable Information Technology Solution for the National Health Information Platform (nHIP)
  - India FinTech: A USD 100 Billion Opportunity, FICCI and BCG
  - FinTech – India, Tracxn
  - Fintech and ICT convergence – Perspective on Middle Eastern country policy-making and regulation, August 2019, BCG
- Green Sustainable Bangla
  - Technology Policies to Address Climate Change, C2ES
- Bangla Stack
  - Estonia X-Road: Open Digital Ecosystem (ODE) Case Study, Omidyar Network India and BCG

Smart Economy

- 4IR Industry Accelerators
  - Bangladesh Rising: The Success Stories of Bangladesh, Issue 6, March 2022
  - Reaping the Benefits of Industry 4.0 Through Skills Development in High-Growth Industries in Southeast Asia: Insights from Cambodia, Indonesia, the Philippines, and Vietnam, ADB
  - Readiness for the Future of Production Report 2018, WEF
  - Winning back the future, BCG
  - Bangladesh Investment Handbook: A Guide for Investors, BIDA
  - Pocket Export Statistics FY 2020-2021, EPB
  - Future Skills: Finding Emerging Skills to Tackle the Challenges of Automation in Bangladesh, a2i
  - Leveraging 4TH IR: New avenues for innovative Investment, BIDA
  - Leveraging Skills for 4IR Transformation, LICT
  - Statistical Yearbook Bangladesh, 2020
  - Global Lighthouse Network: Insights from the Forefront of the Fourth Industrial Revolution, WEF
  - The 4th Industrial Revolution: How It Is Changing the Ready-Made Garments Sector of Bangladesh, LightCastle Partners
  - Apparels at a Crossroads, BCG
  - Ready-Made Garments & Textiles: Weaving the Way, BIDA
  - Is apparel manufacturing coming home? McKinsey & Co.

- Ready-Made Garments Sector of Bangladesh: Its Growth, Contribution and Challenges, David Publishers
- Pharmaceuticals and API Industries, BIDA
- Pharmaceutical Industry of Bangladesh, EBL Securities Ltd.
- Health and Healthcare in the Fourth Industrial Revolution: Global Future Council on the Future of Health and Healthcare 2016-2018, WEF
- Light Engineering Industry Sector in Bangladesh: Challenges and Prospects; University of Chittagong
- Light Engineering Industries, BIDA
- Agro & Food Processing Industries, BIDA

- ICT Industry Acceleration
  - Bangladesh Economic Review, Ministry of Finance
  - LICT IT / ITES Research 2019
  - BASIS Annual Report 2021
  - BASIS Software and IT Services catalog 2021
  - 100 Day Supply Chain Report, White House
  - 20-Year Strategy for The Irish Language 2010 – 2030
  - National Strategy for Artificial Intelligence Bangladesh 2020
  - National Strategy for Robotics 2020
  - National Internet of Things Strategy Bangladesh 2020
  - National Blockchain Strategy Bangladesh 2020
  - National Cybersecurity Strategy 2014
  - Strategy to Promote Microprocessor Design Capacity in Bangladesh
  - China embraces AI: A Close Look and A Long View, Sinovation Ventures 2017
  - Bangladesh Comprehensive Private Sector Assessment 2019, USAID
  - IT-ITES Industry Statistics 2019, BIDA
  - IMF World Economic Outlook October 2021
- Startup Bangladesh
  - Global Startup Ecosystem Index 2022, StartupBlink
- Tech and Infra Backbone
  - The Economic Contribution of Broadband, Digitalization and ICT Regulation: Economic modelling for the Americas, ITU
  - Towards a National Broadband Strategy for Australia: 2020-2030, Telsoc

Other documents:

- Bangladesh Vision 2041 Perspective Plan
- BCG 2022 Digital Government Citizen Survey
- e-Government Master Plan for Digital Bangladesh, 2019
- UN e-Government Survey 2020
- IMF Financial Access Survey
- Doing Business, World Bank Reports
- Singapore Smart Nation and Digital Government: Open Digital Ecosystem (ODE) Case Study, Omidyar Network India and BCG

7.3 Appendix C – Details of the consultation sessions

Session	Topic	Participants
Session 1	Implementation challenges from current initiatives	• Mr. Abu Shahin, Joint Secretary – MoPA • Md. Shafiqur Rahman, Joint Secretary & Chief Innovation Officer, IRD • Rehana Yasmin, Joint Secretary & Chief Innovation Officer, Agriculture • Ms.Khandker Sadia Arafin, Deputy Secretary (Admin-2), Ministry of Commerce • Mr. Abdullah Al Matin, COS, MoFA • Mr. Rubaiyet Binte Nazmul, Addl. Secretary, MoFA • Dr. Syed Muntasir Mamun, Director General and CIO, MoFA
Session 2	Understanding of current and planned initiatives by development partners including key learnings, challenges identified etc.	• Mr. Soon Chan Hong, Senior Country Specialist, ADB • Mr. Jinbo Choi, Bangladesh office, KOICA
Session 3	National e-Procurement Marketplace Bangla Gig Platform - e-Job Marketplace	• Md. Mosharraf Hussain, Senior System Analyst, CPTU • Mr. Mohammed Salah Uddin, Procurement consultant, a2i • Mr. A. M. Zahidul Haque, Future of Work Lab, a2i • Mr. Zillur, Rahman, Future of Work Lab, a2i • Mr. Hossain Bin Amin, Senior Programr, BCC
Session 4	Startup Bangladesh Inclusive Financial Ecosystem	• Mr. Waseem Aleem, Co-founder & CEO, Chal Dal • Joy, Lead - Financial Services, iFarmer • Parvez, Co-founder and CEO, Swap.com • Md. Shadman Yunus, Co-founder, Shadhinbd.com • Nafis Alam, Marketing Manager, Startup Bangladesh • Ahmed Jawad Yusuf, Advisory lead, Bd Angels
Session 5	Bangla Stack Universal Digital ID ICT Policies	• Mr. Khairul Amin, Addl. Secretary ICT Div & DG, Digital Security Agency • Mr. Tanimul Bari, Sr. Technical Specialist, BNDA, BCC

Session	Topic	Participants
		• Mr. Avijit Nandy, Technology & Customer Onboarding, Porichoy
Session 6	Data and Digital Infra Backbone ICT Industry Accelerator ICT Policies	• Atiqul Islam Shawon, CEO, SoftBD • Tanveer Ahmed, Executive Director, SoftBD • Ashraful Kabir Jewel, Director & CEO, OrangeBD • Mr. Shamim Hossain, ED, OrangeBD • Mr. Ringko Kabiraj, Analyst, BCC • Mr. Abu Daud Khan, VP, BASIS
Session 7	4IR Accelerators (RMG, Pharma, Light Engineering, Logistics)	• Mr. Iqbal Ahmed, SVP, Reedisha • Mr. Bashar, Indesore • Mr. Sarfuddin Khair, IT Specialist, Indesore
Session 8	Blended Learning Talent & Skill Development (Digital skilling at all levels of society, Digital in curriculum)	• Dr. Ferhat Anwar (Professor), IBA, University of Dhaka / GUB ICT • Dr. Syed Akhtar Hossain (Dean, CSE), Canadian University of Bangladesh • Mr. Afzal Hossain Sarwar, a2i - Education Policy
Session 9	Smart Cities	• Mr, Md. Selim Reza; Chief Executive Officer (Addl. Secretary), Dhaka North City Corporation • Mr. Md Samsul Alam, Executive Engineer, Faridpur Municipality • Mr. Shafiqul Islam, Programmer - Local Government Division • Aynul Islam • Tuhinul Islam, Dhaka North City Corporation • SP Admin Highway Police

Table 49: Appendix C – Details of the consultation sessions