OICCI DIGITAL REPORT 2022

Recommendations for Digital
Transformation in Pakistan

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Industry

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Executive Summary

The fast-paced development of digital technologies and the impact of the COVID-19 pandemic have served to transform the economy of Pakistan in a manner in which it is both necessary and urgent to adapt to the current circumstances of technological change. It is imperative that the government must act in a manner that anticipates the complex and changing nature of the economy via technology to develop the necessary regulations and policies to facilitate a thriving and flourishing digital economic ecosystem.

This report offers key recommendations on the various facets of the digital transformation of economy including digital infrastructure and connectivity, government, private sector, mass digital use cases, and emerging web 3.0 technologies for the government and policymakers to experience a key paradigm shift and accelerate innovation in Pakistan. While these recommendations are by no means comprehensive in nature, they reflect the key sectors and segments of the economy that the OICCI member companies believe can be leveraged to create the most impact for the future.

At present, internet penetration has grown to 49% and the rate of cellular mobile connections is approximately 82%, with 31.5% constituting active social media users. Whilst the digital infrastructure and connectivity have improved over the last few years, the gender and geographical gaps in fiber optic connectivity are huge. Therefore, we recommend creating a favorable investment environment, reducing the import duty to promote local development of fiber optic cable, and ensuring 4G for all before rolling out 5G to improve connectivity.

In recent years, there has been tremendous development in Digital Financial Services and Fintech. However, Pakistan is still a cash-based economy. The lack of data to evaluate credit performance of the consumers and complex regulatory regime are big hurdles to the growth of Fintech. Introducing tax incentives for merchants to adopt electronic payments, improving the regulatory framework for Fintechs to work independently, and expediting the establishment of Fintech Facilitation Desks at federal and provincial levels to support access to funding, mentorship and training will create a significant impact on upgrading this segment into a major contributor in economic transformation and uplift.

Notably, Pakistani E-Commerce market grew at 29% in 2021, which also contributed to worldwide growth. However, regulatory hurdles to integrating platform business models, e-commerce taxation, difficulties in cross-border funds movement, and warehouse management have created resistance to the growth of such platforms. Keeping this in view, the government needs to simplify the regulations, encourage international e-commerce companies to set up regional offices in Pakistan, and support startups and initiatives aimed at digitizing SMEs with enhanced cybersecurity.

Rapid digitalization is generating new business models, cutting the costs of trade-in services, and offering new opportunities. Therefore, to increase the export of IT and IT-enabled services, we suggest to promote training and capacity building in collaboration with universities and other educational institutions, reduce custom and import duties on computers and laptops, provide innovation grants and other incentives to support R&D in software development, and technologies which will create a shift and significantly impact the IT ecosystem.

Government and social sectors can be huge beneficiaries of digitization. It can bring a lot of efficiency to government services, increase agriculture productivity, and help expand health and education services to far-flung and backward areas of the country. To reap these benefits, investing in human capital, improving consumer access to e-government services, dedicated cell for AgriTech startups, adopting phased-wise digitization of the education and health sectors, preparing National electronic health records, and arranging capacity-building workshops for teachers, doctors, farmers, and females can play a huge role in the uptake of digitization in government and social sectors.

Pakistan has enormous potential to tap the benefits of cloud and data center technology as the adoption of cloud services so far has been largely ad-hoc. The majority of data centers in Pakistan serve the needs of enterprises, thereby preventing the country from tapping into the perks of cloud computing. Policymakers and private sector need to incentivize investments to set up hyper-scale data, support local cloud service providers through tax benefits, and integrate government databases to scale this segment.

The global shift towards Web 3.0 presents a once-in-a-lifetime opportunity for Pakistan to capitalize on this movement and bring the nation out of its current economic situation. To reap the benefits of these developments the policymakers should create an enabling environment to thrive and innovate, develop facilitative regulations to promote local and foreign investment, consider including modern technologies in the school and college curriculum, and support startups working on modern technologies through investment, grants, and subsidies.

The digital revolution can take place only in an environment that is evolving, robust, and supports digitization. An effective digital harassment policy that ensures online safety via simplified processes is the first step in that direction. Other measures to expedite digitization include relaxing of existing regulations around financial trading, improved access to regulators which allows effective coordination amongst different regulatory and governmental bodies, and anticipation of future developments by developing a shared understanding of emerging digital trends. Further keeping up-to-date with global and regional regulations on developing technologies will also aid in accomplishing the vision of a digital Pakistan.

The Scope and Benefits of the Digital Revolution at the Country and Society Level

Digital technologies will continue to disrupt and transform the global economy at an accelerating pace. The impact of digitalization will cascade across every industry, redefining consumer expectations and business models, thus impacting the demand for connectivity in the future. Globally, the digital economy is equivalent to 15.5% of the global GDP, growing two and a half times faster than global GDP over the past 15 years[1]. The digital revolution offers the opportunity for greater cooperation amongst regional stakeholders. For instance, China's "Belt and Road" initiative offers the creation of an interconnected digital silk road, allowing industries to be transformed and development to increase[2].

Contribution of IT Sector [3,4]

Expected to reach
$7 billion
in next 2-4 years

$3.5 billion
at present

Potential to reach
$59.7 billion by 2030

1. https://www.worldbank.org/en/topic/digitaldevelopment/overview#:~:text=The%20numbers%20speak%20for%20themselves,2.5%25%20of%20GDP%20per%20capita.
2. https://www.frontiersin.org/articles/10.3389/fpubh.2022.856142/full
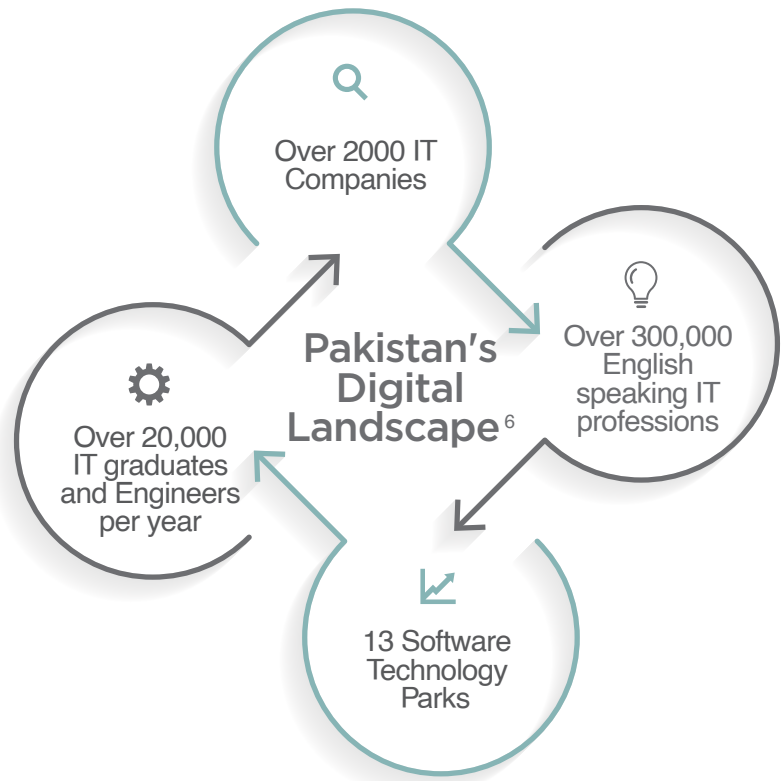3. https://www.dawn.com/news/1686067
4. Unlocking Pakistan's Digital Potential

Developing an enabling environment can create millions of new jobs, open new avenues for upward social mobility, and generate wealth for countless households across the country. In addition, excelling in this emerging Internet economy can help Pakistan leverage its talent to generate significant export revenues necessary to achieve sustainable economic development and stability in the country. Digitalization can further benefit businesses by streamlining the workforce and increasing the efficiency of operations, whilst simultaneously reducing operating costs.[5] It also creates new opportunities for growth, by helping capturing and retaining customers directly, allowing companies to gain and maintain a competitive edge.

The Government of Pakistan has taken various steps to promote and propel digital transformation. Pakistan Vision 2025 and the Digital Policy of Pakistan 2018 have paved the way for transforming the digital landscape; however, several socio-economic barriers hinder universal digital access in Pakistan. Socio-economic conditions mean that families are less willing to invest in devices for women or allow them digital privacy than their male counterparts. The gender divide is starkly evident in the digital space, with a 38% gap in mobile phone ownership between males and females, the highest in South Asia, and a 49% gap in Internet usage.

The distribution of internet services is heavily skewed towards urban areas, leaving tier-2 cities, remote regions, and rural areas digitally excluded. Poor network quality, limited affordability, literacy, and cultural barriers pose challenges to digital access and device ownership in this section and contribute to the rural-urban gap. Considering the global impacts, the digital revolution will not only provide direct jobs but also create the possibility of new innovative business models, participation of small and individual businesses in the economy, and significant productivity gains for Pakistan. The impact of the digital revolution on various components has been analyzed below:

Pakistan's Digital Landscape [6]

- Over 2000 IT Companies
- Over 300,000 English speaking IT professions
- 13 Software Technology Parks
- Over 20,000 IT graduates and Engineers per year

Information Technology Sector

Information technology has assumed a central enabling role in a knowledge society and economy's emerging dynamics, with Pakistan's Information Technology (I.T.) sector carving a differentiated position as the preferred source for software development, Business Process Outsourcing (BPO), and freelancing. This has enabled a skilled-based economy within the Country and acts as a catalyst for the export of services, facilitating foreign remittance and alleviating the Country's poor foreign reserves. Indeed, Pakistan's IT exports grew by 146% between the FY18-22, reaching to $2.6 billion in 2022[7].

5. https://factory.dev/blog/digitalization-business-growth
6. https://invest.gov.pk/sites/default/files/inline-files/IT.pdf
7. https://tribune.com.pk/story/2359168/pakistans-it-exports-to-surpass-3-billion-this-year

Connectivity

Better connectivity is the foundation for implementing and scaling other digital technologies. In Pakistan, better connectivity will not only play an important part in economic growth but will also help in better financial inclusion and improve the gender divide in education and access to health. Pakistan can also develop a globally competitive I.T. sector and industry that nourishes the freelance and service market[8]. In short, all the above areas will be effective only if the Government incentivizes the investment in digital connectivity and its spread across Pakistan.

Digital Banking

The banking sector witnessed a boom in Pakistan, especially in the last two years impacted by COVID, where the economic downturn hasn't dampened the prospects for growth. Some initiatives that validated the Government's commitment to digital banking included the launch of the Country's premier native state-launched digital payment platform RAAST, mandatory use of digital channels in tax payments to improve tax revenues, and allowing brick-and-mortar commercial banks to open bank accounts digitally. Private banks have also started offering certain banking services via WhatsApp. Such initiatives play a vital role in providing banking convenience, extending banking services to remote areas, reducing the risk of counterfeit currency, and improving gender disparity in banking.

E-Governance

Pakistan is steadily advancing toward E-Governance implementation. As of 2020, the Pakistan Citizen's Portal hosts 1.3 million registered members and has a 91% resolution rate, allowing the citizens of Pakistan to have their needs addressed quickly and efficiently[9]. In addition, digitization helps governments ensure efficient and effective provision of services at a fraction of the costs. E-Governance is also extremely client friendly; instead of a stakeholder coming to a government office, the state provides its services at his/her doorsteps, a click away, whether living in a city or rural area

8. https://www.pakistanpressfoundation.org/number-of-3g-4g-users-reached-113-11m-by-march-pta/
9. https://tribune.com.pk/story/2135230/91-resolution-rate-pakistan-citizen-portal-becomes-voice-people

Digital Finance Services and Fintech

Digital Finance Services (DFS) enables users to save time and costs, increase security, and perform faster payments. In the future, these services can play a major role in fostering inclusive economic growth, improving industry value chains, increasing the masses' socio-economic well-being, and bringing transparency to the economy. Pakistan possesses a nascent DFS ecosystem which provides an opportunity for FinTech's to define the DFS landscape by adopting globally successful strategies within the industry. The future for the Fintech ecosystem in Pakistan holds abundant potential. In recognition, the State Bank of Pakistan launched a licensing and regulatory framework for digital banks this year, effectively allowing an initial quota of five digital banks to begin operations in the Country.

Health Sector

More than 60% of the Pakistani population lives in underserved rural areas, where there is a lack of medical personnel, sparse healthcare facilities, and a high cost of treatments in private healthcare institutes. Through digitalization, virtual medical consultations are now possible. The Digital revolution will help expand access to health care and generate employment opportunities. Moreover, digital technologies offer Pakistan the potential to improve national responses to infectious-disease threats and strengthen primary healthcare, as seen during the COVID-19 pandemic. Notably, during the pandemic, the telemedicine sector experienced an 800-900% growth, thereby empowering 3.1 million citizens with health-tech and consultations [10].

Labor Market

Digitization has partially or fully replaced many tasks that human laborers previously did. At the same time, computers have made some workers much more productive. Many production functions and intellectual services (software, financial, legal, etc.) have been shifted to less developed but specialized countries like China and India, helping them earn much-needed foreign exchange. Pakistan, too, can become part of this rising trend by developing its human capital, promoting training and development, and shifting its focus towards a skill-based economy.

10. https://www.arabnews.pk/node/1826911/pakistan

The agriculture & food sector

The agriculture & food sector is projected to be technology's largest economic beneficiary in Pakistan [11]. As such, technology- enabled services can help solve farming challenges, implement Land Records Management and Information systems, provide a digital ecosystem, and empower the farming community, among many others. New technologies and digitalization can help increase crop yields and improve the efficiency of land use and crop output.

Education and training

Digital education is a new approach to learning in Pakistan that employs digital tools to solve traditional educational challenges. At present, 25 million children are out-of-school in Pakistan, with more than 86% of schools being located in rural areas lacking access to internet and mobile connectivity [12]. To reach out to more learners, especially those in remote areas, e-learning schools could be set up in clusters providing seamless access to curriculum materials and teaching resources.

Impact of Digital Transformation

With a population of 225 million out of which more than 38% population under 25, Pakistan is well positioned to play a growing role in the global digital economy over the next decade. The digital revolution is expected to be a game-changer for the Country's economy and open endless growth possibilities across all sectors.

If leveraged fully, the digital revolution can unlock PKR9.7 trillion (USD59.7 billion) worth of economic value in Pakistan by 2030 by generating productivity gains, revenue boosts, cost savings, the introduction of new industries and industrial segments, and GDP increments. With already proven impacts, digital adoption has become more crucial for the Country to gain resilience in the post-pandemic future and alleviate the poor economic conditions

IMPACT OF DIGITIZATION ON ECONOMY

01 Businesses
- EODB
- PRODUCTIVITY
- COMPETITIVENESS

02 Agriculture
- CROP INPUT
- YIELD
- MARKET ACCESS

03 Government
- SERVICE DELIVERY
- DOCUMENTATION
- REVENUE

04 Social Sector
- HEALTH
- EDUCATION
- OPPORTUNITIES
- INCLUSIVENESS
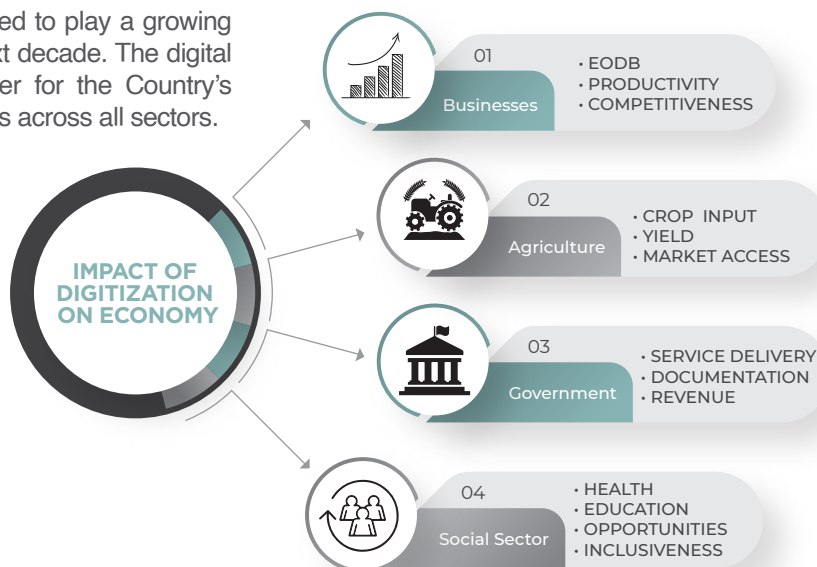
Roadblocks Towards Digital Transformation

| ICT Adoption Index 131/141 [13] | Smartphone Penetration Ratio 51.24% [14] | Internet Inclusiveness Index 90/100 [15] | Lack of Internet Infrastructure 35% [16] |

11. https://tabadlab.com/agritech-crafting-pakistans-journey-to-impact/
12. https://tribune.com.pk/story/2337142/revolutionising-ed-tech-ecosystem
13. https://macropakistani.com/digital-divide-in-pakistan/
14. https://propakistani.pk/2022/06/17/3g-4g-users-in-pakistan-reach-113-89-million/
15. https://www.dawn.com/news/1619250
16. https://www.pta.gov.pk/media/bb_sub_sur_report_10.pdf

Digital Infrastructure and Connectivity

Information and Communication Technology (ICT) adoption index consisting of variables such as internet users and mobile cellular subscriptions, both of which score in the lowest brackets. As such, the digital infrastructure of Pakistan lags behind its regional counterparts for various reasons. Limited fiber optic coverage in rural areas, with only 10% of cell towers connected to fiber optic, is the root cause for slow and limited internet. High taxes and duties (e.g., 20% duty on importing fiber optic cables) make the internet more expensive for most of the population, who at the same time find it difficult to afford expensive smartphones.

Global Competitiveness Index [17]
PAKISTAN RANKING 110/140

Inclusive Internet Index [18]
PAKISTAN RANKING 90/120

Whilst Pakistan's mobile market has significant potential, current levels of mobile internet adoption, smartphone adoption, and digital services lag behind those of other countries in the region. In terms of internet availability it ranked 86th out of 100, with there being a considerable difference between accessibility of males versus females. This is particularly prevalent in the case of mobile phone connectivity, where out of the 52% of the adult female population in Pakistan, only 21% of women use mobile internet [19].

Improving and expanding the current digital infrastructure would catalyze the growth of the digital revolution in Pakistan. This section analyzes some of the key components or digital infrastructure & connectivity and their potential for Pakistan and provides recommendations with global examples.

17. https://www.thenews.com.pk/latest/538840-pakistan-ranked-110-among-141-countries-on-global-competitiveness-index
18. https://www.dawn.com/news/1538509
19. https://tribune.com.pk/story/2344177/pakistans-gender-gap-in-mobile-connectivity

Fiber Optics

The development of fiber optic cables provides a considerable opportunity for growth. However, according to IDATE, Pakistan offers a paltry 1% penetration rate of optical fibers in comparison to its regional peers of Vietnam (44.5%) and Malaysia (32.1%) [20].

10% increase in Broadband Penetration [21] ▶ **GDP increase by 1.38%**

The Ministry of Information Technology and Telecommunication (MOITT), through its Universal Service Fund (USF), has launched seven projects worth over PKR 8 billion to provide broadband services to over 2.5 million people in the un-served and under-served areas of Pakistan, including PKR 3.5 billion for projects in Balochistan.[22] It has further set budgets of PKR 10 Billion for projects providing high-speed mobile broadband access to 11 million people in 4,025 unserved and underserved areas in the country. Whilst the global fiber optics market is expected to reach USD 8 billion by 2026, only a meagre USD 150-250 million are invested into this sector, despite requiring at least 10 times the amount in order to meet market requirements. As a result, Pakistan is progressing slowly in the digital race compared to the neighboring countries.

Challenges

- Only 9% of cell towers are connected to fiber optic, compared to international benchmarks of 40% and regional comparisons of 80% in Malaysia and 90% in Thailand.
- Remote regions and rural areas have a limited footprint in terms of fixed broadband services, which additionally differs within cities depending on the socioeconomic profile of each region [23].
- The absence of true competitiveness in the market, with PTCL holding an estimated market share of 70-75% until 2020, thereby disincentivizing greater developments and an effort to increase the capacity of operations.
- The government's high licensing fees, duties, and challenges in right of way serves to hamper the local development of fiber optics. Whilst the government introduced a 20% regulatory duty on importing fiber optic cables in 2022 in an effort to promote local development, this only served to increase the costs by 107 percent. Rather than fast-tracking the telecom sector towards more growth, this instead debilitates the sector [24,25].

Recommendations

The only logical way forward is to build on the progress made thus far to enrich Pakistan's broadband suite by strengthening its fiber optic backbone. Based on the current situation analysis and study of global use cases, we recommend the following:

1. Invest in optic fiber to improve connectivity

- The government should create a favorable investment environment for local and international investors with the SBP providing financing schemes at favorable rates by balancing import duties on fiber optics and preventing import dumping strategies by foreign players. The priority of investment in fiber optic needs to be increased, and optic fibers must be spread to at least 3,100 out of 6,000 union councils (U.C.).
- The expansion should prioritize industrial and commercial areas, and simplify the provision of building and site permits, whilst promoting the development of new construction techniques such as micro trenching and above-ground laying techniques to ensure cable networks are deployed faster and with less disruption.
- Outstanding licensing disputes of Telecom Companies should be settled to remove their grievances and incentivize the companies for further investment in improving the country's telecom landscape.

2. Financing schemes & incentives to encourage local production

- Initiatives must be taken to encourage local fiber optic manufacturing (including tax breaks, funding incentives, etc.), which would reduce the import burden and produce jobs and economic growth in the long run.

20. https://www.key4biz.it/wp-content/uploads/2022/05/Global-Ranking-2022.pdf
21. https://tabadlab.com/wp-content/uploads/2022/01/Tabadlab-Working-Paper-10-The-Fixed-Broadband-Challenge.pdf
22. https://moitt.gov.pk/NewsDetail/YmYyMmIzMTctMjMxNy00NzA0LWIzYTYtYWVkNDg4NGU3YzI5
23. https://tabadlab.com/wp-content/uploads/2022/01/Tabadlab-Working-Paper-10-The-Fixed-Broadband-Challenge.pdf
24. https://www.phoneworld.com.pk/telecom-projects-suffer-due-to-increased-taxation-on-imports-of-optical-fiber/
25. https://www.phoneworld.com.pk/new-taxes-on-telecom-sector-to-debilitate-pakistans-growing-it-sector/

3. Recommendations for the Universal Services Fund

- Subsidize optic fiber connectivity to all unserved Union Councils (U.C.s) in a phased manner, connecting inter-alia towers of mobile broadband, rural schools, local government offices, healthcare centers, WiFi hotspots, etc. in the U.C.s.
- Review future USF Agreements with the operators so that equal and non-discriminatory access to the fiber bandwidth is available to all potential users.
- Ensure that wherever USF subsidizes upgrades in its "Next Generation Broadband for Sustainable Development" program (2G to 3G/4G), only optic fibers are used in the backhaul to connect the towers - at least the hub sites. For this, the last-mile wireless/mobile operators may bid in consortium with their LDI partners.

4. Reduce taxes on optic fiber, broadband users, and USF funding

- Reduce the import duty from 20% back to the original 10%, in order to promote the local development of fiber optic cables.
- Allow tax-free and mandatory universal internet access across the country (especially in small cities and far-flung areas) for education and healthcare purposes.
- Reconsider the current GST of 19.5% charged to broadband users. Doing so will increase the adoption of fiber connected to the home and businesses.

Global Examples

Gigabit Broadband Deployment, Germany

As of 15 July 2022, Germany has introduced a new strategy aiming drive the deployment of "gigabit" broadband throughout the nation in the coming years, with targets to provide at least 50% of fiber-to-the-home and 5G wherever people live, work and travel by 2030. Accordingly, the government has tasked the Federal Network Agency (BNetzA) with setting up a "gigabit land register" as a central data hub to bundles together the relevant information about fiber and mobile deployments, and share with all relevant authorities. The strategy aims to speed up the expansion of fiber optics across Germany by simplifying building and site permits, whilst increasing the acceptance of new construction techniques such as micro trenching and above-ground laying techniques that enable networks to be deployed faster and with considerably less disruption [26,27].

National Fiberization and Connectivity Plan, Malaysia

Malaysia has seen considerable development in the fiber-optic industry. The optical fibers connected to the home (FTTH) or to the building (FTTB) in Malaysia is now 32.1% in 2021 from 21.4% in 2019. The subscription rate for fixed-line broadband had increased by 9% to 45 % in September 2020 from only 36 percent in September 2019. Furthermore, Telekom Malaysia (TM)'s has covered 5.9 million premises for fibre network as of the first quarter of 2022. Telecommunication companies to invest an additional MYR 400 million to increase network coverage and capacity by improving their backhaul infrastructure in 2022. This was achieved as a result of devising a 5-year plan under National Fiberization and Connectivity Plan in 2019 and approving MYR 21.6 billion in addition its Universal Service Obligation (USO) program of extending optic fibers to villages and smaller islands. The government additionally formulated various Public-Private Partnership (PPP) agreements. For instance, Telekom Malaysia Bhd (TM) signed two PPAs with the Malaysian government for the implementation of the High-speed Broadband Phase 2 (HSBB2) project and the Suburban Broadband (SUBB) project in 2017 costing a total of RM 1.8 billion. Finally, the government has mandated all developers are to install fibre optic telecommunications infrastructure in new buildings and development projects in Penang, whilst adopting a balanced approach between import duties on fiber optic and preventing import dumping strategies by foreign players.

26. https://www.lightreading.com/broadband-tech/fttx/germany-sets-out-fiber-5g-ambitions/d/d-id/778999
27. https://www.rcrwireless.com/20220322/5g/germany-unveils-gigabit-strategy-boost-fiber-5g-deployments

Handset / Smartphones

As of May 2022, the rate of tele-density in Pakistan is at 87.67%, with around 193 million cellular subscribers. There is a 51.73% penetration rate of 3G/4G services, which has opened new avenues of innovation and growth in the country, whilst making it a significant market for the handset/smartphone manufacturing sector.[28]

01	Mobile Device Manufacturing Policy 2020
04	Economic Contribution could reach $24 billion by 2023
Mobile Device Manufacturing Regulations 2021	02
Manufactured 12.27 million mobile phone in 2021	05
03	30 companies Authorized to Manufacture
06	Investment - USD 126 million
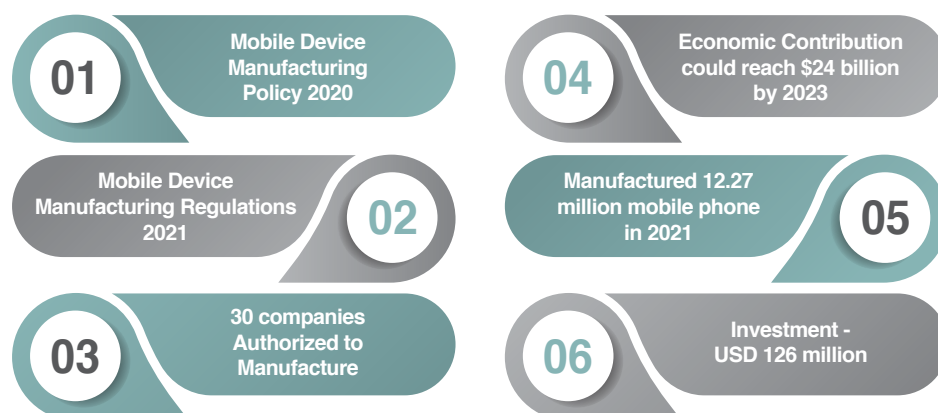
Encouragingly, authorities appear committed to achieving this growth and increasing citizens' access to high-quality connectivity, as the number of smartphone connections is expected to reach 74% in the next four years, up from 52%. However, Pakistan lags behind its regional peers with 51.73% penetration compared to Indonesia (72.07%) and Vietnam (73.5%) [29]. Risks associated with this increased production include an underdeveloped logistics infrastructure, an incomplete component supply chain and lower spending power which may deter future investments[30].

Challenges

- The government has made investing in this sector a challenging feat, by failing to create an environment where volatility is the exception[31].
- The present environment of high electricity costs, a devaluing currency, high taxation rates and minimal operating capacity does not promote a feasible market for the manufacturing of high-quality and high-tech smartphones.
- The introduction of a hundred percent cash margin on mobile imports, and the failure to issue an SRO introduces bureaucratic hurdles to this sector.
- Wide gender gap in mobile ownership prevents 11 million women in Pakistan from owning a mobile phone. 34% fewer women own mobile devices in Pakistan compared to men, whereas 43% fewer women use mobile internet as compared to their male counterparts[32]. Consequently, this impacts the level of financial inclusion in the country and prevents the development of female entrepreneurship.

Recommendations

For Pakistan, cheap and affordable smartphones are key to becoming a digital country. Based on the current situation analysis and study of global use cases, the following measures are recommended:

1. Local manufacturing of mobile phones

- The government needs to relax its policy of opening the L.C. It should bring back the opening of L.C. to 2 to 3 days to ease the life of manufacturers, restore relationships with international suppliers and at the same time and eases the pressure on current account deficit with lower needs for import of mobile phone units.
- Focus groups from rural areas should be involved in designing and piloting services to ensure user needs are met, including content in local languages and using icons, pictures, numeric inputs, and IVR/ voice commands wherever possible.

28. https://www.pta.gov.pk/en/telecom-indicators
29. https://propakistani.pk/2022/03/01/smartphone-users-exceed-2g-mobile-users-for-first-time-ever/
30. https://www.canalys.com/insights/The-driving-forces-behind-the-high-growth-South-Asian-smartphone-markets
31. https://profit.pakistantoday.com.pk/2022/06/20/what-imperils-the-mobile-phone-industry/
32. https://tribune.com.pk/story/2344177/pakistans-gender-gap-in-mobile-connectivity

2. Public awareness to improve the gender gap

- The government, mobile industry, and development community should work together to address public perceptions of women using mobile technology. Male gatekeepers should be considered when targeting marketing or digital skills training programs to women.
- An effective digital harassment policy is also necessary to ensure women's online safety—this can be achieved through collaboration with digital rights NGOs.

3. Pre-loaded applications on locally manufactured smartphones

- Locally manufactured smartphones should come with pre-loaded banking, Agritech, Edtech, insurance, trading and E-Government applications to drive financial inclusion, digital enablement and Government initiatives to promote E-Governance apps.

4. Reduction in Tax on Low-Cost Smartphones

- Simplify and reduce taxation on low-cost smart mobiles (costing less than Rs. 30,000) for enhanced data access.

5. Devise a mechanism to encourage smartphone financing

- Adequate policy and controls should be established to encourage manufacturers to provide smartphones in installments. Currently, there's no mechanism to curb delinquencies and penalize defaults. Actions like SIM blocking and users being unable to issue new SIMs will provide the necessary comfort and assurance to the sellers and encourage smartphone penetration through financing.
- Financial institutions can bundle smartphones with their products & services to enable access to more underserved communities

Global Examples

Made in Indonesia Policy, Indonesia

Most mobile phones sold in Indonesia were made in China. There was no phone manufacturing industry in Indonesia until 2014 when 15 companies submitted plans to the Industry Ministry to start local production. Among them was Samsung Electronics Co Ltd, which opened a factory near Jakarta. In 2015, Indonesia announced 4G smartphones must be 'Made in Indonesia' and in the same year promotion of local sourcing was announced i.e., minimum localization initially set at 20% will be increased to 30% by January 2017. Similarly, minimum level of localization in case of 4G LTE was fixed at 30% in 2018-19 & increased to 40% in 2019-20. The regulations resulted in Indonesia transforming from a consumer centric economy to a product producing economy and helped boost economic growth and eliminate the country's trade deficit.

Prospera Digital, Mexico

Mexico introduced the initiative Prospera Digital which is a conditional cash transfer program that aimed to promote maternal and infant health using a mobile solution by empowering women with knowledge about their pregnancy, offering them health advice and identify critical risk factors leading to complications through a two-way automated smart messaging system available on basic, feature and smartphones. With messages being designed by the Health Ministry and other international organizations, this initiative helped improve the gender gap by allowing women to adopt mobile technology in new and useful ways[33].
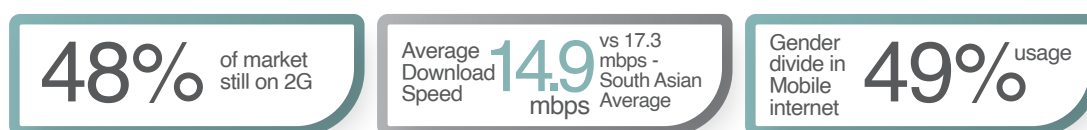
33. https://www.g20-insights.org/policy_briefs/bridging-the-gender-digital-gap/

Internet, Spectrum and Landing Stations

There has been significant growth in mobile broadband coverage in Pakistan since the launch of 3G/4G services in 2014. As of 2022, there are presently 195 million cellular mobile connections in Pakistan. Mobile connections equate to around 89% of the population in 2022. Furthermore, as of 2022, there are 82.90 million internet users with the total penetration rate standing at 36.5% in 2022 [34]. As internet penetration is gradually increasing, MoITT is simultaneously taking various steps to increase internet speed, including auctioning available spectrum, intensive fiberization, resolution of the right of way issues, Rolling Spectrum strategy implementations, tax rationalization, and local manufacturing of electronics and parts. Regarding spectrums and landing stations, the latter is a transition point from the water-based network infrastructure to land-based networking infrastructure. 99% of global data moves through undersea cables. Should their usage be interrupted for any reason, the entire global economy would be disrupted, as an estimated $10 trillion in financial transfers are dependent upon them [35]. In Pakistan, there are currently six international submarine cables connecting and operation the nation [36].

Challenges

Despite these steps, Pakistan lags most of its regional neighbors on connectivity measures and internet bandwidth tracking below the average for South Asia [37]. Large accessibility gaps across wealth, gender, literacy, and location make digital access askew for the impoverished populace. Moreover, low spectrum allocation and high license fees place the country at a disadvantageous position for digital transformation compared to peer economies.

48% of market still on 2G

Average Download Speed **14.9** mbps — vs 17.3 mbps - South Asian Average

Gender divide in Mobile internet **49%** usage

This is because of multiple reasons, including limitations of maximum available bandwidth per site, the low penetration of optical fiber cable infrastructure, and complications in the deployment of telecom infrastructure. These problems are compounded by the high levels of taxation in the telecom sector. The problem is not just limited to internet penetration or speed but is deeply rooted where the gender divide in mobile Internet usage stands at a whopping 49% and a wide rural-urban divide where only a quarter of rural Pakistanis, who comprise more than 60% of the entire population, can access the internet, compared to over half of urban residents [38]. Pakistan has six submarine cables, and just like other countries, any fault in the submarine cable connected with Pakistan results in customers facing service degradation across the country. Alternative channels for bandwidth are then arranged to compensate for a fault in an international submarine cable. Unfortunately, these faults happen due to the busiest shipping routes, drastically increasing the likelihood of disruptions by anchors and other manmade hazards, which unfortunately do happen regularly.

Recommendations

The Government needs to create an enabling environment that ensures that scarce resources are optimally used. Based on the current situation analysis and study of global use cases, the following recommendations are made:

1. **Improvement in internet security, the local language, and digital literacy**

• The availability of relevant local language content should be increased, ensuring privacy and security. Improving digital literacy rates will be critical in reducing the current differential and accelerating the digital economy.

2. **Focus on expanding 4G for all instead of 5G for few**

• With only 1% of 5G expected users, Govt should focus on expanding 4G all over Pakistan as millions of dollars have been invested and can address users' needs. Currently 4G penetration stands at 47% whereas the countries that commercially launched 5G first achieved around 70% or more 4G penetration.

34. https://www.pta.gov.pk/en/telecom-indicators
35. https://harvardilj.org/2020/04/the-infrastructures-of-the-global-data-economy-undersea-cables-and-international-law/
36. https://www.submarinenetworks.com/en/stations/asia/pakistan
37. https://data.worldbank.org/indicator/IT.NET.USER.ZS
38. https://www.brecorder.com/news/40158327#:~:text=ISLAMABAD%3A%20The%20number%20of%203G,Pakistan%20Telecommunication%20Authority%20(PTA).

3. Expand the existing infrastructure

- To ensure digital inclusion, Govt must work towards investment in the infrastructure to expand broadband services in disconnected areas of the country.

4. Increase affordability

- Universal Service Fund (USF) and Ignite-National Technology Fund (Ignite) should be used to provide cheap internet to remote areas to increase the affordability of broadband services.

5. Auction at reduced prices for infrastructure development

- Govt should give some "relief" to the MNOs in spectrum prices against investment in the infrastructure to drastically improve quality and data speeds. Revenues could be collected over time rather than all at once.
- Spectrum pricing should be in local currency - PKR, since operators' revenues are also in PKR.

6. Allocate more spectrums for internet usage

- Instead of allocating a limited portion and keeping back large parts that promote price wars, Govt should allocate more spectrums for internet usage to achieve the goal of a digital Pakistan.

7. Installation of more submarine cables for growing demand

- Govt should consider having sufficient redundant cables to meet the growing demand and address unforeseen circumstances. An enhanced effort to incentivize investment into developing submarine cable infrastructure is required to ensure network redundancy and to cater for increased data rate demands.

8. Introduction of strict policies and penalties for protecting underwater cables

- Govt needs to introduce strict penal provisions on the damage to submarine cables, the introduction of cable protection zones, no-anchoring and fishing zones around submarine cable systems and landing stations, and educate fishermen about the importance of submarine cables to protect against frequent damage to the cable.

Global Examples

Landing Stations, Malaysia

The country is currently connected to 29 submarine cable networks with 14 landing stations, offering excellent connectivity to the rest of Asia and the world. The Malaysian government is working on constructing four new undersea cables to help meet the network needs of the country that will be completed by the second quarter of 2023. By having multiple landing stations, Malaysia is poised to ensure that it has a complete control over their traffic management.

4G Rollout, Indonesia

The COVID-19 pandemic and increased social distancing restrictions facilitated a demand for increase in 4G adoption, and as a result various mobile network operator in Indonesia were encouraged to adopt 4G technology faster and deliver to their customers. Aiming to complete the migration from 3G to 4G by the end of 2022, these operators met increasing demand by strengthening networks in residential areas, adding 4Gs BTSs and increasing the capacity of internet gateways. The government has supported this initiative, with its state-run MNO Telkomsel migrating 4G to 90 districts between March to May 2022. As a result, Indonesia's mobile telecom subscriptions increased 5% YoY in Q1 2022 to reach 362 million, with 5G technology being gradually introduced [39,40].

39. https://www.counterpointresearch.com/indonesia-4g-5g-industry/
40. https://en.antaranews.com/news/223393/migration-to-4g-will-support-digital-transformation-minister

Data Centers

Data is considered the new oil becoming strategically important for not just organizations but for the governments to ensure country's safety and sovereignty. A data center is a facility that centralizes an organization's shared I.T. operations and equipment to store, process, and disseminate data and applications. Within Pakistan, data centers can mainly be found within the three big cities of Karachi, Lahore and Islamabad, being operated by companies and government departments, such as NADRA, PTCL, Jazz, Telenor, Zong, Ufone and various universities. Data centers offer the possibilities of scalability, security, efficiency, and state-of-the-art technology – that are increasingly demanded by companies and organizations. The Government has taken steps to leverage the benefits associated with data centers, including the National Information Technology Board's (NITB) first data center opened in Islamabad.

With only 11 data centers, Pakistan falls behind its regional peers in the data center market compared to Malaysia (market size of $ 1 billion) and Vietnam (market size of $454 million) [41]. The development of data centers has considerable opportunity to provide employment for citizens, as its creation requires a unique logistics chain incorporating internet exchanges, hosting, cloud and fiber optic providers. Furthermore, the creation of data centers usually takes three to five years for multi-tenant centers, and five to ten years for large single-tenant hyperscale data centers, thereby providing a unique opportunity for development [42]. Globally, the data center market size was valued at $215.8 billion in 2021, and is estimated to reach $288.3 billion by 2027 [43].

Challenges

- Companies are disincentivized to invest in such centers due to the high costs associated with its maintenance, given the frequency of electrical shortages and blown-outs resulting from a poorly designed electrical infrastructure.
- Data centers require access to as many fiber optic cables in Pakistan, which are few in number and development.
- Political instability and the frequently changing nature of censorship provides a considerable challenge as it puts the operators of data centers at risk of losing their clients and revenue [44].
- Data centers can be put at risk to cybercrime, as in the instance of the Federal Board of Revenue's data center being hacked in 2021, thereby affecting the country's shipments [45].

Recommendations

The following measures are recommended to capitalize on the benefits offered by the data centers.

1. Incentivize investment in data centers

- The Government should consider formulating a scheme to incentivize investments to set up hyper-scale data centers in the country and boost the capacity of the existing data center ecosystem. This can include tax credits and offering cheaper land to build data centers.

2. Task force to facilitate setting data centers

- Data Center Task Force needs to be formulated to lead negotiations between Government and Private companies
- The Task Force needs to consult market players to understand market requirements and preferences to be highlighted for the implementation partners.
- Cloud policy needs to be effectively implemented with its set target periodically monitored.

3. Development of skilled labor workforce

- Special initiatives can be considered for the training and up-skilling of the workforce for accelerated cloud adoption and implementation throughout Pakistan.

41. https://www.prnewswire.com/news-releases/vietnam-data-center-market-size-by-investment-to-reach-usd-673-million-by-2026--arizton-301377710.html
42. https://www.dutchdatacenters.nl/en/data-centers/what-is-the-economic-impact-of-data-centers/
43. https://www.globenewswire.com/news-release/2022/02/23/2390642/0/en/The-Global-Data-Center-Market-Size-to-Reach-288-30-Billion-by-2027-Arizton.html
44. https://www.quora.com/What-is-the-business-potential-of-data-centers-in-Pakistan
45. https://profit.pakistantoday.com.pk/2021/08/15/fbr-data-centre-compromised-all-websites-down/

4. Increasing cyber-security of data centers

- Operators to work closely with third-party vendors in order to ensure effective cyber-security and protect against any blind spots
- Ensure the physical security of data centers by improving the power, HVAC, CCTV, UPS and fire suppression systems and ensuring they also have manual operations in order to protect against any unauthorized access.
- Provide effective training to employees on how to detect and address any cyber-security infringements.Case.
- Implementation of data sovereignty concept through policy changes to help protect and safeguard strategically important data.

Global Examples

Facilitating Data Center Development, Malaysia

Malaysias' data center market is estimated to be $ 1 billion and the country is considered one of the prime data center markets in Southeast Asia due to the abundant availability of resources and favorable government policies concerning data center infrastructure. This includes the competitive cost of power, ready access to skilled employees, cheaper access to land, and lower construction cost compared to other Southeast Asia countries. Malaysia is focusing on its power generation plan with a target of 31% RE in its installed capacity by 2025, and 40% by 2035. All of this has been possible due to the launch of its Economic Transformation Program (ETP) in 2011 to transform the country into a world-class datacenter hub and its Sedenak Iskandar Data Hub (SIDH) in 2015, a 700-acre data centre hub in Sedenak, in the Iskandar Region in the state of Johor. Furthermore, the formation of the Data Centre Task Force (DCTF) has facilitated foreign DC investments in Malaysia in 2015. Additionally, Malaysia developed the first cloud policy as a national agenda in 2017, and it was approved in 2020 in a policy framework for national cloud services hubs and data centers.

CyrusOne, United States

CyrusOne counts as one of the largest providers of data centers in the United States. The company experienced a ransomware attack in late 2019, causing its operations to be disrupted by an outside party and affecting six of its customers through experiencing outages. CyrusOne is a fairly large company with 45 data centers spanning 3 continents, and the company was extorted over the ransomware attack. Such attacks can be prevented by beefing up cyber-security, and ensuring the presence of encrypted backups without access to outside networks [46].

46. https://www.upsite.com/blog/6-data-center-ransomware-attacks-and-their-lessons-learned/

Government, Private Sector, and Mass Digital Use Cases

Digitization offers endless possibilities for the government and private sector. Government can utilize it to increase the quality and portfolio of public service delivery whereas private sector can use it for increasing productivity and develop new business models. In this section we discuss some of the benefits of Digitization and recommend measures to be taken to reap those.

e-Government

The concept of e-government offers greater transparency and citizen empowerment, whilst contributing to the United Nations Sustainable Development Goals.[47] Whilst Pakistan has attempted to introduce e-governance initiatives through initiatives such as the newly established Special Technology Zones Authority, has introduced efforts to shift 31 out of 42 ministries to electronic systems, introduced the Pakistan Citizen Portal, the "Pak Identity Mobile App" by NADRA, the FRB Tax-payer Facilitation Portal, PTA SIM and NIC verification, etc, the process is nevertheless too slow in unleashing digital citizenship, and transforming the digital economy of the nation.[48]

Global Public Sector Technology Purchasing Market valued at USD **400** billion at present [49]	Global Public Sector Technology Purchasing Market predicted to reach **USD 1** trillion by 2025	**E-Government Development Index (EGDI)** Pakistan ranks 153/193 [50]

Challenges

Most of the e-governance systems deployed operate in silos, thereby making the process a cumbersome activity. The business processes of the government sector in Pakistan is primarily paper-based, thereby leading to considerable inefficiencies in digital workflows. Furthermore, the absence of technical auditing and measurement, given the absence of a technical monitoring means that services provided have few checks and balances. Limited funds allotment to digitalization, and the absence of benchmarks or targets to track the digitization progress [51].

47. https://www.ao-itc.de/what-is-e-government-and-why-it-is-important/
48. https://www.thenews.com.pk/tns/detail/800070-the-rise-of-gov-tech-startups
49. https://www.accenture.com/_acnmedia/pdf-90/accenture-govtech-pov.pdf
50. https://www.dawn.com/news/1641454
51. https://www.mecs-press.org/ijeme/ijeme-v11-n6/IJEME-V11-N6-2.pdf

The potential for change as a result of e-governance is massive in Pakistan, however it requires the following recommendations in order to be successful:

1. Improve the efficiency and efficacy of e-government services by investing in human capital

• Provide regular ICT training with periodic checks on the development of human capital (technical and professional).
• Make it mandatory for Govt agencies, departments, and sub-offices to submit strategic plans with targets to increase digitalization with their budgets. A periodic review of performance will further accelerate the adoption.
• Transform the working culture of ministries and departments from paper-based to digital.

2. Improve consumer access to e-government services

• Ensure that e-government services are available in English and Urdu, accessible for use of disabled individuals.
• Partner with industry and the private sector in e-governance initiatives, given their expertise and experience.
• Based on machine learning and deep learning, speech-to-text translation systems should be introduced to provide real-time translation services and assistance in public service settings.

3. Provide sufficient funds to develop infrastructure, whilst keeping prices of services affordable

• Devise a pricing structure with some free services, and no service being priced to be out of reach for the common man.
• Develop new e-governance systems on top existing successful systems, rather than reinventing the wheel.

4. Ensure stable access to the internet, whilst promoting effective cyber-security measures

• Ensure access to high-speed internet, with regular maintenance to prevent downloading issues and the crashing of files.
• SLAs to be created with developers and service providers to prioritize cyber security.
• Provide effective and regular cyber-security training to all employees, in order to protect against cyber-attacks.

5. Create a centrally-connected and capable network infrastructure

• Introduce cloud-computing facilities to make information more centralized and reachable.
• Use a country-wide universal networking model to break down siloes between ministries.
• Develop a technical monitoring agency to ensure the effectiveness of the database, and to ensure adherence to internationally recognized standards of e-government technology implementation.

Global Examples

E-Government Master Plan, Philippines

Under the E-Government Master plan (EGMP) 2013-16, the building blocks and strategies directed towards the vision of developing the country's e-Government systems included developing infrastructure for cyber-services, developing human capital, institutionalizing the e-Government fund, and promoting digital inclusion and literacy whilst promoting public-private partnerships. As a result, the Philippines has significantly improved on e-government performance by ranking 57th worldwide on e-Participation, leaping 10 levels higher from 2016 position. The Philippines dropped 6 places in its ranking to 77, but its overall EGDI score improved from 0.5765 to 0.68920 with a category of "high EGDI level". Philippines is ranked 95th out of 190 economies in 2020 for ease of doing business jumping 29 notches from no. 124 in 2019.

E-Government Development, Finland

In recent years, Finland has remained at the top ten, quite often as the top five countries in the world in relation to its e-governance infrastructure. Its success has historical roots. In 1958, it instituted the very first IT system in the Social Security Institution and the Postbank, followed by the establishment of an IT unit at the Ministry of Finance in 1963. Since then, there are now around 680 different central e-government initiatives. The proliferation of digital tools are various levels has encouraged greater civic e-participation, in addition to bolstering healthcare, education and social security. Additionally, nearly all Finish ministries and agencies support e-government services by providing interactive information and propose transactions. The government also has national data registers which greatly increase government efficiency [52,53].
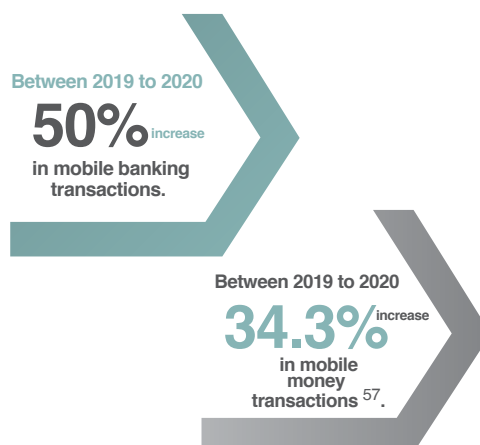
52. https://core.ac.uk/download/pdf/289290445.pdf
53. http://www.untag-smd.ac.id/files/Perpustakaan_Digital_1/E-GOVERNMENT%20OECD%20E-Government%20Studies,%20Finland.pdf
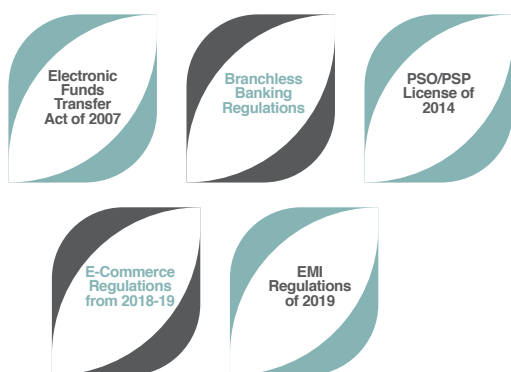
Digital Financial Services & Fintech

The COVID-19 pandemic has increased the pace of digitalization in Pakistan, particularly within the FinTech industry. Varying from branchless banking to financial inclusion, enhanced payment systems, micro credit, and savings, the FinTech industry in Pakistan is growing at a rapid pace. The growing population and young demographic, in addition to the figures of 160 million biometrically verified mobile connections and 58 mobile wallet accounts represents a considerable market for digital financial services, with the government working to include unserved populations within this fold [54].

However, despite promising demographics, Pakistan remains a cash-based economy, with 85% of its population being financially excluded. In addition, most of the Country's 3.3mn SMEs (which contribute one- third to GDP) are excluded from accessing formal credit lines [55]. With regards to financial inclusion, Pakistan has underperformed in comparison to the South Asian average of 68.4% and other low middle income countries with an average of 56.1%. The State Bank of Pakistan (SBP) has been actively promoting and supporting the digital financial services revolution and has introduced various initiatives like the introduction of the Electronic Money Institution (EMI) license, Raast – an instant payment system, framework for digital-only banks, the launch of Roshan Digital Account (RDA), and fee waiver on online banking transactions, among many others. However, as of 2022, digital payments account for only 0.2% of transactions with only less than 5% merchants accepting digital payments [56].
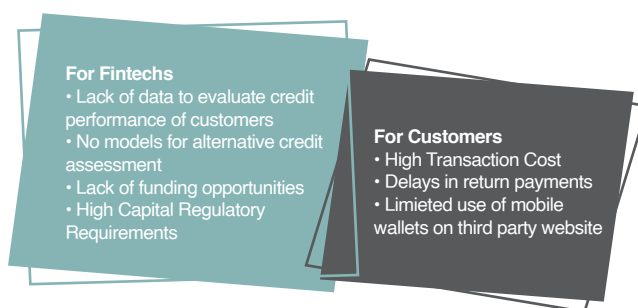
Between 2019 to 2020
50% increase
in mobile banking transactions.

Between 2019 to 2020
34.3% increase
in mobile money transactions [57].

Challenges

Electronic Funds Transfer Act of 2007

Branchless Banking Regulations

PSO/PSP License of 2014

E-Commerce Regulations from 2018-19

EMI Regulations of 2019

Despite these efforts, the industry faces many challenges. Varying regulations mentioned below hinder new FinTechs from entering into the market or delay their entry. The absence of or unclear phrasing of ancillary laws and regulations lead to regulatory ambiguity and gaps, whereas high barriers to entry for startups and FinTechs through existing regulations prevent and disincentivize FinTechs from developing products. Furthermore, though most unbanked adults have mobile phones, they currently lack knowledge of Fintech applications and how to use them. Even for those aware, experience a significant lack of trust on digital channels. The situation is worsened by the extreme difficulty faced in getting merchants onboard, as they fear getting into the tax net.

On the consumer end, transaction costs to operate a Fintech are quite high compared to traditional banking channels (for example, a PKR10,000 cash withdrawal through an ATM costs PKR140 on JazzCash/Easypaisa while it costs just PKR20 from a normal bank account). Raast, a promising venture, is meant for only regulated Fintechs, which have high paid-up capital requirements beyond most players' reach. These issues are amplified since many Fintechs cannot provide independent services to customers. They must partner with banks to satisfy their AML/KYC requirements for B2C services.

For Fintechs
• Lack of data to evaluate credit performance of customers
• No models for alternative credit assessment
• Lack of funding opportunities
• High Capital Regulatory Requirements

For Customers
• High Transaction Cost
• Delays in return payments
• Limieted use of mobile wallets on third party website

54. https://dailytimes.com.pk/939313/the-evolution-of-traditional-finance-into-digital-finance-in-pakistan/
55. https://app.techdestination.com/public/assets/assets/pdf/(3)fintech.pdf
56. https://openknowledge.worldbank.org/bitstream/handle/10986/37230/P172300097cd82032089610283e77293d89.pdf?sequence=1&isAllowed=y
57. https://dailytimes.com.pk/939313/the-evolution-of-traditional-finance-into-digital-finance-in-pakistan/

Recommendations

1. Tax incentives for merchants to adopt electronic payments

- Introduce incentives like tax breaks for merchants who adopt digital payments as Government of Punjab did incase of sales tax on food outlets. Incentives like those can be offered at scale.

2. Improved regulatory framework

- More flexible and 'fintech-enabling' principle-based and data-centric approaches must be adopted to form new regulations. Also adapt existing laws and regulations to become technologically neutral.
- Regulations should focus on areas like open banking, open finance, regtech, suptech, crowdfunding, financial inclusion, open APIs, moves towards a more flexible principle- based regulation, and regulatory coordination.
- Simplify the process of opening a bank account and relaxing the existing regulations around financial trading, which will help boost the number of bank accounts, increase lending, and pique people's interest in the stock market.

3. Creating an environment for Fintechs to work independently

- Devise protocols and adequate policies to reduce the co-dependence of Fintechs in Pakistan.
- Raast infrastructure should be extended to Fintechs, and consideration should be given to reducing the capital requirements for integration.
- For KYC, Fintechs should have access to the NADRA database, and relaxation should be given for KYC requirements similar to branchless banking where "level 0" and "level 1" customers have a relaxed KYC requirement.

4. Expedite establishing Fintech facilitation center

- Expedite establishing Fintech Facilitation Desks at federal and provincial levels, where Fintechs will be invited to gauge the Central Bank and establish a mutual understanding of how Digital Finance Services can be accessed.
- The desk should also branch out towards other levels of support, including access to funding through public-private funds, mentorship, training, and one-stop access to all the regulatory frameworks and requirements.

5. Incentivize financial inclusion

- Develop consumer protection laws in order to increase adoption and usage of ICT infrastructure and instruments for individuals and businesses.
- Government to prioritize implementation of the National Financial Inclusion Strategy, where applicable, and introduce a new strategy with updated targets.
- Existing FinTechs should introduce embedded tax solutions in order to streamline tax reporting, filing and payment processes. B2C and B2B FinTech companies will therefore gain a competitive advantage, and increase assets under management. This will enable the government to increase its revenues.
- Tax incentives and concessions should be provided to FinTechs in order to promote financial inclusion and move towards a cash-less economy.

Global Example

HSBC Connected Money App, UK

HSBC launched its Connected Money app in May 2018 in response to the UK's open banking regulations that attempt to place more control of financial data into the hands of consumers. Connected Money allows customers to view various bank accounts as well as loans, mortgages, and credit cards, in one place. Insider Intelligence projects the revenue potential in the UK generated through Open Banking-enabled small- and medium-sized businesses (SMBs) and retail customer propositions to reach $2 billion by 2024 – a 25% compound annual growth rate (CAGR).

Agri Tech

Contributing 24% to the country's GDP, the agricultural sector is indispensable to Pakistan's economic growth, food security, employment generation, and poverty alleviation, particularly at the rural economy. Although its contribution to the overall GDP has decreased considerably in the past two decades due to multifaceted issues[58], the sector has

nevertheless recorded a remarkable growth of 4.40% in June 2022, surpassing its target of 3.5% and FY2021's growth of 3.48% [59]. Nevertheless, it is estimated that by adopting technological advancements and connectivity, the agricultural sector can contribute an additional value of $500 billion to the global GDP by 2030 [60]. Startup participation within the agritech space has nevertheless been limited in Pakistan, and tech adoption in the sector lags compared to countries like Thailand, Australia, Netherland, etc. The fact that agritech has not reached critical mass in Pakistan creates a risk, as most products "aren't suitable for smaller sized farmers and don't add enough value to justify another upfront investment".[61]

Prominent steps taken by Govt of Pakistan

Digital Dera
A technology-enabled community to find solutions to farming challenges, implementation of Land Records Management and Information System.

Kushal Pakistan
Providing a digital ecosystem and empowerment of the farming community, among many others.

Challenges

"People associated with agriculture sector face challenges in access to finance and modernize infrastructure that may facilitate them either in storing or timely disposal of their agricultural produce" Ms. Sima Kamil, the Deputy Governor of the SBP[62]

The lack of adequate formal financing prevents small-scale farmers from investing in and utilizing agri-tech services. The hesitancy on part of formal financial institutions in lending to farmers stems from an absence of land ownership and collateral, and missing credit histories which make farmers risky investments.

Whilst there is truth to this claim, given the fact that the third quarter of FY2021 observed 16.7% of non-performing loans in the agriculture industry, its impact is such that it forces subsistence farmers to turn to informal means of financing. Regarding the warehouses, farmers face risks in storing their perishable produce, with around 35-40% of vegetables and fruits being estimated to be wasted post-harvest.[63] As the installation of high-tech equipment requires significant investment, farmers have to choose between near-term cash flow and maximizing profits. With limited financing, the adoption of such technologies is severely impacted by limited ICT infrastructure in rural areas. Further, the level of technical know-how is very low, making use of agritech complicated as most farmers over a certain age are often less willing to try newly developed technologies applicable to farming. Finally, agritech startups often struggle to reach out to bureaucracy and policymakers, specifically at the provincial and district level. Startups in this space often find it difficult to expand their footprint because due to a lack of regulatory clarity and support for data collection and policy input.

Recommendations

The answer for the agriculture industry in Pakistan lies in the government taking special interest in not only incorporating technology to help the sector leapfrog, but also to help disseminate information and best practices, as well as drive progress via helping with mechanization and updating irrigation systems. A coordinated and synergistic approach can go a long way to amplify the positive impact on farm economics.

1. Farmers' Digital Education Program

- Government and private entities should define a roadmap for farmers' digital education that starts with setting the goals, delivery, and regular monitoring and feedback.
- Local support needs to be harnessed to successfully implement the program.
- Farmers also need to be educated to introduce them to the future's market and how they can hedge their produce using PMEX.

58. https://www.pbs.gov.pk/content/agriculture-statistics
59. https://www.pakistantoday.com.pk/2022/06/09/agriculture-sector-surpasses-growth-targets-in-fy-2022/
60. https://www.mckinsey.com/industries/agriculture/our-insights/agricultures-connected-future-how-technology-can-yield-new-growth
61. https://www.theirmindia.org/blog/agritech-and-risk-management/
62. https://www.sbp.org.pk/press/2022/Pr1-18-May-2022.pdf
63. https://www.adb.org/sites/default/files/publication/534716/dysfunctional-horticulture-value-chains-pakistan.pdf Agricultural Extension South Asia. (2018, January 23). "Agriculture Extension in Pakistan: Challenges and Way Forward

2. **Incorporating agri-entrepreneurship courses in agricultural education**

- The Higher Education Commission of Pakistan (HEC) and agricultural universities should coordinate to devise courses on entrepreneurship, data analytics, and machine learning in all agricultural streams, together with an internship with agritech startups to develop top-quality talent for scaling the industry.
- The Government should attempt to build public data repositories by collating existing datasets with government departments, the Federal Bureau of Statistics, research institutions, and universities.
- Building high-quality research papers related to innovations in Pakistan by agriculture startups

3. Launching low-interest loans for farmers

- Regulators should work with banks, MFIs, and startups to conceive products with interest subvention and reduction of premium on the loans for farmers looking to finance tech adoption.
- A well-coordinated approach is required between the State Bank and other stakeholders to set annual targets for agriculture credit disbursement aiming at digital transformation of the sector.

4. Dedicated cell for agritech startups

- A dedicated cell at the provincial and district level should be set up to facilitate continuous dialogue between the Government and the agri-tech startups.
- Through agricultural universities and research centers, provincial governments can support startups for pilots and validate the technology.
- Provincial governments can also play an important role in the training and capacity building of village-level entrepreneurs who can act as channel partners for agritech startups to make their innovations accessible to farmers.

5. Building incubation support for rural Pakistan

- Provincial and district governments should build rural incubators to motivate and support rural youth to build entrepreneurial models to truly democratize the startup ecosystem in Pakistan.
- Need to build a government-funded and dedicated sandbox where public and private sector banks can be incentivized to work with startups to build and pilot innovative agritech solutions to scale them faster.
- Govt-supported incubators should have a high-velocity catalytic fund for agritech startups' seed stage investments.

Global Example

Agriculture Policy, Australia

Australia is a major adopter of smart farming. In the agriculture policy announced in 2018, the Australian government set aside over $27 million to promote digital technologies in agriculture to improve productivity and sustainability. By encouraging the use of technology in agriculture, the government hoped to attract the young generation to take up agriculture, stay in rural regions, and build the economy there. In 2018, it promoted precision agriculture in Victoria by providing internet connectivity to all rural areas., training and educating the farmers on the use and benefits of digital farming, setting up agreed protocols for data sharing and privacy protection, encouraging integrated platforms that offer all related digital agriculture services in one place to make it easy for farmers to use and setting up a regulatory structure to track innovations. The policy has changed a little since then. In 2021, the Australian government started eight Innovation Hubs to promote research in digital technologies with $66 million and has given a further $114 million in 2022 to strengthen them. Managing farms using IoT technologies, robotics and drones combined with artificial intelligence (AI) and machine learning (ML) is constantly increasing the quantity and quality of agricultural products while optimizing labor required for production.

EdTech

The global education technology market has embraced the digital revolution with the emergence of artificial intelligence, and holds an absolute growth of more than 130% during the period of 2022-2027.[64] Within Pakistan, the COVID-19 pandemic provided opportunities and challenges for the

education sector. Moreover, Pakistan has the second-highest number of school children anywhere in the world, amounting to 22.8 million, of which 5.3 million are dropouts and 17.5 million have never attended school.[67] This is in addition to regional and gender disparities, with 56% of girls in Balochistan being out of school compared to 18% in Islamabad.[68] Even if the number of edtech's increase, they face risks of low demand and uptake due to low digital literacy skills and low levels of individual access to broadband and internet.

Challenges

The first and foremost challenge faced by Edtech startups in Pakistan are the low speeds of internet [69]. Low internet access and the digital divide remain key barriers to adoption, particularly due to further issues of high electricity rates and challenges in obtaining EdTech hardware access both inside and outside of school.[70] According to the Pakistan Telecommunication Authority, only 1 million children have regular access to digital devices and the bandwidth to access educational content. Additional challenges faced by EdTech startups include obtaining accurate, systematic and comprehensive data on consumer needs and levels of accessibility. These challenges prevent EdTech startups from effectively scaling, thereby also preventing their ability to provide low prices to their consumers.

Recommendations

While it is clear that there is tremendous potential for growth and further innovation in Pakistan's EdTech industry, it is also certain that its development from the ground up requires major support. Increasing access to internet through expension of network to far-flung areas is the basic requirement, other key recommendations for the edtech sector of Pakistan are:

1. Phased-wise digitization of the education sector

- All the record and management of education sector should be digitilize in a phase wise manner.
- Seek services of organizations developing EdTech to make the content child friendly and more engaging for all learners, especially those in rural areas.

2. Awareness campaigns

- Run awareness campaigns to educate public and private schools about the benefits of edtech and how it can improve the teaching and learning experience. There's an urgent need to change the broad mindset of the masses.
- Local heroes need to champion such awareness campaigns in rural areas to create a bigger and long-lasting impact.

3. Capacity building

- School teachers (especially in public sector) should be trained to use digital tools and technologies used in e-learning.
- Make virtual skills development courses a permanent feature of teachers' training modules.
- Urdu and local languages should be integrated with e-learning apps to drive adoption in less developed areas.
- Computer labs in government schools and colleges need to be upgraded, and investment through public-private partnerships needs to be at the forefront of such initiatives.

4. Financial support

- Allocate a reasonable budget toward the edtech sector and provide grants/funding to promising edtech startups that have the potential to improve education quality and access.
- Local funding should be available to innovative Edtech startups through National Incubation Centers, with appropriate benchmarks for tractions and success to access such funding.
- Edtech entrepreneurs need to be groomed and trained by sponsoring their training and capacity- building exercises.
- Tax credits and subsidies can encourage more Edtech startups.

64. https://www.globenewswire.com/news-release/2022/02/01/2376551/28124/en/Global-EdTech-Market-Outlook-Forecast-Report-2022-Market-Size-was-d-to-Reach-605-40-Billion-by-2027.html Valued-at-254-80-Billion-in-2021-and-is-Expecte
65. https://tribune.com.pk/story/2306874/the-tech-innovation-called-edtech
66. https://www.researchgate.net/publication/351747839_Country-Level_Research_Review_EdTech_in_Pakistan
67. http://library.aepam.edu.pk/Books/Pakistan%20Education%20Statistics %202016-17.pdf
68. https://dhsprogram.com/publications/publication-f r290-dhs-final-repor ts.cf m
69. https://profit.pakistantoday.com.pk/2022/01/02/will-the-india-model-work-for-pakistans-edtech-startups/
70. https://www.menabytes.com/edtech-pakistan/

Global Examples

Educational Technology Plan, Singapore

Since 1997, Singapore has developed four ICT in Education Masterplans and currently has an Educational Technology (EdTech) Plan in place. The Ministry of Education employs a robust monitoring and evaluation plan to review and iterate upon existing plans. From the first Masterplan (1997 – 2002), to the current plan (2020 – present), areas of focus have evolved from putting in place basic infrastructure and equipping teachers with digital skills, to quality learning, digital citizenship, and supporting a tech-enabled, agile and flexible learning environment. The key enablers of ICT in Singapore have been the development of teachers' capacity for teaching with technology, the strengthening of digital safety, security and responsibility of students and teachers and the enhancement of partnerships with parents and stakeholders to support learning (networking with community and industry). Currently in its third iteration, the ICT Masterplan includes initiatives like infrastructure upgrades, increased connectivity in schools, as well as 'edumall 2.0', an integrated portal of global learning resources and approaches that teachers can access to plan their lessons. In addition, government agencies such as Agency for Science, Technology and Research (A*STAR) provides grants, licensing services, and proof-of-concept projects that can be adopted by various sectors, including edtech. It is due to these initiatives that edtech is a maturing industry in Singapore and hard copy study materials coupled with mundane teaching methods are being replaced with more engaging digital ways of learning.

Education ICT Master Plan, Bhutan

The Ministry of Education released an Education ICT Master Plan in 2019, which intends to provide life-long learning for its citizens by equipping them with transpirable skills, integrate curricula and interdisciplinary digital pedagogy in order to facilitate collaboration amongst educators and learners, and create a comprehensive and integrated management information system to improve decision making and monitoring and evaluation.[71] Furthermore, Bhutan has developed an Education and Technology Academy Park, which is designed to provide diploma courses in business management, start-ups and entrepreneurship, computer science and IT, and cyber security.

HealthTech

Globally, digital health is a rapidly growing industry which is expected to be valued at USD 504.4 billion by the end of 2025.[72] The COVID-19 pandemic, and its impacts of social distancing and greater medical care have created a demand for digital health, particularly in the public sector. This has spurred the government and health-tech startups to deliver greater services. For instance, in response to the COVID-19 pandemic the government introduced measures such as real time registries to visualize data, SMS-text messaging-based EHSAAS emergency cash transfer programs and a COVID-19 specific telehealth portal.[73] Telemedicine tools are utilized to educate patients, and initiatives such as eDoctor and Sehat Kahani enable women who have left clinical practice due to household and childcare responsibilities to practice remotely.[74] Accordingly, COVID has facilitated public-private partnerships in the health sector, whilst instituting mechanisms of valuable data sharing, standardizing digital health care and promoting interoperability.

Accessibility of Healthcare Services Pakistan ranking **130** | **195**

Doctor-to-patient Ratio **0.83** | **1000** Physicians per[75]

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71. http://www.education.gov.bt/wp-content/uploads/2019/05/iSherig-2-Education-ICT-MNasterplan-2019-2023.pdf
72. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7499163/
73. http://www.finance.gov.pk/survey/chapters_18/11-Health.pdf.
74. Hashmi NR, Khan SA. Interventional study to improve diabetic guidelines adherence using mobile health (m-Health) technology in Lahore, Pakistan; Moazam F, Shekhani S. Why women go to medical college but fail to practise medicine: perspectives from the Islamic Republic of Pakistan. Med Educ..
75. https://www.ghsindex.org/country/pakistan/

Challenges

The health-tech industry is beset by various challenges. There is an absence of a comprehensive framework for digital health and effective regulations or standardized best practices resulting from the fact that digital healthcare is not recognized as a separate sector.[76] The absence of a national effort to address the ethical aspect including data privacy and retention also proves a considerable challenge to the promotion and protection of basic human rights.[77]

At the level of infrastructure, a key challenge is that most hospitals, healthcare units, private clinics and tertiary centers lack the capacity to incorporate digital health interventions. Furthermore, the low rates of e-literacy in healthcare professionals coupled with the use of old generation technologies introduces constraints to the development and scaling of e-health services. Hospitals and healthech startups also face the challenges of finding adequate means of data storage and retention, unorganized datasets leading to faulty predictions and additional hidden costs due to storage, cloud and security.[78] On the demand side, the ability of consumers to use healthtech services is dependent on their ownership of devices, access to connectivity, good quality of network and digital literacy.

Recommendations

1. Leadership and prioritization by the Government

*   Create a vision and take ownership of the digital health plan with a clear roadmap to focus on expanding coverage, providing quality healthcare services, and optimizing costs.
*   Establish dedicated departments for E-health in the Ministry of National Health Services, Regulations and Coordination, and Provincial Health Departments.
*   Formulate a comprehensive E-Health strategy in consultation with health sector stakeholders and health ICT vendors.
*   A national E-Health regulatory authority must be formed to develop and enforce frameworks that should focus on medicare, connectivity, data privacy, online prescription, etc
*   Encourage and support the implementation of national E-Health plans aligned with national ICT and broadband agendas, with an allocated budget for digital health.

2. Phase-wise approach

*   Adopt a phased-wise approach for integrating Healthtech into the existing health system in the Country.
*   Healthcare I.T. departments like IHIS in Singapore can be established to digitize, connect, and analyze Pakistan's health ecosystem and support a one-patient one record policy.
*   Establish an online registration system for services like a selection of hospitals, OPD Appointments, LAB Reports, details of blood availability, etc.
*   Conduct nationwide training and development programs for certified telemedicine practitioners.

3. National electronic health record with better data security

*   A national electronic health record should be progressively deployed to public and private health care institutions across the country to support the One Patient, One Health Record initiative.
*   The electronic record system could collect patient health records across different health care providers.
*   An act needs to be drafted and passed for data portability obligation. As a result, individuals will be empowered to request an organization to transmit a copy of their data to another organization.
*   Public education and awareness programs should also be devised regarding data portability and security.
*   Make a universal platform for data sharing by all e-health service providers, place an effective system of data analytics based on AI and ML which can detect disease patterns and help government take prior preventive measures.

76. https://tabadlab.com/wp-content/uploads/2021/06/2021-01-28-Tabadlab-Brief_17_Digital-Health-Solutions-to-Improve-Public-Health-During-Covid-19.pdf
77. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7499163/
78. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7499163/

Global Examples

Digital Healthcare, Singapore

Singapore is one of the countries that are leading the digital healthcare adoption worldwide. The digital health care market in Singapore is expected to be $418.8 million in 2021 and it is expected to reach $ 603.2 million by 2026. The National Electronic Health Record (NEHR) has been progressively deployed to both public and private health care institutions across the country to support the One Patient, One Health Record initiative since 2011. Owned by Singapore's Ministry of Health and managed by the Government technology agency, Integrated Health Information Systems (IHiS), the NEHR system collects summary patient health records across different health care providers. This enables authorized health care professionals to have a holistic and longitudinal view of their patients' health care history as well as provides data security for individuals. Singapore's Ministry of Health has allowed the use of Government subsidies and a national medical savings scheme (MediSave) to pay for the video consultations of regular follow-ups of all approved chronic diseases.

NHS, UK

The National Health Service of the UK has created a digital policy which ensures effective cyber-security in relation to the collection and dissemination of public data, noting the need to respect privacy, promote transparency and maintain ethics. The service additionally delivers digitally scalable and secure services which are reliable and responsive to user needs through their website and app, whilst developing tools and platforms to benefits patients. In 2022, the service also launched a cyber-security toolkit designed to be used by social care organizations across the UK in order to boost knowledge and training about cybersecurity issues. This toolkit included web banners, screen savers and relevant social media graphics.[79]

Public Sector Health Initiative, Pakistan

The government has introduced various e-health policies and programs, such as the Prime Minister's National Health program providing health facilities to underprivileged individuals, which has successfully impacted[80] 3.1 million families in 40 districts who live below the poverty line, by providing them 0.3 million rupees per family per year. The government has also launched personal identification cards which store health histories and patient data, in order to ease the efficiency of doctors and insurers.

Cloud

The cloud refers to servers accessed over the internet and the software and databases on those servers. Cloud servers are located in data centers all over the world. Unfortunately, Pakistan has not been able to fully tap into the potential of this technology, and its adoption of cloud services so far has been largely ad-hoc and siloed. Whilst cloud spending in the Asia Pacifiic region is forecasted to reach USD 200 billion by 2023, growing at a CAGR of 20% from 2018-2024, Pakistan comparatively spends way below ASEAN averages on these services.[81] Indeed, Pakistan has failed to join the Association of Cloud Computing Asia's cloud readiness index, in comparison too regional competitors such as India, Indonesia and Vietnam.[82] Instead, the majority of data centers in Pakistan serve the needs of enterprises, thereby preventing the country from tapping into the perks of cloud computing. To date, the government's efforts at promoting cloud computing include the SBP's circular in 2020 allowing financial institutions to use cloud-based services for non-core business, and the SECP's draft Cloud Adoption Guidelines for Incorporated Companies in 2021 offering instructions to businesses on adopting cloud technologies.[83] Nevertheless, the federal cabinet's introduction of Pakistan Cloud First Policy on February 15, 2022 provides positive encouragement for the future. Introduced by the Ministry of Information Technology and Telecommunication, the aim of this policy is to shift digital services and data of all federal level Public Sector Entities to the cloud. Nevertheless, the risks associated with this venture includes increased likelihood of cyber-attacks, and challenges surrounding data protection.

79. https://digital.nhs.uk/cyber
80. http://digitalpakistan.pk/pdf/d-health.pdf
81. https://web- assets.bcg.com/17/91/e6cd678e4256b635b0c4c29ad127/the-future-of-cloud-in-asia-pacific.pdf
82. https://profit.pakistantoday.com.pk/2022/02/20/is-the-cloud-first-policy-a-step-towards-digitising-the-country/
83. https://www.sbp.org.pk/bprd/2020/C4.htm; https://propakistani.pk/2021/08/02/secp-issues-draft-cloud-adoption-guidelines-for-companies/

Challenges

Fragmented and outdated data management infrastructure	Lack of Flexibility in Data Management	Limited policies and Framework for Data Protection and Privacy	Low Digital Literacy and Lack of Training

Recommendations

The policy framework can be seen as the first step toward developing the Cloud ecosystem, and the introduction of the Pakistan Cloud First Policy is a step in the right direction. However, its implementation is the real challenge. For successful implementation, we put forward the following recommendations:

1. Focus on Whole-of-Government policies and practices

- Devise a wholesome approach toward cloud adoption and organize forums for top leaders within different sectors to discuss craft and implement policies.
- Adopt a proactive approach with a consensus within the Government and tight collaborations among CIOs, finance leaders, and I.T. vendors to assess key bottlenecks regarding data management, data classification, and interoperability between government service platforms.

2. Building a Smart Nations Platform and increasing public trust

- The Government should launch the Smart Nation Platform (SNP), to enable agencies to collect and analyze data from nation-wide sensors, which can allow the government to gain deeper insights for a variety of government services.
- A data governance framework with proper access restrictions and audit trails should be drafted

3. Data portability and consistency

- Internationally recognized standards, best practices, and regional support initiatives that enable data portability and establish consistency across regulatory regimes should be adopted.

4. Support local cloud service providers

- The Government must support local cloud service providers through various subsidies and tax benefits in view the data protection concerns and increased threat of breach .

5. Integration of government databases

- Layout a proper strategy for integrating all government databases to cloud platforms to better analyze the data, ultimately leading to quality enhancement of E-Government services.
- Devise and implement adequate frameworks for security, privacy, and confidentiality.
- Prioritize important departments like NADRA and FBR that possess valuable data that can benefit other government departments.

Smart Nation Platform, Singapore

Singapore's public sector is ploughing ahead with its five-year cloud migration plan, with more than $623.56 million worth of contracts dedicated in 2020 to moving more of its systems over to the commercial cloud. This is primarily due to the following major steps taken by the Government. Singapore has done very well in ICT infrastructure development. On the public front, through e-government initiatives, Singapore migrated many processes that required face-to-face interactions to self-help channels, along with noteworthy adoption of paperless transactions. A key catalyst of cloud computing is the Smart Nation Platform (SNP) involving a nationwide communications and sensor infrastructure. In sum, the Smart Nation Platform is an ambitious example of a comprehensive and massive cloud computing platform that sets the foundation for whole-of-government policy-making and practices. Once the smart nation platform is fully developed, people and businesses will be more empowered through increased access to data, more participatory through the contribution of innovative ideas and solutions, and a more anticipatory government that utilises technology to better serve citizens' needs.

Draft Cloud Policy Proposal, South Africa

The South African government has introduced a draft policy proposal, which includes policy recommendations in relation to cloud computing infrastructure. Primarily, it highlights the establishment of a High-Performance Computing and Data Processing Centre in order to manage the cloud computing capacity of the nation, including its universities and businesses, and to facilitate the use of user-on-demand services for customers. It also makes provisions for data storage architecture, and ensuring the adequate purchase of capacities from cloud service providers. Furthermore, the policy focuses on promoting investment by establishing ICT Special Economic Zones, and notes the investment in data centres will be centralised in large metropolitan areas in South Africa, like Gauteng, KwaZulu-Natal and the Western Cape[84].

E-Commerce

The E-Commerce sector is rapidly evolving in Pakistan, particularly in the wake of COVID-19, as the internet becomes more accessible. Pakistan's eCommerce market is the 37th largest in the world[85]. Accordingly, the COVID-19 pandemic created a stage of hyper-growth for the e-commerce sector, as consumers increased their digital purchases against offline purchasing due to the suspension of business activities and frequent lockdowns. Typically, the E-Commerce sector in Pakistan comprises of a domination of business-to-consumer (B2C) companies, primarily in general e-commerce, groceries and fashion[86]. Notably, start-up funding in Pakistan grew by 355% year-over-year in 2021, with the FinTech and E-Commerce industries accounting for 50% of all transactions registered in 2021[87]. Nevertheless, e-Commerce reflects hardly 1% of the entire retail market of Pakistan, as there is an online penetration rate of only 19%, but the untapped market presents a huge space for further growth[88].

Revenue USD **6** billion in 2021 | Expected Annual Growth Rate **6%** (2022-25) | Projected Market Volume USD **9** billion in 2023

Challenges

Pakistan stands to gain a lot from e-commerce (locally and internationally), but there are some critical challenges to be resolved to realize the true potential of e-commerce. The most critical challenge is limited trust in e-commerce and the absence of institutions and trade bodies to promote and regulate the industry. Lack of trust in e-commerce results in cash on delivery still being the preferred payment method. 95% of e-companies receive payments via cash-on-delivery, disturbing their liquidity and working capital requirements. Further, payment gateways such as PayPal play a key role in e-commerce growth as they allow traders to easily receive money and promote business through trust. However, such services are unavailable in Pakistan due to high costs of entry, money laundering risks, and regulatory uncertainties. Some other challenges of e-commerce include high taxes on a nascent industry, poverty, illiteracy, a lack of adequate infrastructure, absence of online content in regional languages, weak enforcement of consumer protection laws, deception by online sellers, overpriced and faulty products, difficulties in making returns, and poor customer service.

84. https://www.globalpolicywatch.com/2021/11/overview-of-south-africas-draft-national-data-and-cloud-policy/
85. https://www.brecorder.com/news/40170403
86. https://www.dawn.com/news/1660894
87. https://magnitt.com/research/pakistan-2022-venture-investment-report-50801
88. https://ecommercedb.com/en/markets/pk/all

Recommendations

1. Encourage international e-commerce companies to set up regional offices in Pakistan

- To support e-commerce growth, the Government should encourage a diverse mix of international companies (Amazon, eBay, Etsy, AliExpress, etc.) to set up their regional business base in Pakistan. This will encourage other companies to be based in Pakistan and be part of a larger ecosystem of international companies.
- Initiate nationwide trade fairs to promote the Pakistan retail industry and its shift towards eCommerce. Global players should see the scope and benefits of investing in Pakistan.
- Attract sustainable and responsible FDI by providing preferential financing programmes such as grants, loans, financial guarantees, equity participation and private enterprise funds.

2. Support and incentivize E-Commerce:

- Support Amazon sellers through tax subsidies, grants and Government supported incubators.
- Arrange training camps and annual awards programs to promote talent export. Simultaneously, a strict check should be kept on the training camps to ensure the credibility of the trainers and the quality of their training.

3. Support startups and initiatives aimed at digitizing SMEs:

With the help of private partnerships and local startups, the Government should offer:
- Affordable hosting solutions
- Easy template-based website creation
- Sub-domain name site address
- Necessary training and onboarding process with continued support

4. Enhance cybersecurity and increase digital and financial literacy

- Introduce up-to-date cybersecurity laws and regulations and promote the use of encrypted services.
- The Government should play a crucial role in seeing that intellectual property is protected. Innovators need the assurance that their efforts will not go to waste.
- Mandate e-commerce companies to acquire international security certifications.
- In partnership with financcial institutions organize free seminars and webinars to enhance the digital literacy.

5. Improve internet infrastructure to expand access and lower costs

- Invest in projects in partnership with telecom entities to increase connectivity in less developed areas.
- Decrease the cost of the internet by establishing or strengthening internet exchange points (IXPs).
- Incentivize expanding the branchless banking network in rural areas and possibly partner with the Pakistan Post.

Global Example

Supportive E-Commerce Policies, Indonesia

Indonesia stands 9th position in e¬commerce and it has one of the highest adoption rate in the world. According to global data, Indonesia e¬commerce market is $30 billion and it is expected to reach $53.8 billion in 2025 with a CAGR of 23.8%.[109] Online commerce supports 26 million jobs directly and indirectly and it would represent 20% of the total work force.[110] There are five trends that help explain the rapid growth of online commerce in Indonesia: a "mobile-first" market; digitally savvy, young consumers; increasing MSME participation in online commerce; growing investment in online commerce; and supportive government policies (like low tax rates)[89,90].
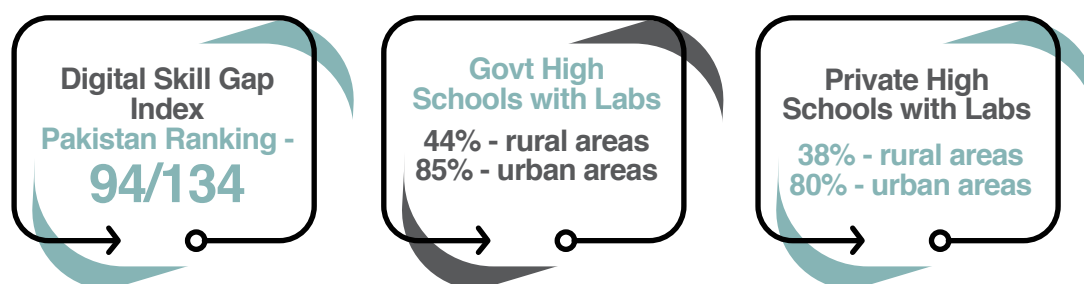
89. https://www.trade.gov/country-commercial-guides/indonesia-ecommerce
90. Indonesia's Online Commerce Journey by McKinsey & Company.

Export of IT and IT-Enabled Services

International trade in digitally deliverable services has been developing rapidly, especially during the COVID-19. Rapid digitalization is generating new business models, radically cutting the costs of trade in services, and offering new opportunities for the international division of labor and wage arbitrage. At present, Pakistan has an annual ICT export of USD 2.5 billion, with the industry maintaining a solid rise of inflows totaling USD 2.6 billion in financial year 2022[91]. Pakistan currently ranks 94th out of 134 countries on the digital skills gap index, well behind comparable nations like Indonesia (47th number) and the Philippines (51st number). Nevertheless, its progress is well ahead in ICT exports in comparison to least developed countries. However, volatility and challenges in domestic stability threaten the competitiveness of ICT exports, and the turn towards a global recession may decrease demand.

Challenges

The lack of effective development and accessibility of technological infrastructure in Pakistan poses a significant challenge in imparting digital skills through schools. Even though the subject of computer science is taught at each level, students cannot gain practical knowledge (digital skills) without using the required infrastructure.[92] This provides a hamper to the future development of ICT products to export, and prevents true scalability of operations. Furthermore, It decreases the amount of labour available with reference to skilled IT professionals, in comparison to the global estimate where there are around 60 million IT professionals. Comparatively, Pakistan should have 1.6 million+ IT professionals adjusting for its population size, however the actual number is about a fifth of that.[93] Further, most of our IT institutes are focused on low-tech IT, including basic apps, programming, web development, computer graphics, SEO, network and security, and social media marketing, among others. Therefore, a nationwide focus should be on providing digital skills through workshops and training in schools and technical and vocational education and training (TVET), along with building the right infrastructure to keep up with the changing and rapidly evolving global demand, especially in a post-Covid world.

Digital Skill Gap Index
Pakistan Ranking -
94/134

Govt High Schools with Labs
44% - rural areas
85% - urban areas

Private High Schools with Labs
38% - rural areas
80% - urban areas

Recommendations

To realize the true potential of the export of IT and IT-enabled services, the following measures are recommended:

1. Training and capacity building

- In collaboration with universities and other educational institutions:
  * Organize training sessions to enhance freelancers' skillsets in terms of quality and variety.
  * Provide scholarships for individuals from rural and less developed areas while organizing awareness campaigns for these areas.
  * Develop an industry-led curriculum and keep it up to date with the latest trends and technologies.
  * To produce more IT graduates to meet the rising demand, set up short programs such as six-month boot camps, one-year diplomas, and two-year industry-focused degrees.
  * Establish IT Incubators (or software parks) in every major university. These incubators should also regularly conduct free marketing, branding, HR skills, business development, and project management workshops for IT professionals, freelancers, and companies.
- Technology parks should be set up in remote areas with access to high-quality internet to develop human capital from rural areas representing more than 60% of the population.

91. https://www.sbp.org.pk/ecodata/ExportsImports-Goods.pdf
92. https://tribune.com.pk/story/2310932/digital-skills-a-necessity-post-covid
93. https://icap.org.pk/files/per/publications/PA/2022/jan-mar/jan-mar-2022.pdf

2. Reduce custom and import duties on computers and laptops

• Importers have to pay 30-40% additional duty to import used computers, laptops, etc. Resulting in extremely high market prices3. There's a need to reduce this duty to make computers and laptops more affordable for the masses.

3. International PR

• Create an online database of all freelancers and IT companies, and market them aggressively on social media platforms to become visible globally
• Hire an international PR company to improve country perception and marketing.
• Overseas Pakistanis with exceptional marketing skills and PR networks can be appointed as 'IT ambassadors' in top technology hubs worldwide and assigned to seek business for our companies.
• Train Pakistan's commercial counselors in overseas diplomatic missions on the new brand positioning.

4. Innovation grants and other incentives

• Incentivize and support research and development (R&D) in software development, big data, AI, ML, Blockchain, etc., to make Pakistani talent stand out in the world.

5. Promote the role of women in export

• Provide scholarships and grants to women in the development of ICT companies and products, and encourage more women to join university courses related to ICT
• Utilise media in publicizing the success of female exporters
• Develop women-specific resources guides

Global Examples

Austrade, Australia

The Australian Trade Commission (Austrade) which is the Australian Government's trade and investment development agency has historically provided tailored support for women in business particularly those involved in exporting and international business. Since the late 1980s, the organization has been key in running events for women involved in exporting, and launched a formal "Women in Export" program which increases business awareness of women's efforts and assists them in becoming sustainable exporters. It does so by identifying women active in export and using media to publicize their success, in addition to developing women-specific resource guides, organizing women's trade missions abroad and encouraging them to export[94].

Supportive Policies, Philippines

The Philippines sells itself as global hub for business process outsourcing and has an ICT services export of USD 6.3 billion in 2021 despite having only half the population size compared to Pakistan. The high growth of ICT services exports is achieved by the following strategies: Through providing an income tax exemption for 2 years and preferential treatment afterwards, providing grants and financial support for research and development (R&D), and market validation through IT focused educational policies and curriculum. It additionally promotes the duty-free import of several IT products including computers, and network equipment[95].

Overall Start-up Ecosystem and the Role of Accelerators and Incubation Programs

The rise of Pakistani startups has been exponential. With nearly USD 350 million in investments and a total of 83 deals, Pakistan experienced a 355% growth in investment value and 63% in the number of deals since 2020. Accordingly, V.C. funding in Pakistan as a percentage of GDP grew 10x faster than the MENA startup ecosystem over the last 3 years and is now at parity. Furthermore, Pakistan has moved up the ladder to 75th position worldwide and 2nd in the South Asian region for its startup ecosystem[96]. These strides can be accounted for by new initiatives from the SBP which introduced legal frameworks for EMIs, from the SECP which established legal definitions for startups, and from the federal government's establishment of Special Technology Zones[97]. Furthermore, the government's support for the National Incubation Center and the HEC's Business Incubation Center policy have allowed incubators to expand, whilst the private sector through Telenor Velocity, Jazz XLR8 and Invest2IInnovate have provided accelerator labs.

Challenges

A detailed understanding of the challenges of the startup ecosystem is important as it impacts other verticals and has the potential to be the game changer in Pakistan's economy with job creation, increases in exports, and foreign direct investments (FDI). Despite some promising movements, the entire ecosystem is marred by an uncoordinated regulatory environment, red tapism, challenging KYC requirements for foreign inflow/outflow, complicated taxation, limited access to high-quality talent, stiff laws for repatriation funds, lack of incentives (like tax deferrals, subsidized loans), and very few exit routes. These factors discourage V.C.s from investing in Pakistan and they resultantly ask the startups to have "HoldCos" in countries like Singapore and Dubai, leading to more challenges for the ecosystem[98]. As a result, low levels of funding are available to startups. For instance, the National Incubation Center (NIC) takes 5% of equity without injecting capital. Startups also have limited options for local investor networks, as there are more international investors (37) than local angel investors (11), with financial capital for later-stage rounds is scarce due to a lack of investors willing to invest at those stages. Accordingly, most deals in 2021 were at the pre-seed stage ($32m raised across 14 deals) and seed stage ($123m raised across 46 deals). A key further challenge to note is that universities and incubators do not adequately prepare students and graduate for entrepreneurships, thereby impacting the success rates of these ventures. Furthermore, the advance of a global recession poses a key challenge to the startup ecosystem, with previous near-unicorns such as Airlift shutting down operations.

Recommendations

What happened in China, USA, and Indonesia has started to happen in Pakistan, only faster. The wheel has started turning now but to keep it moving, the following measures are recommended:

1. Regulatory and tax framework for startups

• The Government should play a more proactive role by providing tax deferrals or exemptions for early-stage startups to facilitate their operations and help them grow faster.

• Reduce the regulatory hurdles in the rules governing mergers and acquisitions, remittance of funds, KYC requirements, and taxation for foreign investors, giving them the confidence and certainty of smooth operations and exit.

2. Partner local banks with foreign investors

• Partner local banks should be encouraged to open their operations with HoldCo's foreign banks. After one-time approval from SBP, other regulatory requirements must be relaxed to ensure a smooth flow of funds between the countries.

94. https://www.apec.org/docs/default-source/Publications/2009/12/Public-Policies-to-Promote-Women-Entrepreneurs-Project-Cases-of-Australia-Canada-Chile-and-Peru-Augu/09_gfpn_publicpolicies.pdf
95. https://www.pasha.org.pk/pashapk/Policy-Comparative-Analysis-by-P%40SHA.pdf
96. https://www.techjuice.pk/pakistans-startup-ecosystem-rises-to-second-position-in-south-asia/
97. I2i 2021 Pakistan startup ecosystem report
98. Ibid

3. A sustainable model to encourage private investment from expats

- A transparent, digital model should be developed that provides expats the access to invest in local startups incubated in the National Incubation Center (NIC) needs to be created.
- NIC can maintain a database and digital portal of such startups open to funding and connect them with expats.
- SBP may also coordinate to streamline the funding flow and make the KYC and necessary legal requirements easier and simpler.

4. Create a one-window operation

- The Government should create a one-window operation, especially for foreign investors, a web-based One Customs (WeBOC) platform that deals with all the legal filings. This one-window operation could help solve the bottlenecks and red tape faced by a foreign investor before investing in the startups in Pakistan.

5. Promote female startups and bridge the gender gap.

- Formalized diversity and inclusion training should be provided to V.C.s that addresses common gender biases that prevent V.C.s from investing in female founders.
- The Government should also start incubators and accelerator programs for women with special grants.

6. Creating sector-specific programs

- The Government needs to build sector-focused specific programs and grants that address companies' unique needs, like an incubation center for Fintech, blockchain, e-commerce, digital payments, etc., just like the USA, China, and other countries.
- Industry-academia linkages should be made strong, and HEC, SECP, and NIC should play an active part where research and data-oriented approach is adopted for startups.

Global Examples

Government Incentives, United States

The United States, is home to more than 70,000 startups, creating more than 3 million jobs in 2020, and had more than 14,400 VC funded startups. In 2021, VC funds closed topped $100 billion, VC investment into startups surpassed $330 billion, VC-backed IPOs raised more than $500 billion, and disclosed VC-backed mergers and acquisitions exceeded $100 billion. For the growth of the startup industry, US Government took the following initiatives – it instituted federal and local grants providing funding of up to $2 million with few strings attached (no equity) to bring your idea to life from The Small Business Innovation Research (SBIR) Program. It permanently eliminated the Capital Gains Tax on Certain Small Business Stock, whilst providing tax incentives for startups that have commenced operations and are incurring payroll and R&D expenses, the Internal Revenue Service (IRS) offers up to $250,000 tax credits annually. Across the US, states and local authorities also offer financial support in form of tax and other incentives to attract and retain startups. For instance, California offers tax incentives in different forms, loans and business development support. Similar initiatives are available across the entire country to help entrepreneurs start and scale[99].

J-Startup, Japan

The Japanese government initiated a program for startups called "J-Startup," intending to attract and incubate internationally competitive and winning startups in order to continue their staying in Japan. The program encouraged private sectors to support the establishment of startups and SMEs, by providing business spaces and referring the startups to its customers and related companies. The government committed to welcoming these startups on overseas missions led by ministers and other government officials, whilst publicizing their successes on the dedicated websites of domestic and overseas media outlets[100,101].

99. prnewswire.com
100. https://www.adb.org/sites/default/files/publication/668331/adbi-wp1206.pdf
101. https://www.j-startup.go.jp/en/about/

Emerging Web 3.0 Technologies

In the past few years, Pakistan has accelerated the digital revolution with various initiatives from the public and private both. While this has helped Pakistan in adopting the technologies that are fairly developed and have achieved mainstream adoption in the developed countries, it is also important to note that the world is now rapidly shifting towards Web 3.0, and this presents a once-in-a-lifetime opportunity for Pakistan to capitalize on this movement and bring the nation out of its current economic turmoil. Web 2.0 and Web 3.0 refer to successive iterations of the web, compared with the original Web 1.0 of the 1990s and early 2000s. Web 3.0 represents the next iteration of the World Wide Web based on blockchain technology, incorporating concepts such as decentralization and token-based economics.

Being one of the youngest countries on Earth, Pakistan enjoys a great opportunity to capitalize on Web 3.0 technologies. This talent has made Pakistan one of the world's largest freelancing markets, boosted its I.T. exports, and attracted global investors to the country's startup ecosystem.

Pakistan must realize the importance of policymaking and regulation that encourages innovation and investment in this space. The Government must seize this opportunity for its transformational impact on the Country's economy, society, and demographic youth dividend.

This section analyzes some of the leading Web 3.0 technologies and their potential for Pakistan and provides recommendations to realize this potential.

Blockchain

Blockchain is a shared, immutable ledger that enables and records transactions between two parties without needing a centralized authority acting as a trusted third party. While worldwide spending on blockchain technology reach $6.6 billion in 2021, the global market size is expected to reach $67.4 billion by 2026 and is expected to grow at a rate of 85.9% from 2022 to 2030[102]. In 2019, Pakistan approved the first use of blockchain technology by Telenor Microfinance Bank in order to attract remittances from Malaysia, allowing the country to meet its digital and financial goals[103]. The scope of the applications of blockchain technology ranges from the financial field (digital currency, cross-border remittance, crowdfunding) to many non-financial applications, including medicine (electronic medical records), supply chain (logistics tracking), agriculture (food production and sales, food safety resume), digital rights (copyright authorization, art product authenticity verification), public management (electronic voting, identity verification), etc. Blockchain also has the potential to immensely improve the quality of public services. For instance, it can facilitate the Government with a digital identity mechanism providing a comprehensive national database and storing citizen information (such as birth certificate details). This will significantly reduce labor-intensive processes and costs and instill fool-proof accountability mechanisms.

Challenges

The present regulatory landscape in Pakistan is not conducive to the development and proliferation of blockchain technologies. Whilst the central bank did approve the first use of blockchain technology in 2019, given the inter-connectedness of blockchain technology to crypto-currency, the SBP's recommendation to ban the latter does not provide an encouraging environment. The absence of any specific regulations on blockchain also provides a challenge, as this is a complex and fast-developing technology requiring policies and recommendations recommended by experts, rather than offering simplistic recommendations[104]. Beyond an absent and disincentivizing regulatory environment, the development of blockchain technology is also hampered by supply constraints, as large amounts of power are required to operate graphic processing units, with increasing demand for these units causing a price surge which consumers have to pay the brunt for[105].

Recommendations

Taking advantage of this opportunity requires a concerted effort to train talent and build an enabling environment built upon a regulatory framework biased toward innovation and entrepreneurship. We recommend the following steps from the Government to capitalize on the opportunity provided by blockchain:

1. **Government policy**

• Develop a separate blockchain policy to derive its mainstream adoption in coordination with private sectors, I.T. leaders, industry experts, and regulators.

2. **Talent nourishment**

• Initiate (in public-private partnership initiatives) education and training support at all levels.
• Consideration is to be given to including technologies like blockchain, ML, AI and Big Data in the curriculum.

3. **Awareness campaigns**

• Hold seminars, conferences, training, and other awareness campaigns to educate the SME sector about the potential of blockchain.

4. **Investments in blockchain startups**

• Support blockchain startups through investment, grants, and subsidies and create an enabling environment for these to thrive and innovate.

102. https://findstack.com/blockchain-statistics/
103. https://www.thenews.com.pk/print/752179-blockchain-for-pakistan
104. https://www.dawn.com/news/1669922
105. https://lahoreschoolofeconomics.edu.pk/EconomicsJournal/Journals/Volume%2024/Issue%201/05%20LJE01%20Afzal%20ED%20AAC%20ttc.pdf

5. Research and development (R&D)

• Issue R&D grants to explore the potential of blockchain digital technologies (especially in the public sector).

6. Taxation

• Tax exemptions and exemptions for specific projects, research and development tax credits; indirect taxes and payroll taxes; and personal allowances can encourage more blockchain-based innovative startups.

Global Examples

Blockchain Conducive Environment, UK

As of 2021, approximately 18 industries are using or developing blockchain technologies in the UK, with there being more than 520 blockchain-specific companies with investors having invested more than £1.6 Billion. Accordingly, the UK is the second highest country in the world possessing the most amount of blockchain-based businesses, with the government itself introducing Blockchain-as-a-Service (BaaS) under its "Innovate UK" program, to compensate student loan and welfare checks. The UK has a blockchain innovation system which makes the most of talent nourishment by cultivating a science system in universities, research bases and the education system. It mixes industry, finance and talent systems with relevant Blockchain related think tanks and event companies, facilitating partnerships and a close network, thereby leapfrogging development[106,107].

Binance Blockchain and Cryptocurrency Awareness Tour, Africa

In June 2022, Binance introduced its fourth Blockchain and Cryptocurrency Awareness Tour in Africa on the theme of the Digital Economy. The tour was aimed at spreading education and awareness about blockchain and driving

2010-2020 has been the decade of blockchain and the future looks even more bright. At the global level, it's predicted that by 2025, blockchain will add business value worth over $176 billion, which would further increase to $3.1 trillion by 2030. These numbers reveal that blockchain technology has limitless potential in Pakistan.

crypto adoption in Africa. As a result, the goal of the program is to empower millions of people across the continent through the promotion of blockchain networks and education. Traveling through Nigeria, Uganda, Ghana and Cameroon, the tour assists individuals in understanding the definition of blockchain and crypto, introducing them to NFTs, SocialFi, Play2Earn and the Metaverse, whilst informing them of potential career opportunities within this domain. Since its inception in 2019, the tour has reach over 60,000 Africans[108].

Prominent Blockchain applications in Pakistan

Telenor Microfinance Bank's blockchain-based cross-border remittance service :

A real-time money transfer enabling instant and secure transactions and aiding to fight the illegal Hundi system. It has the potential to streamline the way international remittances (which currently stand at around $20 billion per year which contribute over 6% to GDP) are received in Pakistan[109].

DAO Proptech:

The first block-chain based platform in Pakistan that allows users to buy, sell and transfer property digitally with speed and security. The Company is increasingly gaining popularity and has the potential to revolutionize the legacy real estate market of Pakistan[110].

Liber Health:

A blockchain based patient identity network which uses patient biometrics for identification and health data linkage. The platform saves doctors' time especially in emergencies, prevents medical errors caused by patient misidentification and deters fraud and identity threats[111].

106. https://www.blockchain-council.org/blockchain/top-10-countries-leading-blockchain-technology-in-the-world/
107. https://analytics.dkv.global/Blockchain-in-the-UK-2021/Full-Report.pdf
108. https://www.binance.com/en-NG/blog/all/binance-kicks-off-blockchain-and-cryptocurrency-awareness-tour-across-africa-421499824684903836
109. https://www.pri.gov.pk/telenor-bank-introduces-blockchain-remittances/
110. https://daoproptech.com/
111. https://devpost.com/software/liber-health

Digital Currencies

Digital currency is any form of currency that exists digitally or virtually and uses cryptography to secure transactions. Despite no regulations, crypto adoption is on the rise in Pakistan, and its status dangles between it being legalized with proper regulatory and taxation frameworks like those done in Bahrain, Canada, Australia, Mexico, USA, U.K., etc. A report by the Federation of Pakistan Chambers of Commerce and Industry indicates that ownership of cryptocurrencies in Pakistan amount to $20 billion, doubling that in foreign reserves in the SBP. Accordingly, Pakistan is ranked 3rd in the Global Crypto Adoption Index 2020-21 – just behind Vietnam and India, having the highest recorded growth in cryptocurrencies – expanding at 711% – over the period 2020-21[112].

To counter the rising demand for digital currencies, governments worldwide are experimenting with central bank digital currencies (CBDCs). Central Bank Digital Currency (CBDCs), backed by a government and controlled by a central bank, would provide households, consumers, and businesses with a stable means of exchanging digital currency. CBDCs also provide a country's central bank with the means to implement monetary policies to provide stability, control growth, and influence inflation. Digital currency is not only vital but will be a major player in the economy of Pakistan. If cryptocurrency is fully embraced in Pakistan, it can lead to high economic growth. Pakistan could generate at least $100 million in taxes in one year — or Rs. 20 billion — by just legalizing the crypto trading in Pakistan on top of employment generation, saving millions in transaction fees, and better-controlling money laundering and other illegal activities done through cryptocurrency is untraceable.

Challenges

In 2018 and 2020 the State Bank of Pakistan (SBP) and the Securities & Exchange Commission of Pakistan (SECP) decided to refrain all banks, DFIs, payment system operators and payment service providers from processing, using, trading, holding, transferring value, promoting, and investing in virtual currencies and tokens on the ground that it could invite the ire of the International Monetary Fund and the Financial Action Task Force[113]. Such declaration was made on different grounds, including potential use in illegal activities, risk of widening of grey economy, promotion of capital outflow, and capital volatility. Furthermore, digital currency markets are highly speculative and face the risks of financial fraud, illicit financial flows and perceived use by terrorists[114]. A general lack of awareness and low literacy rates in Pakistan opens up different avenues for fraudsters to lure a common man into crypto schemes for promises of ultra-high returns. Thousands of Pakistanis lost life savings in a $100 million cryptocurrency scam, Pakistan's Federal Investigation Agency (FIA) revealed in January 2022, with investigators estimating that some 37,000 people, mostly from middle-class households, had been defrauded after investing money in a scheme which promised to multiply funds.

Recommendations

1. Development of regulatory framework

- Development of facilitative regulations to promote investment and subjecting the crypto exchanges operating in the country to anti-money laundering (AML) and know-your-customer (KYC) protocols.
- Legal authorization of Licensed banks, registered money transfer agents, and trust companies to issue stable coins subject to strict compliance requirements.

2. National cryptocurrency strategy

- Develop national cryptocurrency strategy to officially adopt the ecosystem at the earliest to safeguard the economic interest and minimize vulnerabilities to the new system, considering cyber security and other fraudulent activities.
- Work with experts and relevant stakeholders to develop a Central Bank Digital Currency as declared by the SBP to achieve by 2025.

112. https://moderndiplomacy.eu/2022/06/02/the-regulatory-cryptophobia-of-pakistan/
113. https://propakistani.pk/2022/06/15/pakistan-can-no-longer-be-policy-neutral-on-cryptocurrency-regulations/
114. https://moderndiplomacy.eu/2022/06/02/the-regulatory-cryptophobia-of-pakistan/

3. Taxation

- Require cryptocurrency exchanges to be registered and integrated with the Federal Board of Revenue (FBR) system to bring cryptocurrency transactions under the tax net.
- The Government should impose an adjustable advance tax of 1-2% on cryptocurrency transactions.

4. Provide a conducive environment to encourage foreign investments

- With proper regulations, leading cryptocurrency exchanges like Binance and Coinbase can be invited to become licensed in Pakistan. This will boost foreign direct investment and help better regulate the exchanges.

5. Awareness campaigns

- Awareness campaigns could educate the masses on the risks of investing in cryptocurrency to enable more informed decisions.

Global Examples

Digital Yuan, China

China has advanced the furthest towards a fully-fledged CBDC with its digital yuan. The digital yuan is China's electronic currency, also known as e-CNY or e-RMB designed to replace the cash and crypto coins. Now, China is ramping up efforts to roll out the digital yuan to the broader population, as the country's technology giants like Alibaba and Tencent jump on board. This adoption will push the demand and soon e-CNY will be replacing legacy payment systems to bring more efficiency, transparency and security in banking and payment transactions. This thus suggests the need for Pakistan to join the revolution and create its own CBDC[115].

Stable Coin Bill, Japan

Japan has passed a new stable coin bill, which aims to curbing financial risks and safeguard investors of stablecoins, which have a combined market value around $159 billion. Under the new law stablecoins can be issued by licensed banks, registered money transfer agents and trust companies subject to a registration system and anti-money laundering measures. This stresses the need of the hour for clear regulations on stablecoins[116].

Benefits of regulating digital currencies in Pakistan

Taxes:

- The government could gain knowledge of all the transactions happening on crypto exchanges and take steps to eliminate the movement of illegal money, transfers, or cash changing hands and monitoring the crypto exchanges.

Security:

- If international remittances are allowed through crypto, Pakistan could save millions on banking fees on top of transactions being processed way faster. El Salvador, for instance, saved more than $400 million in remittance fees just last year.

Save millions in international remittances fee:

- If the government allows exchanges and cryptocurrencies to be set up in the country, there could be tons of interest from foreign investors in the power sector, blockchain-based projects, crypto mining industry and even some futuristic initiatives that could revolutionize the country.

115. https://thesvi.org/artificial-intelligence-in-south-asia-and-implications-for-pakistan/
116. https://www.forbes.com/sites/martinboyd/2022/05/16/regulating-the-metaverse-can-we-govern-the-ungovernable/?sh=1349418f1961

Artificial Intelligence, Non-Fungible Token and the Metaverse

The global AI market is expected to increase its revenue from USD 5 billion in 2015 to over USD 125 billion in 2025. Noting the significance of AI, Pakistan has created initiatives such as the "Presidential Initiative for Artificial Intelligence and Computing", "National Center of AI and the Department of Robotics and Intelligent Machine Learning" in NUST in order to reshape Pakistan's approach to the development of this technology[117]. Non-Fungible Tokens (NFTs) are unique cryptographic tokens that exist on a blockchain and cannot be replicated. NFTs are made from almost anything unique that can be stored digitally and holds value. They are like any other collector's item, like a painting or a vintage action figure, but instead of buying a physical item, you are instead paying for a file and proof that you own the original copy.

The Metaverse is a massively scalable, persistent network of interconnected virtual worlds focused on real-time interaction where people can work, socially interact, transact, play and even create. It uses advanced virtualization and technologies (Augmented Reality, Virtual Reality, Haptic Sensors, etc.) to fully immerse the user into the virtual world. It can transform every aspect of our lives, both in our professional and personal spheres. Pakistanis have got amazing potential in the NFT and metaverse industry. Recently, a Pakistani NFT project, "The Merge," has just generated USD 91.8 million on the Nifty Gateway, the world's top NFT marketplace. Further, like cryptocurrencies, there is a rapidly growing interest in investment in metaverse real estate.

The future of AI, NFTs and Metaverse in Pakistan can be bright. The evolution of the internet is a tremendous economic opportunity for Pakistan, and developing an enabling environment can create millions of new jobs, open new avenues for upward social mobility, and generate wealth for countless households across the Country. In addition, excelling in this emerging Internet economy can help Pakistan leverage its talent to generate significant export revenues. Pakistan must take a deeper effort to train the population on the importance of the Metaverse; many innovators and I.T. professionals can help make the process easier. Information Technology opened up roles for professionals willing to use diverse tools and their skills for the betterment of the world. There will be more premium live event experiences that will make it easier to find your favorite entertainment. There will also be a greater connection, information sharing, and content development pathways.

1. Introduce regulations for NFTs:

• Introduce regulatory licenses to facilitate NFT trading Subject NFTs to anti-money laundering regulations if they fit the definition of a virtual currency.
• Require advertising companies to make it clear to consumers that they are purchasing NFTs, whilst sufficiently informing consumers of risks of purchasing NFTs.

2. Create an AI policy to supplement human development and decision making with the help of advanced algorithms:

• Promote talent nourishment and nurturing in order to attract more employees, and decrease unemployment rate.
• Foster the nascent AI research and development ecosystem by facilitating of public-private partnerships to create synergies between research bodies and enterprises.
• Require companies using high-risk AI systems to introduce and implement risk-management systems, have technical documentation and have transparency measures to inform risks to customers.

3. Create Metaverse Standards:

• Introduce KYC requirements requiring metaverse users to acknowledge and verify their real-world identity, and institute a detailed and robust process for protecting against human rights abuse online and protecting minors.
• Introduce digital safe spaces to promote mental health and wellbeing, and utilize AI tools to monitor addiction and PTSD[118].
• Ensure companies have existing intellectual protect rights to use any content developed by third parties.

117. https://assets.innovazione.gov.it/1637777513-strategic-program-aiweb.pdf
118. https://www.natlawreview.com/article/nft-collection-brave-nft-world-regulatory-review-nfts-part-2

Global Examples

Strategic Program on Artificial Intelligence, Italy

To date, Italy has the most comprehensive plan on Artificial Intelligence. Published in 2021, its Strategic Program on Artificial Intelligence outlined key themes which the country should follow. Firstly, the plan promotes the nurturing of talents and fostering its AI research and development ecosystem. Italy intends to promote its companies as leaders within the field of research, development and innovation and suggests the facilitating of public-private partnerships in order to create synergies between research bodies and enterprises. Furthermore, the policy intends that all AI should be human-centered, trustworthy and sustainable. Accordingly, it should align with the SDGs and be built in a responsible and transparent manner based on trust and robustness. It suggests that the government should actively use AII as well, whilst governing it and mitigating its potential risks[119].

Virtual Asset Enhancement Proposal, UAE

Within the United Arab Emirates, the Abu Dhabi Global Market has recently published consultation papers titled "Proposals for enhancements to capital markets and virtual assets in ADGM". Within these sets of proposals, the ADGM notes that companies will need licenses from the free zone's regulator in order to facilitate their NFT trading. Furthermore, this proposal notes that NFTs may be subject to crypto-asset regulations, and that depending on the nature of the asset, NFTs may trigger compliance with the ADGM's anti-money laundering and sanction rules[120].

Brands that have dipped their shoes into the NFT world

NFTs are bigger than digital art:

Digital art collections have made NFTs famous but NFTs are much large than digital art. Some of the use cases include:

1) NFTs can be used to ensure that the product you are purchasing is authentic

2) NFTs and real estate are made for each other. NFTs could be used to transfer land deeds, provide proof of ownership and even keep track of changes in property value over time using timestamped NFTs

3) NFT ledgers can store an individual's medical records without compromising confidentiality or risking tampering from external sources

4) NFTs are great for protecting intellectual property and patents.

5) NFTs are also a good way to represent academic credentials. NFTs can provide proof of attendance, degree earned, and other important information which will be stored on the NFT chain that cannot be altered or hacked into.

119. https://www.dawn.com/news/1690550
120. https://www.mondaq.com/privacy/1005646/data-privacy-comparative-guide

Potential of Metaverse:

Healthcare

The healthcare industry will be impacted, with doctors having virtual consultations with the patients on minor issues.

Travel and tourism

The metaverse will help in virtual travel, tourism, and recreation. People will be able to travel virtually to any of their destinations. People will also be able to make money in a virtual social economy – through blockchain, cryptocurrencies, and NTFS.

Online shopping

Metaverse will continue growing the industry once it is adapted fully by everyone to reduce the hustle of physical shopping.

Manufacturing

Metaverse will also impact the manufacturing industry because of the introduction of virtual simulation. This will ease the production process. There will be many virtual factories, and this will make the operations easier to partake in.

Gaming and entertainment

The gaming and entertainment industry will be greatly impacted by the introduction of virtual games. There will be 3D avatars, world- building, and other immersive features. Media and entertainment will also grow in various ways.

Engineering industry and NFTs

The engineering and architecture industry will also be impacted as professionals will be needed to design the cities, buildings, real estate, and much more. Hugely, there will also be monetization of some digital assets through NFTs (Non-fungible Tokens).

Education

The education system will be greatly impacted. Students won't have to learn about historical events in theory books, but also through seeing the live events.

Digital Regulations

At present, Pakistan currently has a nascent legal landscape in relation to digital regulations, despite the fact that technology is becoming a central part of every-day life, and requires the government to anticipate its incursions and developments into different sectors. Most of these sectors, in comparison to their regional and global rivals, are at a nascent stage. Nevertheless, this provides a perfect opportunity for the government to step in and take its cue from existing global regulations to ensure the successful development of new digital industries, whilst ensuring they are based on the principles of promoting individual rights. With regards to cyber-crime, the existing Electronic Transactions Ordinance (2002) stipulated provisions for the violation on privacy, which was repealed by the 2016 Prevention of Electronic Crimes Act.

Nevertheless, cyber-crime and harassment have been increasing in recent years, especially targeting women in particular[121]. This is particularly problematic, considering the absence of a data privacy regime in Pakistan's legal landscape, as it directly impacts the success of all facets of technological innovation explored in this report[122]. SBP has made significant efforts in promoting and developing the digital financial sector, particularly through the recent regulatory framework on digital banking. However, their "one-size-fits-all" approach primarily favors large institutions as small institutions find it difficult to meet the restrictive regulations[123].

121. https://pdf.usaid.gov/pdf_docs/PA00X9F9.pdf
122. https://www.ofcom.org.uk/__data/assets/pdf_file/0021/192243/drcf-launch-document.pdf
123. https://ogletree.com/international-employment-update/articles/july-2020/philippines/2020-05-26/safe-spaces-act-increases-protections-against-sexual-harassment-online-and-in-workplaces-in-philippines/

Recommendations

While sector specific regulatory recommendations are already covered, overarching regulatory recommendations are listed below:

1. Promote greater awareness surrounding the existence of laws such as PECA

- An effective digital harassment policy is necessary to ensure women's online safety. It is also necessary to promote existing laws in order to ensure citizens are aware of their rights. This can be achieved through collaboration with digital rights NGOs.

2. Improved regulatory framework for Fintechs

- More flexible and 'fintech-enabling' principle-based and data-centric approaches must be adopted to form new regulations.
- Simplify and digitize the regulatory framework with more representation from tech industry.

3. Ensure coordination amongst regulators

- Improve access of regulators to accurate data, and promote effective coordination amongst different regulators and government departments
- Pool knowledge and resources in order to ensure that all departments and regulators have the necessary skills, expertise and tools needed to perform their tasks[124].
- Anticipate future developments in the digital space by developing a shared understanding of emerging digital trends, whilst keeping up-to-date with global and regional regulations on developing technologies.

Global Example

Safe Spaces Act, Philippines

On Aug. 14, 2009, the Philippines introduced the Safe Spaces Act, which nationally applies the provisions of the Convention on the Elimination of All Forms of Discrimination Against Women. The act covers all forms of gender-based sexual harassment (GBSH) committed in public spaces, particularly online as well. The Philippines has also adopted the Philippine Commission on Women (PCW), which leads the national gender mainstreaming strategy. Since 2012, the Commission has served to provide capacity-building support for gender and development (GAD) programs and advocate for the acceptance of more gender-responsive development assistance projects[125,126].

124. https://www.ofcom.org.uk/__data/assets/pdf_file/0021/192243/drcf-launch-document.pdf
125. https://ogletree.com/international-employment-update/articles/july-2020/philippines/2020-05-26/safe-spaces-act-increases-protections-against-sexual-harassment-online-and-in-workplaces-in-philippines/
126. https://opinion.inquirer.net/155740/thirteen-years-of-the-magna-carta-of-women

Conclusion and Summary of Recommendations

As the development of technologies and digital services changes the foundations of the global and national economy through incorporating a digital element, it becomes clearer and more necessary to develop regulations, policies and recommendations which keep pace with the fast-changing nature and development of new technologies. With the growing impact of external variables such as geopolitics and the lingering impacts of the COVID-19 pandemic, it is clear that the digital revolution, inasmuch as it creates its own unique challenges, offers the potential for a revolution for the Pakistani economy.

This report has attempted to provide a holistic and overarching overview of the multiple and varying facets of technologies, their uses and consequences on the economy. Its recommendations span the topics of digital infrastructure and connectivity, government, private sector and mass digital use cases and emerging web 3.0 technologies. It is important to note that whilst the government has taken massive steps to develop the digital ecosystem in Pakistan, and position it as a key player in the region, there is considerable room for improvement across all sectors mentioned. As such, an underlying theme and vision for the government's digital goals should be to promote development and financial inclusion, particularly keeping in line with the Sustainable Development Goals.

The following table presents a summary of the key recommendations highlighted throughout this report:

Policy Area	Recommendations	Ministries/ Participants	Time Frame
Digital Infrastructure & Connectivity			
Fiber Optic	1. Invest in optic fiber to improve connectivity. 2. Better utilization of the Universal Services Fund. 3. Reduce taxes on optic fiber, broadband users, and USF funding. 4. Financing schemes & incentives to encourage local production.	MoIT, SBP, MoF, PTA	6 months
Handset/ Smartphones	1. Local manufacturing of mobile phones. 2. Public awareness to improve the gender gap. 3. Pre-loaded applications on locally manufactured smartphones. 4. Reduction in tax on low-cost smartphones. 5. Devise a mechanism to encourage smartphone financing.	MoF, FBR, Provinces	1 year
Internet, Spectrum & Landing Stations	1. Improvement in internet security, the local language, and digital literacy. 2. Focus on expanding 4G for all instead of 5G for few. 3. Expand the existing infrastructure. 4. Increase affordability. 5. Auction at reduced prices for infrastructure development. 6. Allocate more spectrums for internet usage. 7. Install more submarine cables for growing demand. 8. Introduction of strict policies and penalties for protecting underwater cables.	MoIT, PTA	3 year
Data Centers	1. Incentivize investment in data centers. 2. Task force to facilitate setting data centers. 3. Development of skilled labor workforce. 4. Increasing cyber-security of data centers.	MoIT, Planning Ministry	3 years

Policy Area	Recommendations	Ministries/Participants	Time Frame
Government, Private Sector and Mass Digital Use Cases			
E-Governance	1. Improve the efficiency and efficacy of e-government services by investing in human capital. 2. Improve consumer access to e-government services. 3. Provide sufficient funds to develop infrastructure, whilst keeping prices of services affordable. 4. Ensure stable access to the internet, whilst promoting effective cyber-security measures. 5. Create a centrally-connected and capable network infrastructure.	MoIT, Ministry of Interior, Provincial IT Boards, SBP	1 years
Digital Financial Services & FinTech	1. Tax incentives for merchants to adopt electronic payments 2. Improved regulatory framework 3. Creating an environment for Fintechs to work independently 4. Expedite establishing Fintech facilitation center 5. Incentivize financial inclusion	MoIT, MoF, SBP, Provincial Government	2 years
AgriTech	1. Farmers' digital education program 2. Incorporating agri-entrepreneurship courses in agricultural education 3. Launching low-interest loans for farmers 4. Dedicated cell for agritech startups 5. Building incubation support for rural Pakistan	MoIT, MoF, SBP, Provincial Government	2 years
EdTech	1. Phased-wise digitization of the education sector 2. Awareness campaigns 3. Capacity building 4. Financial support	MoIT	2 years
HealthTech	1. Leadership and prioritization by the Government 2. Phase-wise approach 3. National electronic health record with better data security `	MoNHSRC, Provinciial Health Departments, MoIT	3 years
Cloud	1. Focus on Whole-of-Government policies and practices 2. Building a Smart Nations Platform and increasing public trust 3. Data portability and consistency 4. Support local cloud service providers 5. Integration of government databases	MoIT, NADRA, FBR	2 years

Policy Area	Recommendations	Ministries/Participants	Time Frame
Government, Private Sector and Mass Digital Use Cases			
E-Commerce	1. Encourage international e-commerce companies to set up regional offices in Pakistan. 2. Support and incentivize E-Commerce. 3. Support startups and initiatives aimed at digitizing SMEs. 4. Enhance cybersecurity and increase digital and financial literacy.	MoIT, PTA, SBP	2 years
Export of IT and IT-enabled Services	1. Training and capacity building. 2. Reduce custom and import duties on digital tools. 3. Build international PR. 4. Innovation grants and other incentives. 5. Promote the role of women in export.	Planning Ministry, MoIT, MoC, MoF, SBP	1 years
Overall Startup Ecosystem and the Role of Accelerators & Incubation Programs	1. Regulatory and tax framework for startups. 2. Partner local banks with foreign investors. 3. A sustainable model to encourage private investment from expats. 4. Create a one-window operation. 5. Promote female startups and bridge the gender gap. 6. Creating sector-specific programs. 7. Local investors to create synergies with international growth funds. 8. Centralized databases to speed up the verification process.	Planning Ministry, MoIT, MoC, MoF, SBP	1 years
Emerging Web 3.0 Technologies			
Blockchain	1. Supportive Government policy. 2. Talent nourishment. 3. Awareness campaigns. 4. Investments in blockchain startups. 5. Research and development (R&D). 6. Taxation.	MoIT, SBP	2 years
Digital Currencies	1. Development of regulatory framework. 2. National cryptocurrency strategy. 3. Supportive taxation policy. 4. Provide a conducive environment to encourage foreign investments. 5. Awareness campaigns.	MoIT, SBP	3 years
Artificial Intelligence, Non-Fungible Tokens, and the Metaverse	1. Introduce regulations for NFTs. 2. Create an AI policy to supplement human development and decision-making with the help of advanced algorithms. 3. Create Metaverse Standards.	MoIT, SBP	3 years
Digital Regulations			
Digital Regulations	1. Make an effective digital herassment policy and promote awareness surrounding existing laws. 2. Improved regulatory framework for Fintechs. 3. Ensure coordination amongst regulators.	MoIT, SBP, FBR	2 years

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