

IT Industry Development in South Asia:

Lessons for Pakistan

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Abstract

The global IT industry is reshaping economies through digital services, innovation and cross-border integration. In South Asia, India, Bangladesh and Sri Lanka have demonstrated notable advancement in this sector. In contrast, Pakistan's IT sector and human capital remains underutilized. The absence of a clear value-based benchmark limits its competitive visibility. This study examines IT development patterns in South Asia and evaluates Pakistan's position using qualitative, quantitative indicators and strategic frameworks. A mixed comparative approach was adopted based on secondary data. SWOT analysis was applied to assess Pakistan's digital economy, while Porter's Diamond Model was operationalized through a qualitative-to-quantitative scoring method to facilitate cross-country comparison. Findings indicated that India's consistent policies, Bangladesh's targeted digital initiatives and Sri Lanka's sectoral specialization have strengthened their competitiveness. Pakistan, however, continues to face structural constraints, including skills shortages, low R&D spending, inadequate infrastructure along with fragmented policy execution. The paper concludes with short and long-term recommendations focused on developing a comprehensive IT export strategy enhancing digital skills, promoting venture capital investment and expanding regional digital cooperation to improve Pakistan's global competitiveness.

Keywords: *IT, Development, South Asia, Pakistan.*

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1. Introduction

Technological advancement is rapidly transforming industries across the globe and Information Technology (IT) is emerging as one of the most influential sectors in the global economy. IT is the use of computers and other electric devices to store, retrieve and share information. It involves processing, protecting and exchanging information and providing services including types and emerging technologies. IT industry is valued in trillion of dollars and it represents a powerful force of digital transformation. This sector is revolutionizing how economies function, businesses operate, and societies interact. As a cornerstone of modern economic growth, the IT sector has positioned itself at the forefront of innovation and competitiveness, particularly in the South Asian region.

South Asia has increasingly become a significant contributor to global IT development. Governments and private enterprises are actively investing in cloud computing, block chain, artificial intelligence (AI), IT exports, establishment of IT parks, digital freelancing, and outsourcing. This growth has been instrumental in the recent economic advancements witnessed in several South Asian countries.

Pakistan shares similar demographic strengths and digital growth patterns with its regional peers; but it has yet to translate these advantages into a fully realized IT sector. While the industry has experienced steady growth in recent years, Pakistan remains underutilized in terms of tapping into its vast human capital. The sizeable rural population represents a significant untapped resource that can be empowered through targeted advanced digital skills development. A digitally skilled population can drive innovation, entrepreneurship, and contribute valuable perspectives and technical capabilities to the global IT landscape. Furthermore, increasing internet outreach presents a promising opportunity to cultivate a dynamic domestic market, creating demand for software solutions, digital services, and move towards technological advancement.

1.1. Statement of the Problem

Pakistan ranked 88th out of 133 economies in the Global Innovation Index (WIPO, 2023), with IT exports reaching \$2.5 Billion (PBS, 2023), while India's IT exports surpassed \$245 Billion (NASSCOM, 2023), highlighting a significant competitiveness gap. Despite a tech-savvy, youthful population (60% under the age of 30), growing digital connectivity and a global shift toward remote services, Pakistan's IT sector remains underdeveloped. This disparity points to underlying structural and policy challenges. Therefore, it is essential to evaluate the key challenges, identify existing strengths and suggest strategic measures to enhance the global competitiveness of Pakistan's IT industry.



1.2. Research Questions

Q.1. How has the information technology sector developed across South Asia?

Q.2. What are the key challenges of Pakistan's IT industry, how can the significant regional lessons, recommendations be implemented to enhance the growth and global competitiveness of Pakistan's IT sector?

1.3. Significance and Scope

This study carries important implications for policymakers, IT experts, investors, entrepreneurs and academicians seeking to strengthen Pakistan's IT industry. By identifying key risks and opportunities, it provides strategic guidance for legislators to design essential policies and regulatory measures needed to support sectoral growth. IT specialists and industry leaders can use the findings to enhance innovation, upgrade digital infrastructure, and improve export performance. Likewise, investors and entrepreneurs can gain insight into emerging business opportunities and the investment landscape, supporting the development of startups and technology-driven enterprises. The study also contributes to academia by offering a structured analysis of IT industry development in South Asia and serving as a useful foundation for future research. By incorporating these insights, Pakistan can work toward building a more secure, well-regulated and competitive IT sector capable of driving sustainable economic growth and enhancing its standing in the global digital market. The research begins with a broad global overview, narrowed down to national dynamics and links international and regional lessons to Pakistan's specific needs. The aim was not only to highlight gaps in Pakistan's IT sector but also to propose realistic policy actions and achievable targets for long-term development.

1.4. Literature review

The regional literature of South Asia suggests that countries which prioritize policy alignment, digital capacity building and export branding have seen greater IT sector expansion (ADB, 2021). Analyzed through Porters Diamond Model (Porter,1990), South Asia's IT industry has provided firm strategy and strengthened its factor /demand conditions in order to perform better in global IT market. The National Innovation Systems (NIS) perspective (Lundvall, B.A., 2010) emphasizes the role of institutions, universities and firms in co-producing digital capabilities, highlighting why some South Asian countries convert policy into sustained competitiveness more effectively than others.

South Asia's IT industry has witnessed significant growth, driven by strategic government interventions and talent development. It has become a major contributor towards economic transformation. Every country is trying to enhance the digitalization with its software and IT-enabled services (ITeS) exports (Agarwal, 2019). Among regional countries, India represents a case

within Diamond Porter model and NIS framework that is on the way of technological growth (NASSCOM, 2023). Its strategy of combining policy continuity with digital skilling initiatives has enabled its dominance in global IT services (World Bank 2020). Strong Institutions serve as key nodes in developing a countries innovation system, facilitating standard setting, branding and integration into Global Value Chains (GVCs) for IT services (Gereffi et al., 2005). The Human Capital Theory and Diffusion of Innovations (Rogers, 2003), support large-scale investments in STEM education and digital skills along with accelerated adoption of new technologies and service models.

Bangladesh has rapidly positioned itself as an emerging IT exporter by leveraging low-cost human capital and structured digital policy regime. Its strategic IT plans focusing on startup incubation, infrastructure investment through **Hi-Tech Parks**, and incentives for IT exports led to exponential growth (BASIS, 2023). Government programs, like Sheikh Kamal IT Training Centers have also promoted grassroots digital up skilling (Siddiqui & Rahman, 2022). This reflects elements of the developmental state approach, where the state actively coordinates infrastructure, skills, and industrial policy to move the country upward in IT-related GVCs. Sri Lanka has demonstrated resilience in IT manufacturing sector, producing over 1.7 billion dollars (Chakraborty, 2022).

Pakistan's overall IT sector development trajectory is more uneven (Basu & Maertens, 2009). The revenue generation is impressive with promising freelance growth (Government of Pakistan, 2023) but the formal IT sector lags behind due to fragmented policies and weak institutional coordination (World Bank, 2022). Pakistan Software Export Board (PSEB, 2023) acknowledged that inconsistent tax policy, weak brand identity and limited startup financing are hindering the progress. Moreover, infrastructure challenges, especially in regional areas exacerbate the urban-rural digital divide (GSMA, 2021). These institutional voids constrain the competitive upgrading.

A McKinsey report shows that businesses accelerated their digital capabilities by three to four years in the early months of the pandemic (McKinsey & Company, 2020) showing how crisis can fast-track digital transformation. Remote work has become a permanent feature of global IT and knowledge-based industries. Major firms now operate through hybrid or fully remote models enabling cross-border employment. Pakistan has struggled to fully benefit from this shift due to gaps in digital infrastructure, limited high-end skills and weak institutional support.

2. RESEARCH METHODOLOGY

This research employs a qualitative methodology based on the in-depth review of literature on information technology development in South Asia, with particular emphasis on lessons for Pakistan. A comparative approach is used to provide a comprehensive, evidence-based assessment of Pakistan's IT landscape relative to other South Asian countries. To overcome the qualitative limitations of Porter's Diamond Model and support meaningful cross-country comparison,



the study incorporates a Qualitative to Quantitative Conversion structured scoring system that converts qualitative judgments into quantitative values through a detail analysis of secondary literature, industry reports and institutional evaluations. Limitations include variations in data availability across countries, reliance on secondary data and potential subjectivity in interpreting qualitative literature.

2.1. Data Collection

A detailed analysis of the IT landscape in South Asia was carried out using secondary data obtained from official documents, published reports, research articles, thesis and other credible sources dating from 2015 onward. The research also incorporated data from online databases, digital libraries and reputable internet-based resources to ensure a comprehensive evaluation of regional IT developments. Additionally, published videos and case studies were examined to gain broader insights into industry trends and technological advancements. The collected evidence also offers valuable insights into the transformation of Pakistan's IT industry and highlights lessons that can further advance the country's digital progress.

2.2. Data Analysis

This research adopts a Porter's Diamond Model to assess the competitive landscape of the IT industry across South Asian. SWOT is also applied to examine the strategic position of Pakistan's IT industry. A gap analysis was conducted comparing Pakistan with other South Asian countries, including India, Bangladesh, and Sri Lanka. Key indicators such as IT export volumes, employment generation, policy initiatives, digital infrastructure metrics, and global competitiveness rankings have been analyzed to benchmark Pakistan's position in the region. Overall, the methodology reflects a layered and comparative approach. The aim was not only to identify the gaps but also to suggest realistic policies and achievable targets.

2.3. Organization of Report

The report has been organized into four sections. The first section covers the introduction, statement of the problem, research questions, significance, scope and the literature review. The second section deals with the research methodology and organization of the paper. Third section of the report contains the situational analysis of the global markets, IT industry in South Asia and Pakistan's IT industry. The fourth section includes identification of key issues and challenges, analysis frameworks including Porters Diamond Model Analysis, SWOT, Gap analysis and key findings. This is followed by the conclusion and recommendations.

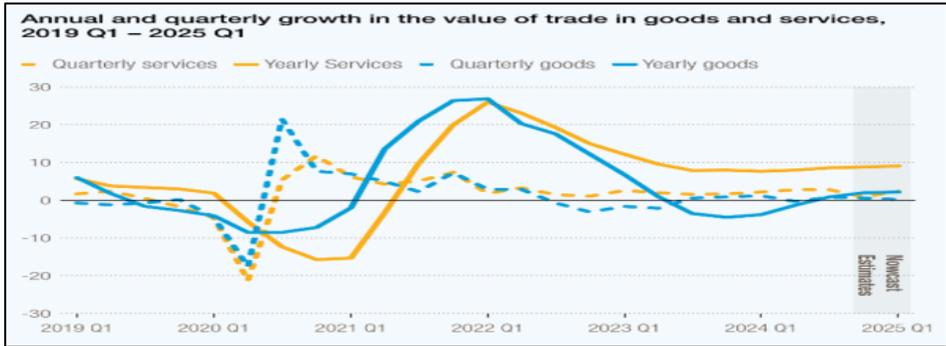
3. Section III: Situational Analysis

3.1. The Global IT Industry

The global Information Technology (IT) industry has undergone a great transformation over the last two decades. The worldwide spending on IT products and services reached approximately \$4.7 Trillion in 2023 (IDC, 2023). This growth is driven by the adoption of emerging technologies such as artificial intelligence (AI), cloud computing, big data analytics, block chain and the Internet of Things (IoT) which are reshaping businesses across the globe. Figure No.1 shows the exponential increase in the services sector from 2019 to the first quarter of 2025. Figure No.2 marks an expansion in worldwide digitally delivered services including IT, marketing, financial, professional training and educational services.

Figure 1

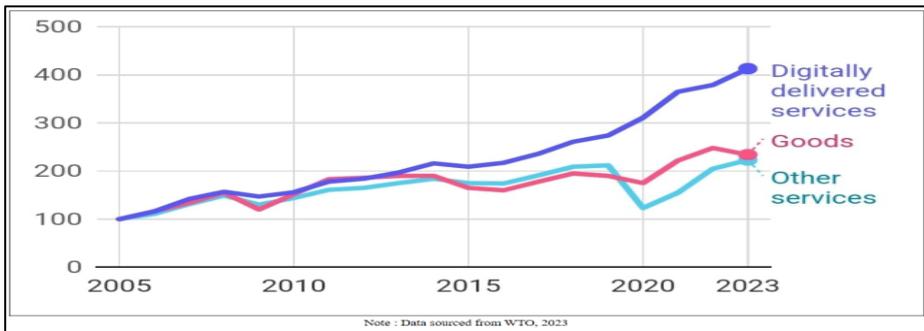
IT Export Growth Trends



(Note. Adapted from UNCTAD Statistics, 2025)

Figure 2

Globally Digitally Delivered Services (2005-2023)



(Note: From WTO statistics database by World Trade Organization, 2023)



The IT expansion is mainly due to integration of developing countries into the IT supply chain. The shift toward cost efficiency and a 24/7 service model has encouraged companies in developed economies to outsource IT services to emerging markets. Countries in South Asia, Eastern Europe, Latin America, and Africa have capitalized on this demand by offering competitive pricing, a skilled workforce and improving digital infrastructure. The developing economies now account for over 40% of global ICT exports, with countries like India and the Philippines dominating the software services and business process outsourcing (BPO) segments (UNCTAD, 2022).

Outsourcing and freelancing have become central pillars of this global IT landscape. The global outsourcing market was valued at over \$620 Billion in 2023 (Statista, 2023). South Asian freelancers have become major players in web development, app development, graphic design, and digital marketing. Pakistan has become the fourth fastest-growing freelance market globally indicating how individual digital workers from developing countries are directly participating in global value chain (Payoneer, 2020).

Moreover, the emergence of digital platforms and gig economies has reduced the reliance on traditional employment structures. This has become particularly relevant for countries with high youth unemployment, limited formal sector jobs, and expanding internet outreach. By 2026, it is estimated that more than 50% of the global workforce will be part of the gig economy, with IT and digital services forming a substantial portion of this work (Deloitte, 2021). Governments and private sector actors in developing countries are increasingly recognizing the economic potential of digital freelancing, leading to policy initiatives and infrastructure development aimed at supporting digital entrepreneurship and export-led IT growth.

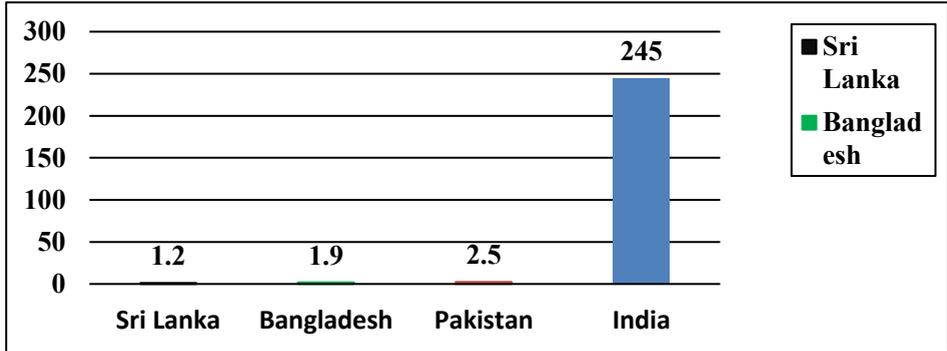
3.2. IT Industry in South Asia

South Asia has emerged as a dynamic hub for IT development. Figure No.3 Indicates the IT exports from Pakistan, India, Bangladesh and Sri Lanka. India has emerged as the region's leading IT country contributing over \$245 Billion in 2023 (NASSCOM, 2023). India's IT sector employed more than 5 million professionals, supported by strong collaboration between government, industry, and academia. The Government of India has played a central role in shaping this growth through landmark initiatives such as Digital India. It is aimed at improving digital infrastructure and public services. Startup India fosters innovation through regulatory simplification, funding access, and incubation (MeitY, 2022). The Multinational corporations (MNCs) such as Infosys, TCS, and Wipro, along with global giants like IBM and Microsoft have made India a global outsourcing destination. A robust higher education sector, producing nearly 1.5 million engineering graduates annually, further fuels India's IT workforce (AICTE, 2022). The startup ecosystem is also thriving, with over 100,000 registered startups making India the third-largest tech startup ecosystem

globally (Startup India, 2023).

Figure 3

IT Export Revenues, 2023 (South Asian Countries) (\$B)



Note: Authors Own Compilation

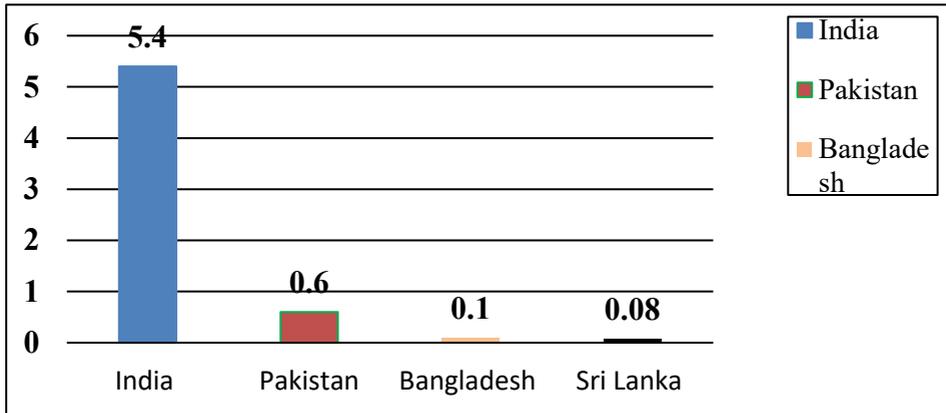
Bangladesh, while smaller in scale, has demonstrated remarkable momentum in its IT sector primarily through focused government policy and public-private collaboration. The Bangladesh Association of Software and Information Services (BASIS) has been instrumental in bridging the gap between government and IT companies and facilitating export growth. With over 1,500 registered IT firms and nearly 650,000 freelancers, Bangladesh is now the second-largest supplier of online labor globally (Oxford Internet Institute, 2022). The country's IT export earnings reached approximately \$1.9 Billion in 2023, with ambitions to reach \$5 Billion by 2025 (BASIS, 2023). Infrastructure improvements, including the development of 39 Hi-Tech Parks and near-universal 4G coverage, have significantly improved digital access (BIDA, 2022).

Sri Lanka has established itself as a specialized destination for Business Project Management (BPM) services, especially in areas such as finance and HR outsourcing. The country generated approximately \$1.2 Billion in IT export revenue in 2023 (SLASSCOM, 2023). Backed by initiatives from the Information and Communication Technology Agency (ICTA), Sri Lanka has introduced national strategies to boost digital literacy and entrepreneurship (ICTA, 2022). Figure No.4 shows comparative analysis of the IT workforce size in four south Asian countries, in 2023. India is taking the lead in this regard with highest number of workforces in IT industry.



Figure 4

IT Workforce Size, 2023 (South Asian Countries) (M)



(Note: From WTO statistics database World Trade Organization, 2023)

There is visible disparity in the internet outreach and digital infrastructure in South Asia. India follows with a 57% internet outreach and approximately 800 million users. The BharatNet initiative, aiming to connect all 625,000 villages with 100 Mbps broadband. It is marked as the world's largest rural broadband connectivity program. Bangladesh has 38.9% internet outreach and 131 million internet subscribers by the end of 2023, including 118.49 million mobile internet users and 12.88 million broadband users (Dhaka Tribune, 2024). Sri Lanka, with a 66.7% internet coverage along with 14.58 million internet users in January 2023 (Data Reportal, 2023). The country is also witnessing the entry of Starlink, a satellite broadband provider, following legislative amendments to attract international companies and enhance rural connectivity (Reuters, 2024). These nations demonstrate varied progress in internet outreach and digital infrastructure, influenced by governmental initiatives, technological advancements, and market dynamics.

3.3. Pakistan’s IT Industry

Pakistan’s Information Technology (IT) industry has witnessed considerable growth over the past decade, emerging as a progressive sector for exports, job creation, and digital transformation. Pakistan is the most financially attractive IT & ITeS outsourcing destination in the world (Kearney, 2023). The total IT export volume was \$2.5 Billion in 2023 (PBS 2023).

The Government of Pakistan continues to advance the '**Digital Pakistan Vision**', focusing on strengthening digital infrastructure, promoting e-governance, and fostering innovation. The major policies are mentioned in Figure No. 5 as follows:

Figure 5

Legislative Framework of Pakistan’s IT Industry

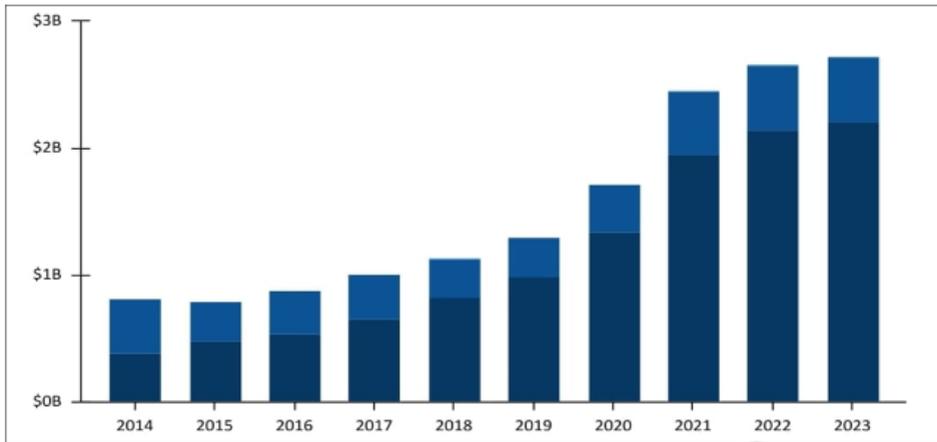


Note: Adapted from Special Investment Facilitation Council, 2024 (www.sifc.gov.pk)

Figure No.6 Indicates gradual increase in the IT sector of Pakistan from 2014 to 2023, indicating a persistent upward trajectory. The export volume has risen from below \$1 billion in 2014 to \$ 2.5 B in 2023 with a surge in IT proceeds over the last two decades.

Figure 6

IT Exports of Pakistan (2014-2023)

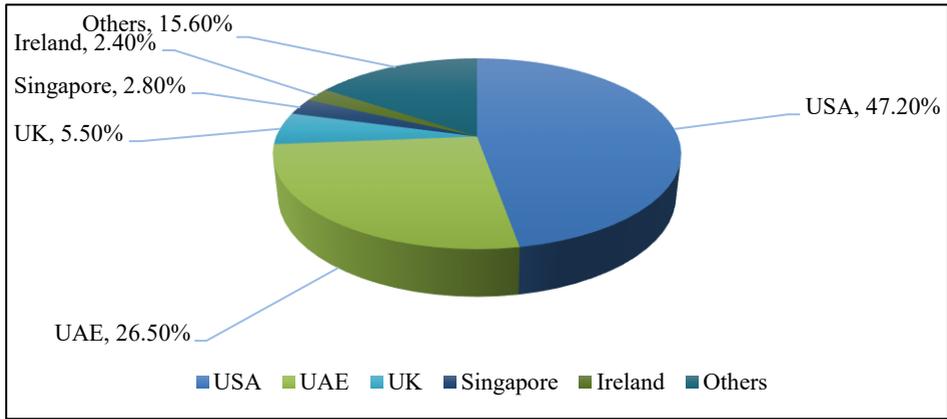


Note. From State Bank of Pakistan, 2023

Moreover, Figure No 7. indicates that Pakistan’s IT export market remains concentrated. The USA is the major export destination followed by UAE, UK, Singapore and Ireland indicating a limited export market.

Figure 7

Pakistan's Top IT Export Markets (2023)

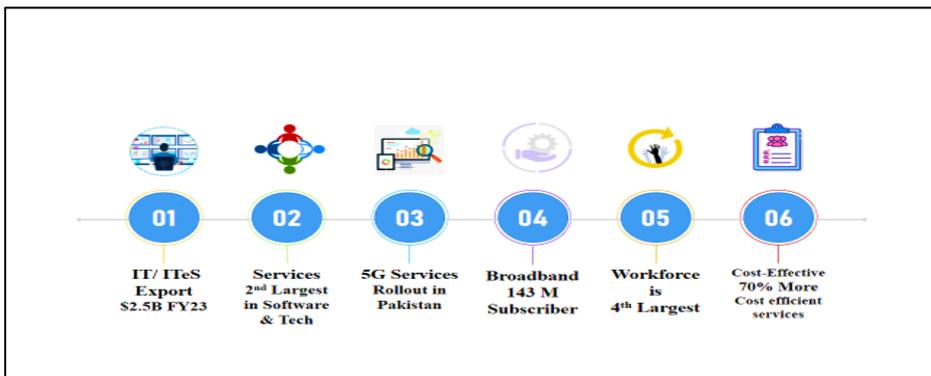


Note. From State Bank of Pakistan, 2023

The global standing of Pakistan's IT industry has some promising positive indicators. Pakistan has the 4th largest workforce, 70% more cost effective IT talent and the 2nd largest software and tech services. Furthermore, it is considered the 2nd most financially attractive destination for offshore outsourcing. The IT landscape in Pakistan includes large service providers, mid-sized software houses, and a rapidly growing freelance workforce. Software development, mobile applications and enterprise solutions are key sub-sectors. The notable companies such as **Systems Limited**, **NETSOL Technologies** and **10 Pearls** are achieving international recognition and clientele. The BPO segment including call centers and back-office processing is also contributing significantly to IT service exports.

Figure 8

Pakistan's Global Standing



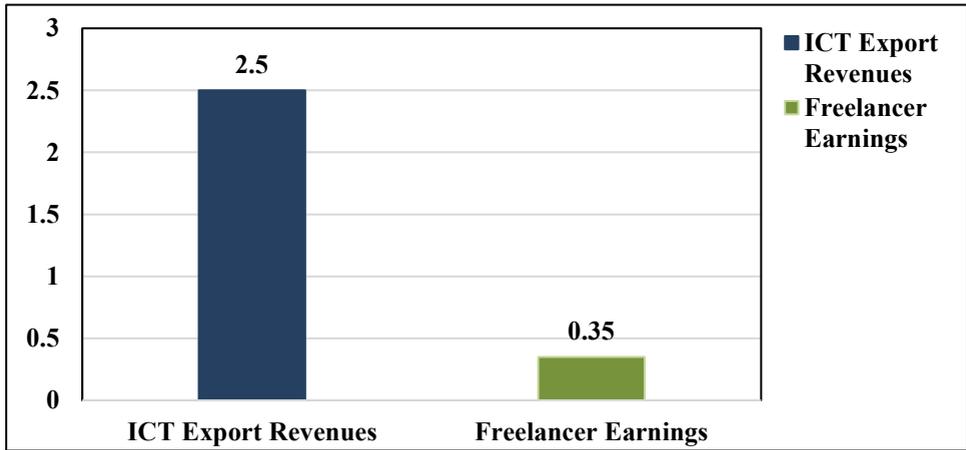
(Note. Adapted from Special investment Facilitation Council, 2024 (www.sifc.gov.pk))

In recent years, Pakistan's IT sector demonstrated remarkable performance. IT export revenues reached \$ 2.5 Billion (PBS, 2023) accounting for 40 % of the country's total service exports with 'Other Business Services' trailing at \$ 1.205 billion. During FY 2024 (July–March), Pakistani freelancers contributed \$ 350.15 million in foreign exchange remittances to the national economy.

Figure No.9 reflects the satisfactory growth in IT sector despite economic headwinds and currency depreciation. However, Pakistan's most remarkable success lies in the freelance economy. With over 1.5 million registered freelancers, Pakistan ranks fourth in the global freelance market (Payoneer, 2020). Freelancers in Pakistan provide services in areas like web development, content creation, SEO, graphic design, and digital marketing through platforms like Upwork and Fiverr. The rise of freelancing has opened avenues for youth participation in global markets despite limitations in traditional employment absorption.

Figure 9

Pakistan's Financial & Telecom Statistics (FY 2023-24)



Note: from Economic Survey of Pakistan, 2023

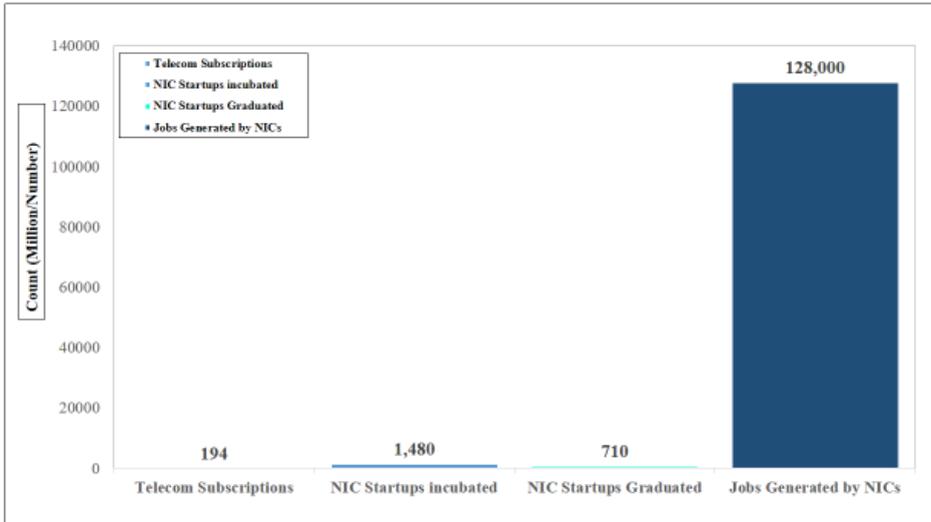
The progress of Pakistan's IT sector is reflected in the registration of over 20,000 IT and ITeS firms with the SECP, encompassing both locally focused and export-driven companies. PSEB established its first women's software technology park at the Women's University of Bagh, AJK, in FY 2024. Figure No.10 indicates that till 31st March, 2024, the NICs have incubated over 1,480 startups with more than 710 graduated successfully, generating over 128,000 jobs. Over 2,800 women entrepreneurs have been empowered through the programme. Furthermore, the project Ignite, under the Ministry of Information Technology and Telecommunication (MoITT), funds research and innovation through its



National Incubation Centers (NICs) located in major cities. These centers have supported over **800 startups**, offering mentorship, seed funding, and networking opportunities (Ignite, 2023).

Figure 10

Pakistan’s IT Activity & Growth Statistics (FY 2023-24)



Note. From Economic Survey of Pakistan, 2023

The Telecom services are expanding, raising the country’s teledensity to 80.7%. The International Labour Organization ILO further identifies Pakistan as the second-largest source of global digital labour, particularly in software and technology services. Pakistan has an internet outreach of 35%, encompassing over 100 million internet users, and a broadband subscriber base of 1.9 million. The international connectivity is through seven fiber-optic submarine cables and plans to add three more in the next two years. The Government of Pakistan has launched several initiatives to promote IT sector growth.

The **Special Technology Zones Authority (STZA)** was established in 2021 to create dedicated zones with tax incentives, infrastructure and regulatory ease for IT companies and startups. The STZA aims to attract foreign investment and help transform Pakistan into a regional technology hub. Additionally, programs like **DigiSkills.pk** and eRozgar provide free digital skills training to young people, particularly targeting underserved areas. Collectively, these initiatives represent a strong policy commitment. However, there are gaps remain in their coordination, scalability and long-term sustainability. The Government is also offering Special incentives in Special Technology zones including tax exemptions, reduced Income tax, 100 % tax credit for startups etc., as shown in

Figure No.11.

Figure 11

Special Technology Zones Authority (STZA) Incentives

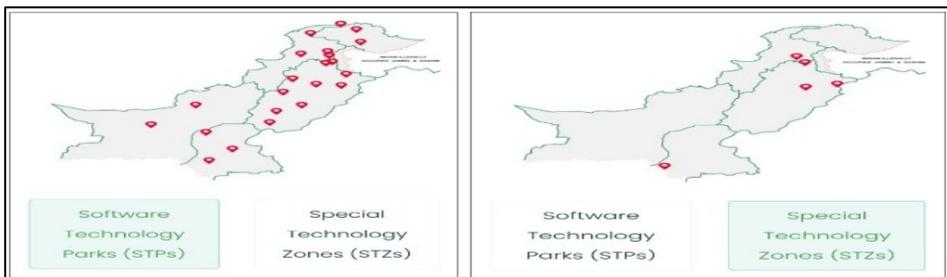
Tax Exemption	Venture capital companies and funds enjoy tax exemption on profits and gains till June 30, 2025	Tax Exemption	Tech enterprises and zone developers enjoy a 10-year tax exemption under the Income Tax Ordinance, 2001
Foreign Ownership	Embrace opportunities with up to 100% foreign ownership	Import Tax Relief	Capital goods imports are exempt from taxes
Profit Repatriation	Benefit from 100% profit repatriation	Income Tax Benefits	Exemption from income tax on dividend income and capital gains
Reduced Income Tax (0.25%)	PSEB registered businesses and freelancers pay only 0.25% tax on export proceeds of IT & IT-Enabled Services (till June 2026)	Property Tax Exemption	No property tax obligations
100% Tax Credit for IT Startups	PSEB registered Startups offering technology-driven products or services to any sector of the economy are allowed 100% tax credit, including minimum, alternate corporate tax, and final taxes for three years	Sales Tax Waiver	Full exemption from sales tax under the Sales Tax Act, 1990
50% Foreign Currency Retention	Exporters of Software, information Technology (IT), and IT-enabled Services (ITeS), as well as freelance services, are permitted to retain up to 50% of export remittances in Exporters' Special Foreign Currency Account (ESFCA) for meeting business-related international expenses, including travel abroad	Repatriation Freedom	Investments, profits, and dividends are fully repatriable, with overseas payments permitted without constraints
		Special Foreign Currency Account	Benefit from a designated account facilitating foreign currency transactions, providing ease and flexibility in managing international financial activities

Note. Adapted from Special Investment Facilitation Council, 2024 (www.sifc.gov.pk)

Figure No .12 shows the country wise distribution of special technology zones and Special Technology parks. Only 18 STPs have 5 STZs have been established, which is far less than the national requirement far less than the MoITT vision to establish 25 Software Technology Parks (STPs) across major and secondary cities.

Figure 12

Special Technology Zones / Software Technology Parks in Pakistan



Note. From Special Investment Facilitation Council, 2024 (www.sifc.gov.pk)

Pakistan ranks 97th on the ITU’s ICT Development Index (ITU, 2023) and rural-urban disparities in broadband access continue to restrict inclusive digital growth. While the internet footprints crossed 54%, broadband speed and coverage still lag behind regional competitors like India and Bangladesh (PTA, 2023).

4. Issues and Challenges /Findings

4.1. Porter’s Diamond Model

Porter’s Diamond Model explains how a country’s industry can gain competitive advantage over its counterpart nations through four pillars i.e. Factor Conditions, Demand Conditions, Related Industries and Firm Strategy further shaped by external factors like the Government and chance (Figure No. 13).

Figure 13

Diamond Model (Porter, 1990)

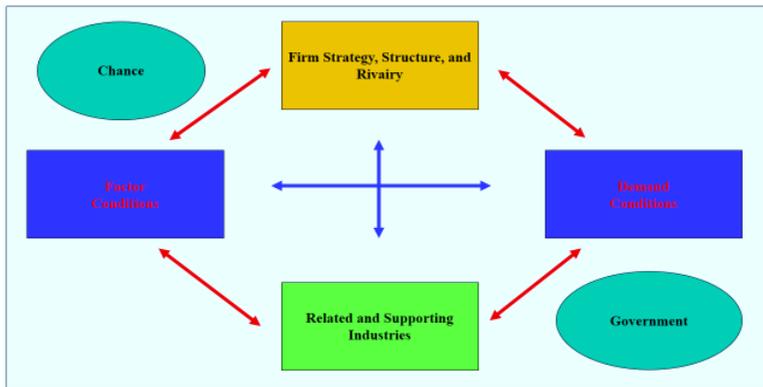
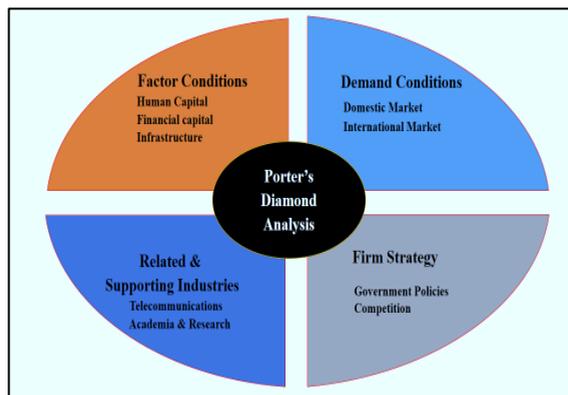


Figure14

Diamond Model Factor Analysis



Factor Conditions refer to the resources, infrastructure and capabilities that give an industry a competitive benefit over others including human capital, financial capital and infrastructure. Strong factor conditions enable sector to innovate, progress and maintain a leading position in the global market.

- **Human Capital** - In Pakistan, significant number of students opt for IT for academia, identifying the increasing demand for technology personnel. Pakistan annually produces about 75,000 IT graduates, yet only around 10% secure jobs in export-oriented firms (*The Express Tribune*, 2023) According to industry-academia research, roughly 80% of these graduates lack the in-demand technical and practical skills (Access Partnership, 2024). Universities must therefore revise curricula, incorporate industry certification tracks, and adopt hands-on learning techniques to align with evolving market needs.
- **Financial Capital** - Government financial support for IT initiatives remains limited and requires significant enhancement to meet industry needs. The federal funding for IT and telecom stood at only Rs. 6.2 billion in FY 2023-2024 insufficient for a sector contributing over USD 2.6 billion in IT/ITeS exports (PSEB, 2024). Despite the sector's potential, Pakistan allocates less than 0.4% of GDP to R&D, far below India (0.7%) (World Bank, 2023). Increased incentives, grants, and fiscal support could enable startups, technology professionals and IT companies to scale operations and contribute more effectively to the digital economy. Strengthening financial support would not only develop national talent but also improve Pakistan's competitiveness in global IT markets.
- **Infrastructure** - Pakistan is facing a dearth of proper IT infrastructure like technology parks, undisrupted power supply and uninterrupted internet. These challenges hinder the efficiency of IT businesses and limit the country's potential to compete in the global technology market.

Demand Conditions: The demand and fluctuation between local and international market, affects the industrial growth. As market demands fluctuate, firms must adapt to changing consumer preferences, developing technologies, and global trends to stay firmly in the list. A strong domestic demand can motivate innovation and expansion whereas international demand paves way for exports and foreign investment.

- **Domestic Market** - Rising technological advancement across South Asia has generated strong domestic demand for IT services. Regional countries have strengthened their IT industries to meet this growing need. However, Pakistan's IT sector continues to depend heavily on export markets rather than local demand.
- **International Market** - South Asian countries have established a strong presence in the global IT export market with many firms serving clients in



the U.S., U.K., and Middle East. Pakistan also maintains a solid IT export base, providing high-end technology services to various international markets. Its skilled workforce and cost-effective solutions make it an appealing choice for software development, cybersecurity, and digital services.

Related and Supporting Industries: A strong network of supporting industries strengthens innovation, partnership and a competitive IT system. The industries accelerate IT success rate by providing essential services and resources.

- **Telecommunication-** India and Bangladesh have advanced their telecommunications sectors through major 5G investments, resulting in faster speeds and more reliable services. Pakistan, however, still struggles with network outages and service disruptions. To stay competitive, it must prioritize 5G deployment, strengthen infrastructure, and improve service reliability.
- **Academia and Research Institutions** - The Collaboration between universities and IT companies is vital to align education with industry needs. Such partnerships provide students with practical skills and improve employability, especially in countries lagging in IT development. Integrating internships, technical training, and joint research strengthens the workforce, drives innovation, and supports overall IT sector growth.

Firm Strategy, Structure, and Rivalry: There is an important role of policies and strategies. This includes government policies competition with other counterparts. Strong competition among companies encourages efficiency, better products, and continuous developments, eventually motivating industry accomplishment and economic growth.

- **Government Policies** - The efficient and proactive strategies are vital for IT expansion. Nations like India and Bangladesh have implemented well structured, long-term frameworks allowing them to thrive in the global digital market. Pakistan is struggling amid absence of a logical long term IT framework. The lack of structured policy restricts opportunities for innovation, investment and labor development. Without a detailed IT policy, Pakistan may further fall behind in the regional and global technology scene.
- **Competition** - Pakistani IT companies mainly race on finances instead of innovation. This makes it tough to maintain the level of development at internal market. Without a strong emphasis on research, creativity and product development, it becomes difficult to sustain long-term growth. Therefore, it is suggested that companies must divert their attention towards innovational strategies and skill development.

Table No. 1 indicates the IT competitiveness scores in South Asian countries. The scores reflect an interpretation of consistent evidence reported in peer-reviewed

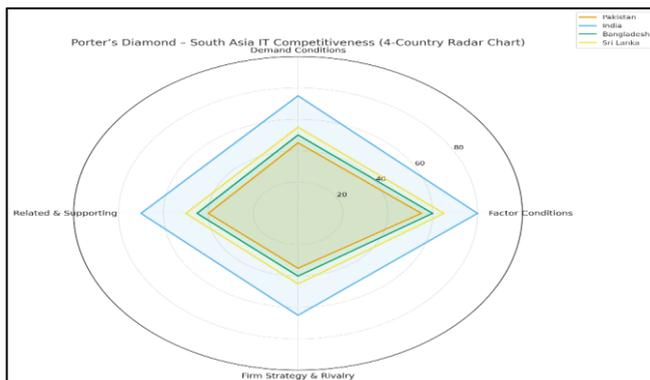
literature, industry reports, and policy documents. Higher scores were assigned to multiple converging sources whereas, lower scores were used for weak or contradictory evidence. Subsequently, the proportional scores (0-100) were utilized to facilitate radar visualization. (Figure No.15)

Table 1

Porter’s Model -IT Competitiveness Scores (4-South Asian Countries) (0–100 Scale)

Pillar	Pakistan	India	Bangladesh	Sri Lanka	Interpretation
Factor Conditions	55	80	60	65	Scores based on strongest human capital, infrastructure and financing capacity.
Demand Conditions	45	75	50	55	Largest national/ international IT demand base to lowest.
Related & Supporting Industries	40	70	45	50	Scores based on deeper and enhanced research startup
Firm Strategy & Rivalry	35	65	40	45	Countries with stronger competition, clearer policies, and better IT export branding have higher score.

Figure 14: Porter’s Diamond Model (Comparative Radar Chart)



Note: From Authors own compilation



Figure No. 15 indicates the radar chart comparing factor conditions, demand conditions, related & supporting Industries, firm strategy & rivalry across Pakistan, India, Bangladesh and Sri Lanka. Pakistan performs relatively well in factor conditions but lags behind in firm strategy and supporting industries.

4.2. SWOT Analysis

SWOT analysis has been carried out to determine the internal and external factors effecting the IT industry. Identification of these factors are critical and will support the IT sector to capitalize on their advantages, address shortcomings and mitigate the risks. It will also assist in in formulation of effective policy.

Figure 15

SWOT Analysis (IT Industry Pakistan)

 STRENGTHS	 WEAKNESSES	 OPPORTUNITIES	 THREATS
<ul style="list-style-type: none"> • IT-export and Youth Labor • Freelancing • Cost effective IT services 	<ul style="list-style-type: none"> • Limited IT-export Market& Startup coverage • Mismatching Skills- 	<ul style="list-style-type: none"> • Feasible IT Infrastructure • Students IT Studies inclination • IT-services Demands 	<ul style="list-style-type: none"> • Brain drain • Cyber threat

4.2.1. Strengths

Pakistani IT industry has recorded some drastic transformation and still trying to emerge as a key player in this sector globally. The country also possesses some strengths, furnishing to which, it can emerge as a strong competitor for its neighboring states in information technology sector.

- **IT-export and Youth Labor:** Pakistan had a surge by 24 percent in 2024, higher from the previous year (The Express Tribune, 2024). Every year, over 20,000 students get graduated in IT while over 300,000 English speaking IT personnel have expertise in latest IT trends (MoITT, 2024).
- **Freelancing** - Pakistan has one of the largest freelancing sectors worldwide with a rapidly growing number of independent professionals offering IT, software development, and digital services. As reported by the global payment platform Payoneer, it is ranked as the fourth-largest freelancing industry following United States, United Kingdom, and Brazil whereas India stood at seventh position (Niazi, 2024). Pakistan is home to more than a million freelancers who contribute significantly to the digital economy. Platforms like Fiverr and Upwork rank Pakistan among their top talent pools (Payoneer, 2023). Pakistan still has the potential to further strengthen its position in the global freelancing industry. Outsourcing, freelancing, and remote

service delivery has democratized participation in global markets and reduced traditional barriers to entry.

- **Cost effective IT services:** Pakistani software developers and IT professionals charge significantly less as compared to their counterparts. While a mid-level Indian software engineer might cost \$35–50 per hour, a similarly skilled Pakistani developer can be hired for \$20–30, offering substantial cost savings for foreign clients (Clutch, 2023). This pricing advantage can help attract startups and SMEs from Europe and North America seeking affordable talent. This combination allows businesses to access quality services at lower costs making Pakistan more attractive for global technological collaborations and investments.

4.2.2. Weaknesses

Pakistan's IT sector is also surrounded by some challenges which are as follows:

- **Limited IT-export Markets and start up coverage:** Pakistan's IT exports are majorly focused on a few key markets. The US alone attributes to over half of the country's total IT services which includes computer related exports. Other countries and entities have no or very minimal share. This IT exports concentration of Pakistan towards a few countries is also restricting it from expanding its market appearance. Pakistan's local startups remain mostly grouped around e-commerce and Fintech. The startups have limited focus and they need to diversify on products and different forums like WordPress, Steam, Ethereum, Android, iOS etc. so that they can be reached to more countries. The limited variation of IT products and the absence of local startups hamper Pakistan's capability to grow its customer base.
- **Mismatching Skills-** Pakistan produces around 25,000 to 30,000 IT graduates annually but only 20% are considered in the IT industry due to outdated curricula, lack of practical exposure and weak university-industry linkages (PSEB, 2022). The disconnect between academia and industry results in a workforce mismatch that limits the sector's growth potential. Furthermore, there is a geographic concentration of talent in major urban centers like Lahore, Karachi, and Islamabad, while talent from secondary cities and rural areas remains largely untapped due to poor infrastructure and limited training resources (World Bank, 2021).

4.2.3. Opportunities:

Following are few of the opportunities:

- **Feasible IT Infrastructure** - Pakistan has constructed feasible infrastructures for IT startups providing a supporting environment for innovation and entrepreneurship. These includes National Incubation Centres (NICs) and Software Technology Parks (STPs) that serve as key



forums for developing technology related businesses. They not only provide low costing platforms but also bring close companies, university research centers, promoting a culture of knowledge sharing and technological progression. Through offering resources, networking opportunities, and business development support, NICs and STPs perform a vital part in cultivating Pakistan's IT system.

- **Students IT Studies Inclination** - Professional studies Computer Science and Software Engineering field have become among the most opted academic areas in Pakistan. This is due to the increasing demand for IT professionals in the job market. Businesses are rapidly accepting digital alteration and this has increased the necessity for skilled computer operators, software designers and IT experts. Due to this, more students are registering in IT programs identifying the enormous professional prospects inside this specialized area. However, to fully take advantage of the global and local IT job market Pakistan needs to increase the number of IT graduates to 100,000 annually to avail the opportunities. Pakistan can overcome the talent gap, improve its information technology exports and boost its spot in the worldwide technological sector.
- **IT-services demands:** Post COVID-19, the world promptly shifted to digital forum from traditional way of doing tasks transforming the way businesses and professionals' function. This further increased the demands of IT services for businesses and augmented acceptance of digital technologies as the firms increasingly be dependent on digital gadgets, equipment, remote working solutions, and online forums to manage their operations. The high demand for IT services provides an opportunity for Pakistan to take steps for expanding its IT field while unearthing novel opportunities for businesses globally. This shows an excellent opportunity for Pakistan to lift its IT sector through financing in technological infrastructure, skill growth and digital entrepreneurship. The country can spread its IT exports, fascinate foreign investments and emerge as a key player in the international digital economy. Thus, strategic preparation and helpful guidelines are vital to guarantee long term stability and competitiveness in the ever-evolving technological field.

4.2.4. Threat:

The external threat factor is discussed as follows:

- **Brain Drain:** The ongoing brain drain could refrain Pakistan from establishing the necessary workforce. This issue must be handled timely as numerous talented IT personnel seek better opportunities abroad owing to inadequate career prospects, minimal wages, and economic

unsteadiness. This could further cause Pakistan to struggle for retaining its top talent making it hard to form the employees needed for a blooming IT sector. To overcome this, the government and private sectors have to join hands and work together to provide much deserved salaries, better working environment, and growth opportunities that allure IT professionals to stay and contribute to the country's digital evolution.

- **Cyber Threat** - In Pakistan, the dependence on international IT products provides a chance for external forces to potentially affect and interrupt the country's IT sector. This reliance makes Pakistan subjected to supply chain disruptions, foreign policy modifications and cyber security fears that may influence grave digital infrastructure and national security. Though cyber security landscape in Pakistan has experienced great developments like approval of the 'National Cyber Security Policy 2021', 'e-safety Bill 2023', or 'Data Protection Bill 2023', few important elements still need to be incorporated. Robust enforcement procedures, latest and up-to-date cyber security training and cooperation with international specialists are required to ensure broad digital protection. Furthermore, encouraging local IT product development can decrease reliance on imported tools and augment Pakistan's digital dominance. Without these steps, the country remains exposed to cyber risks, data piracies, and potential economic hindrances in its information technology sector.

Figure 16

SWOT Analysis of the Current Study with Description

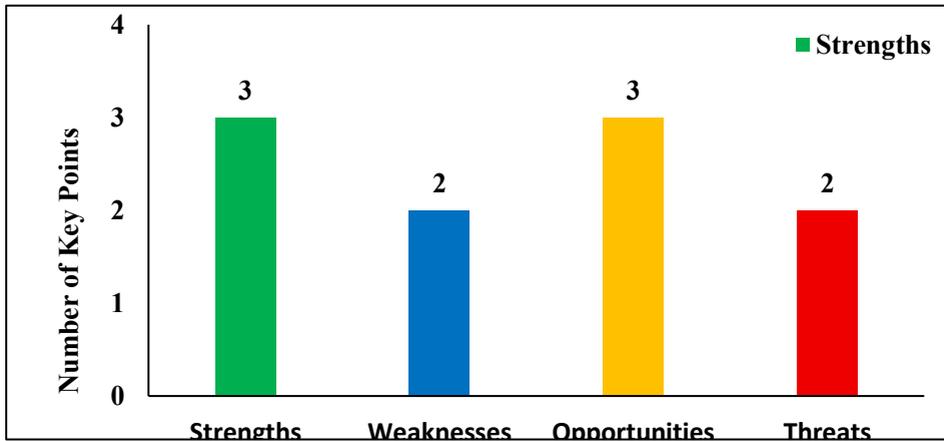


Figure No. 17 explains that the Pakistan's strengths and opportunities have comparative advantage over the weakness and threats. This significant analysis can leverage Pakistan's IT industry, globally.



4.3. Comparative Gap Analysis

4.3.1. Benchmarking Pakistan against South Asian Peers

- Policy Interventions:** One of the most defining features of India's IT success is its long-term policy vision. The Indian government-initiated liberalization reforms in the early 1990s followed by the establishment of Software Technology Parks of India (STPIs), which provided tax breaks, high-speed internet access, and streamlined export procedures (NASSCOM, 2023). These zones became breeding grounds for IT giants like Infosys and TCS. Similarly, Bangladesh's government launched the "Digital Bangladesh Vision 2021" in 2009, emphasizing digitization across public services, education, and commerce. This was supported by the National ICT Policy and incentives for IT entrepreneurs, including 100% tax exemption on IT exports until 2024 (ICT Division Bangladesh, 2023).
- In contrast, Pakistan's policy landscape has been inconsistent often disrupted by political instability and bureaucratic red tape. A lesson here is the importance of policy continuity and targeted incentives to attract foreign and local investment in the IT sector. Pakistan could replicate the SEZ/STPI model with Special Technology Zones (STZs), ensuring these are backed by reliable infrastructure, legal protection, and one-window operations.
- Table No.2 indicates a comparative gap analysis of IT revenue exports, IT workforce, free lancing and digital infrastructures along with key highlights of Pakistan, India, Bangladesh and Sri Lanka. The table shows significant gaps significant gap when compared to regional peers.

Table 2

IT Export Revenue /IT workforce/Key Highlights

Country	IT Revenue (USD)	Export	IT Workforce Size	Key Highlights
India	\$245 billion		5.4 million	Global leader in IT services and outsourcing.
Pakistan	\$2.5 billion		750,000	Rapid growth in IT exports and freelance economy.
Bangladesh	\$1.9billion		100,000	Expanding digital infrastructure and workforce.
Sri Lanka	\$1.2 billion		80,000	Focus on high-value BPO services and digital transformation.

Note: Authors own compilation

- a) **Talent Development and Up skilling:** India's targeted investment in education and skill development has created a tech workforce of over 5 million professionals (NASSCOM, 2023). India's IT growth has been sustained by a strong emphasis on education and skills. With over 10,000 engineering colleges and partnerships with platforms like Coursera and edX, India has created a scalable skills ecosystem. Programs like "Skill India" and "Digital India" have trained millions of young professionals in software development, AI, data analytics, and cloud computing (Government of India, 2023). Bangladesh's emphasis on digital literacy particularly through its "Learning and Earning" initiative, has turned thousands of young people into digital freelancers. The IDEA (Innovation Design and Entrepreneurship Academy) project has also provided seed funding and mentorship to IT startups further strengthening the innovation pipeline. Pakistan has not been able to convert its demographic dividend into a productive digital workforce. The country produces around 25,000 to 30,000 IT graduates annually, yet industry estimates suggest only 20% are employable due to skill mismatches and curriculum gaps (PSEB, 2022). Pakistan, despite having a young population, faces a mismatch between educational outcomes and market needs. Universities still rely heavily on outdated curricula and practical exposure is limited. Pakistan has historically missed multiple opportunities to become a regional IT leader. For example, in the early 2000s when India was building its IT ecosystem with SEZs (Special Economic Zones), Pakistan was unable to replicate similar policy frameworks. Moreover, while India invested heavily in institutes like the IITs and linked them to its IT industry. Pakistan's educational institutions remained largely disconnected from market needs. The country also underutilized donor backed digital capacity building programs. Between 2010 and 2020 multiple World Bank and UNDP-funded projects targeting digital skills development in Pakistan could not scale due to poor implementation and coordination (World Bank, 2021). Additionally, Pakistan did not capitalize on its early lead in freelancing. Despite being ranked among the top five freelancing countries globally, most freelancers remain disconnected from the formal IT export ecosystem leading to lost tax revenues and weak client retention. Another missed opportunity lies in export diversification. Pakistan continues to focus on low-end outsourcing and call center operations while India and Bangladesh expanded into value added services.
- b) **Export Strategy and Branding:** Branding has played a crucial role in positioning a nation on the global map. Pakistan lacks a coherent IT branding strategy. Freelancers and firms often operate in silos without backing of national narrative. India branded itself as the "World's Back Office," leveraging its English-speaking population and Y2K-era software boom. Today, Indian IT exports span over 100 countries supported by a global brand image of reliability and scale. Bangladesh, despite being a latecomer has invested heavily in rebranding itself as a destination for cost-effective



and secure digital services. Through initiatives like the "Made in Bangladesh - ICT" campaign and participation in international expos the country has improved its perception among global buyers (BASIS, 2023).

- c) **Investment and Ecosystem Building:** Bangladesh and India have attracted substantial FDI in their IT sectors due to investor-friendly environments and the development of innovation ecosystems. Bangladesh’s Hi-Tech Parks are being developed in 28 districts with infrastructure, tax benefits, and shared services for tech startups. India’s Bengaluru and Hyderabad are global tech hubs with incubators, VC networks, coworking spaces and government-sponsored R&D labs. In contrast, Pakistan has yet to fully operationalize many of its Special Technology Zones. Furthermore, regulatory clarity and investor protections are crucial. Both India and Bangladesh have enacted laws to protect data, intellectual property and digital assets. Pakistan needs to create a stable and transparent legal environment to attract global investors and diaspora funding. Table No.2 indicates that Pakistan is still far behind in establishing Technology Parks.

Table 3

Number of Technology Parks in South Asian Countries (2024)

Sr. No.	South Asian Country	Technology Parks
1	Pakistan	18
2	India	65
3	Bangladesh	28
4	Sri Lanka	12

Note: From Special Investment Facilitation Council, 2024 (www.sifc.gov.pk)

- d) **Digital Infrastructure and Data Governance:** Pakistan has high mobile outreach but there are issues of broadband quality and affordability. Investments in fiber optics, 5G rollout, and localized data centers should be prioritized. Moreover, Pakistan lacks a robust data governance framework, which is essential for building trust in digital services. A national digital identity and data protection law aligned with global standards (e.g., GDPR) can help Pakistan attract international clients who value cyber security and compliance. India’s Aadhaar system, UPI (Unified Payments Interface), and broadband expansion have transformed digital access bringing millions into the formal economy. The government’s Digital India initiative has ensured that even rural populations are connected through mobile phones, fiber optics and digital IDs. Bangladesh has also significantly improved internet outreach and digital service delivery. Projects like InfoSarker and digital centers in rural areas have helped the government offer over 150 services

online, enhancing e-governance and reducing corruption. Pakistan has yet to address the gaps such as limited access to venture capital, low investment in research and development (R&D), intellectual property protections and the provision of quality broadband infrastructure. Similarly, regulatory uncertainty especially in the area of taxation and foreign exchange remittances is creating friction for exporters and freelancers. Although the government has offered tax holidays and income tax exemptions, frequent policy reversals and delays in the issuance of tax certificates have eroded industry confidence (P@SHA, 2022). On the other hand, India and Bangladesh have successfully made advancements in these

- e) **Regional Digital Collaboration:** Pakistan's participation in structured regional digital initiatives has been comparatively modest, despite its potential. India, Bangladesh and Sri Lanka have advanced cross-border partnerships in software development, cloud services, fintech and cybersecurity (NASSCOM, 2023; BASIS, 2023; Chakraborty, 2022). Collaborative digital skilling programs also offer significant potential. India currently trains over 1.5 million IT professionals annually, Bangladesh trains 40,000–50,000 youth through Hi-Tech Park programs, while Pakistan's structured digital skilling remains below 300,000 trainees per year (MeitY, 2023; Bangladesh Hi-Tech Park Authority, 2023; PSEB, 2023). Joint capacity-building programs in AI with the global AI market is projected to reach USD 1.5 trillion by 2030 (PwC, 2022). Pakistan can further benefit from collaborative R&D, co-developed e-governance solutions, and regional startup-to-startup linkages across more than 200 incubators in South Asia (ADB, 2021).

5. Conclusion

Pakistan's IT sector holds immense untapped potential, yet it remains underdeveloped compared to its South Asian peers. While the country faces structural and institutional challenges, it also enjoys significant competitive advantages, including a growing youth population, a vibrant freelance community, and a cost-effective workforce. With strategic investments in talent, infrastructure, and governance, Pakistan can unlock this potential. To achieve this, fostering public-private partnerships is essential for driving innovation and digital transformation across sectors. Educational reforms and stronger industry-academia collaboration are crucial to aligning the workforce with evolving market demands. Additionally, enhancing cyber security, expanding internet outreach, and streamlining regulatory frameworks will help create a more enabling environment for sustainable IT growth. With these efforts, Pakistan can position itself as a key player in the global IT economy.



6. Recommendations

Pakistan must adopt a forward-looking approach through planning, institutional coherence, and targeted reforms and invest in human capital, digital infrastructure, and supportive regulatory environments. It should also take insights from the global best practices and adapt them to the local context. Following are some actionable short and long-term recommendations:

6.1. Institutional Frameworks

To implement these reforms effectively, Pakistan must rethink its institutional architecture around digital governance:

- **Digital Pakistan Authority (DPA):** Establish an autonomous body under the Cabinet Division to coordinate national digital policy, integrate provincial efforts, and serve as a bridge between government, industry, and academia. The DPA should oversee export strategy implementation, data governance, and cross-border digital trade.
- **Establish a National Digital Export Strategy:** Pakistan needs a unified and cross sectoral digital export policy that outlines clear goals, incentives, timelines, and coordination mechanisms. This strategy should identify priority markets, niche services (e.g., fintech, cyber security, cloud services), and provide a roadmap for workforce development, investment attraction, and export promotion.
- **Reform of PSEB and STZA:** The Pakistan Software Export Board (PSEB) should be restructured into a leaner, more agile trade promotion agency focused on branding, market research, and client matching. The Special Technology Zones Authority (STZA) should prioritize zone development based on demand forecasting and strategic location.
- **Tech Industry Advisory Council:** A high-level body comprising representatives from leading IT firms, diaspora entrepreneurs, academia, and civil society to advise on policy and market trends. The council should meet quarterly and report directly to the Prime Minister's Office.

6.1.1. Short-Term recommendations (1–3 years)

- **Operationalize Special Technology Zones (STZs):** The Government should fast-track the development of fully equipped STZs with tax incentives, plug-and-play infrastructure and international marketing support.
- **Digital Skills Acceleration Program:** Digital skill programs may be initiated in collaboration with tech platforms and industry associations to train 100,000 youth annually in high demand technologies like AI,

block chain, and cyber security.

- **Startup Export Voucher Scheme:** Micro-grants or export vouchers may be offered to IT startups seeking to scale internationally. Promoting startup culture, investment in R&D and product innovation can help Pakistan strengthen its IT sector and attract a vast list of investors.
- **Formalize and support Freelance Economy:** Pakistan's freelance sector is among the largest globally, yet remains mostly informal. A targeted policy to register freelancers, simplify tax compliance, micro-loans and training could bring this workforce into the formal economy and significantly boost export figures.
- **Digital Pakistan Export Brand:** The Government must establish its own digital brand and include showcasing local tech success stories, facilitating participation in global tech conferences, and promoting Pakistani talent through digital platforms and embassies.

6.1.2. Long-Term recommendations (3–10 years)

- **Establish Digital Innovation Hubs:** At least one digital innovation hub may be established in each province. These hubs should serve as R&D centers, startup incubators, and training grounds linked to universities and industries.
- **National Data Protection & Cyber security Law:** A robust legal framework aligned with global standards (e.g., GDPR) is essential to boost client confidence and safeguard digital assets.
- **Curriculum Reform in STEM Education:** Overhauling university and technical curricula is essential to align with global industry demands, integrate soft skills, and promote project-based learning. Pakistan should invest in market-driven, modular training programs focused on AI, cybersecurity, DevOps and fintech. Public-private partnerships can further scale bootcamps and online certifications that meet international standards.
- **Internationalization of IT Services:** Government must facilitate Pakistani firms in establishing representative offices abroad, particularly in key markets like North America, the Middle East and Southeast Asia and strengthen regional collaborations.
- **Regional digital Collaboration:** Pakistan must strengthen its regional digital collaboration through platforms like SAARC's ICT Working Group, the South Asian Telecommunication Regulators' Council (SATRC). These organizations engage nine regional regulators (SATRC, 2022) and regional innovation networks that can enable Pakistan to harmonize digital trade standards, streamline cross-border data flows



and participate in shared digital infrastructure projects.

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