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Article: **Determinants of ICT Exports in Pakistan: Analyzing the Key Drivers of Digital Trade Growth**

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Determinants of ICT Exports in Pakistan: Analyzing the Key Drivers of Digital Trade Growth

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Abstract

The services sector of Pakistan has experienced significant growth in recent years, with the information and communication technology (ICT) industry emerging as a major contributor. The ICT sector holds substantial potential to address Pakistan's economic challenges, including the need to strengthen foreign direct investment and improve overall economic performance. ICT has also played a central role in transforming the world into a global village through enhanced connectivity and digital integration. This study examines the key factors that influence Pakistan's ICT exports and investigates whether ICT exports have a direct or inverse relationship with the country's economic growth in both the short and long run. An Autoregressive Distributed Lag (ARDL) model is employed to analyze the impact of ICT exports using variables such as human capital, foreign direct investment in ICT, GDP, and the exchange rate. Data were obtained from the Ministry of Commerce and the Ministry of Education. The findings indicate a positive relationship between ICT exports and Pakistan's economic growth. The study provides policy-relevant insights for enhancing ICT export performance and highlights how strengthening this sector can contribute to long-term economic development.

Keywords: ICT Exports, FDI ICT, External demand for ICT, Human Capital**.**

Introduction

In the modern global economy, the transformative power of digital technologies has become one of the driving forces of economic powerhouse, social advancement, and structural transformation. The 21st century marks a paradigm shift from traditional production-centered economies to knowledge-driven digital economies, underpinned by the rapid expansion of the information and communication technology (ICT) sector. The integration of ICT into economic

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systems has redefined how businesses operate, how governments deliver services, and how individuals participate in economic activities. ICT has not only enhanced productivity and innovation but also fostered globalization through seamless cross-border communication, e-commerce, and data-driven trade flows.

Globally, ICT exports have become a central pillar of the services trade. Countries such as India, Ireland, and the Philippines have strategically leveraged their ICT sectors to drive export earnings, create employment, and reduce their dependence on traditional sectors. According to the OECD, the digital economy of the world amounts to approximately USD 12 trillion, with ICT-enabled services contributing to a huge proportion of total gross domestic product (GDP) in the world and trade growth. More than 15 percent of the world GDP is made up of e- commerce alone and it has grown almost twice as fast as the GDP. the increase of GDP during the past 15 years.[1]

In sharp contrast, the economy of Pakistan is still very much dependent on traditional industries particularly textiles, rice and cotton, which have shown stagnation and deteriorating competitiveness in the international environment markets. At present, the export-to-GDP ratio of Pakistan is very low at 10.37 %.[2]

The world economy is experiencing a drastic transformation by the boosted development of the high-speed racing world. and adaptation of the Information and Communication Technologies (ICTs). The technologies have required redesigning of economic systems, changed labor markets, and transformed international trade. ICT has today emerged as a core driver of productivity, competitiveness and creativity. the mutation of the ancient economic schemes to a great extent. In the modern digital world, countries that have been able to embrace and export ICT services have recorded an accelerated economic growth. Better delivery of services to the people, creation of more jobs, and integration. into the world market.

This is because in the last 2 decades, the world has recorded an exponential growth in the ICT industry. Due to the spread and use of internet services, mobile devices, cloud computing and digital platforms, ICT exports have emerged as a major part of international trade, especially

where high-growth industries are concerned; namely software development, digital financial services, business process outsourcing (BPO), and e-commerce. The OECD (2019) states that a digital economy currently brings around USD 12 trillion to the global economy, with services that are enabled by ICT being one of the rapidly increasing segments of world GDP. E-commerce has increased its share of world output by a factor of twice in the last decade and a half, and persists to channel trade liberalization and electronic innovativeness.

In the past twenty years, the services industry has grown exponentially in the world. In comparison to manufacturing or agriculture, the services industry has proven much more extensive to economic disruptions and has found itself much more flexible before crises, as illustrated in the COVID-19 pandemic. Researchers like them found that as the pandemic reached its height, several industries failed, whereas digital services (e-learning, e-commerce, internet traffic, and information exchange) increased by more than 50 percent.[3]

In the recent years, there has been a realization by the governments at the national level to consider the ICT sector as a matter of national consideration. In 2019 the "Digital Pakistan Vision" was initiated to address the digital divide, digital literacy, broadband connectivity, and fostering e-government and e-commerce. Various national programs, including the National Freelance Training Program (NFTP) and the DigiSkills initiative have been initiated as a means to train young people in ICT skills of interest to the market. By the same token, the creation of Special Technology Zones (STZs) aims at attracting investment, technological innovation, and a more favorable business climate in the country on behalf of the local startups and foreign-based technological companies. As much as these efforts are desirable, their adoption has been erratic and most projects affected by bureaucracies and inefficient expenditures, budgetary cutbacks, and lack of a synchronization between the state and the business.

The need to concentrate on ICT exports strategically can pose great advantages to the economy of Pakistan at a macro level. The overwhelming among them would be that an increase in production of ICT exports can contribute through generation of foreign exchange revenues, thus the current account position of the country would improve with lesser dependency on either short-term borrowings or remittance incomes. Secondly, ICT related work is normally better

paying than work in traditional sectors and the work in ICT is more accommodative of women and young people, which translates to more equal development outcomes. Third, digital industry promotes innovation and knowledge spill over into other economic sectors that further enhances the productivity within the sectors such as education, healthcare, agriculture and manufacturing sectors. With the introduction of digital tools in the work of public and private sectors, efficiency and transparency are bound to be considered.

These have notwithstanding, various impediments still hamper the maximum utilization of the potential of ICT in Pakistan. Uneven internet accessibility is still an issue of concern to its people especially in the rural regions although the digital infrastructure leaves much to be desired. Though cities have recorded huge progress in the level of connectivity, most citizens have been left out of the digital prospects. Moreover, the education sector of Pakistan has failed to adapt to the evolution in the skill requirements of the digital economy. There are numerous ICT graduates with no practical skills and are not ready to service standards of the international standards. Such an incompatibility between educational preparations and market necessities presents a great challenge to developing a world competent ICT workforce. The other obstacles are that start-ups lack funding, there exists confusion regarding taxation policies and information privacy that discourages investment and innovation in the sector and the lack of any trust towards digital payment systems.

However, the experience of other countries shows that all these challenges can be overcome. India, Bangladesh, and Vietnam are nations which have strategically invested in ICT Infrastructure, better regulatory frameworks, and skilled human resource to extent of being the global leaders in exports of ICT. The success of their stories highlights the relevance of policy persistence, private sector involvement and skill capital investment. For Pakistan to emulate such success, it must adopt a comprehensive approach that combines regulatory reforms, public-private partnerships, and international collaboration.

In sum, the ICT sector represents a critical pathway for Pakistan to diversify its exports, modernize its economy, and enhance its global competitiveness. It aligns with the country's

demographic profile, circumvents the infrastructural demands of traditional sectors, and offers opportunities for rapid scale and innovation.[4]By investing in the ICT ecosystem through education, infrastructure, regulatory clarity, and international integration Pakistan can position itself as a serious player in the global digital economy. The time to act is now, before the country misses yet another opportunity to leap forward in a rapidly digitizing world. There are good examples of countries that have effectively used ICT as an agent of economic growth and these teachings are vital. As an example, India has taken advantage of well-trained manpower, regulatory framework and presence of telecommunications infrastructure early in its development as a global powerhouse in IT. Arora believe that the competitive advantage of India was created by state vision, low wages and existent strong technological infrastructure. In the same regard, Pohjola asserted the importance of ICT in enhancing productivity as well as propelling economic growth especially in developed economies.[5]

Diverse studies carried out in different regions, specifically ASEAN-5 and the OECD countries[6] support the strong relationship between ICT exports and macroeconomic factors, including GDP growth, innovation, and labor productivity. Such findings are however contextual most of the time. The institutional, infrastructural and economic limitations that are unique to developing countries such as Pakistan require an empirical study that is based on the realities of the ground.

The world economy is in the position of structural transformation that has been observed in the last three decades; the growing importance of information and communication technologies (ICTs). This has seen transformation in the conventional root of economic growth, which shifted away from resource-endowed and heavy manufacturing industries to knowledge-based, service based economies. Throughout this transformation, the better impact on the productivity and efficiency experienced on a local level in countries, which have adopted ICT, exceeded the expectations making the countries competitive in the global digital economy. The experience of other countries of the world can serve as a guide to Pakistan which is trying to use ICT exports as these tools of economic progress and achieving structural diversification.

The most referred transformation movement is the Indian case, which like a shooting star became the global center of IT industry due to the strength of strategic politics, investments in human capital and export oriented vision. The IT exports of India increased to more than USD 150 billion in 2023, compared to USD 1 billion at the beginning of 1990s, among other factors to GDP increase, job creation and foreign exchange output. India succeeded in its export business on software and services export; this was not a chance occurrence.

Arora and Athreye (2002)[7] contend that the government of India was central through liberalization of trade in services, making investments in telecommunications infrastructure and the promotion of industry-academia relationships. Besides this, India had an abundant supply of English-speaking, computer science graduates and engineering graduates; this made multinational corporations (MNCs) locate their offshore delivery centers in India. Said as Pohjola noted, in countries where underpinning technologies are adopted and combined with skilled manpower and sound policy-making frameworks, ICT will play a major role in growth.

Other than in India, other smaller economies like Estonia, Ireland and Israel have also used exports of ICT in achieving impressive economic results. As another example, Estonia left its years of stagnation under Soviet rule to emerge as a world leader in e-governance and ICT services by digitizing its governmental sector and promoting an attitude towards innovation. Ireland, too, had reinvented itself to be a European center of technology through tax incentives, simplification of regulations and development of high skilled workforce. Such nations showed that so long as the match of regulatory support, investment in human capital and capacity of institutions is right, even smaller or less industrialized countries can create a niche in the world ICT market.

Other examples in terms of how strategically aimed ICT policies can result in nationwide restructuring and global competition are evident in East Asia, with South Korea and Singapore being some of the latest examples. Digital trade policies and smart city policies helped South Korea to become one of the biggest exporters of hardware and Singapore to become a regional hub of ICT services. The digital infrastructure and focus on research and development (R&D), coupled with public-private partnerships also contributed to South Korea being a digital trade

leader. The holistic strategies of these countries were based on integrating industrial policies, educational, and reforms and integration into the world market as the means of developing world-class ICT industries. Their trajectories offer insights into how ICT can be embedded within broader economic development strategies to enhance productivity, innovation, and export performance.

Exporting countries in Southeast Asia such as Indonesia, Malaysia, the Philippines, Singapore, and Thailand have also caught up in terms of integrating ICT in their export policies.[8] The study confirm that these nations were led by the ICT Development Index (IDI) as a measure of the national ICT policies and improvement. They found that access and use of ICT was steadily making the cost of trade cheaper and the number of services exports growing. The case of particular interest is that of Malaysia and the Philippines which have grown big ICT-based components of business process outsourcing (BPO) industries that employ millions and bring in a lot of export income. These are not only developments that have augmented their service industries but have spewed over the education, telecommunications and urban development.

Moreover, empirical research findings in advanced economies support the fact that ICT export shows a high correlation with the economic growth. In a study conducted by Sinha (2017) on OECD nations between 1991 and 2015, it was established that the exports of ICT were positively associated with GDP, internet usage number, and even the environmental sustainability of the nations. In a similar manner, Appiah-Otoo and Song[9] showed that adopting ICTs were of benefit to both poor and rich nations though the development was more pronounced in the developing economies since they experienced the rapid catch-up effect. The results particularly apply to the rest of the world, particularly the countries, such as Pakistan, whose digital economy is in the early stages of development yet can grow in size with proper policies. The message that cuts in all these success stories is the fact that ICT does not grow in a vacuum. It is a result of informed policies that include education transformation, modernization of the regulatory system, mobilizing the private sector, and integrating the international trade to the country. These nations undertook investing in their own population, developed institutional capabilities, and set up

providing environments to innovation. In addition, they have embraced fair governance systems that picked changes in technology and market environment fast.

Objective of the study

To identify the factors that effects ICT exports of Pakistan.

To provide policymakers with recommendations on leveraging ICT exports as a potential catalyst for economic revival.

Literature Review

Das examined to explore the benefits of ICT in education sector and in the enhancement of teaching and effective introduction of ICT in education. He used qualitative data for the study and used questionnaire and interview based study to get the results and got that Employing the advanced ICT tools can improve the quality of service of this sector and can also prove to be economical. It can provide employment opportunities to the masses in the technological-savvy world.[10]

Mania and Rieber (2019)[11] examined the relationship between export diversification and economic development strategy through the lens of sustainability. The study used a balance of payments constrained growth model in order to compare the capacities specifically the productive capacities that come with the diversification of exports with the external constraints of the countries. The study came to the conclusion that every export basket doesn't have the same potential for growth and development therefore, the baskets must be assessed by taking into account the country's capacity to develop a productive structure.

The study examined that the impact of ICT on labor productivity and creating employment opportunities and used the descriptive analysis to get the relationship of ICT on labor productivity. The results were that the number of IT professionals have increased but in order to

fully exploit the potential of this sector government needs to provide ample opportunities and persistent professional and skills development programs are required.[12]

The study analyzed the effect of internet access on services export diversification. The study makes use of panel data consisting of 131 countries and proves that there is a positive link between internet and services export diversification. The association is linked with the level of innovation in the country, export merchandise, export product concentration, and on the size of FDI inflows. The study also highlighted a need for digital infrastructure development and regulations that will help in the provision of the internet especially in developing countries.[12]

Malik and Velan provides a comprehensive investigation of factors influencing India's IT software and service exports. The research implements the Auto-Regressive Distributed Lag (ARDL) framework to analyze both immediate-Time effects and permanent-Time structures by employing data from 1980 through 2017. The major variable utilized in the study include human capital, exchange rate, investment in IT, external demand, and openness index. The study analyzed that ICT exports have significant relationship with human capital, exchange rate, investment in IT, external demand, and openness index.[13]

Altman & Bastian found that all sectors' growth had significantly but the services sector improved too much. This made the lives of masses easier. The growth of almost all the sub-components - which includes internet traffic, e-commerce business across borders, flow of information, e-learning, etc. - of services posted growth around 50% during the peak hours of Covid-19.

Appiah-Otoo and Song analyzed Which type of countries – poor or rich – tend to get more benefits from a paradigm shift towards ICT? They used Aggregate production function approach has been utilized to assess the impact of ICT on 123 countries and the results were ICT positively effect all set of countries, but the impact has been more prominent in poor countries.[1]

Nabi, *et al.,* (2022)[12] analyzed the link between FDI, ICT, international trade, and economic growth by using the Pooled mean estimator on a dynamic ARDL model to conduct robust analysis

and got the results that ICT has a significant negative effect on economic growth while FDI and trade positively affect the economic growth in the long run.

Malik and Velan[13] adopt a more nuanced approach by use considering telecommunications infrastructure investments. A lot of studies showed that the cross sectional data have limitations foe the time specific dynamics. Their studied used time series data to show short term as well long term relationship by using ARDL model for better results. He found that there is significant relationship of ICT exports and economic growth of the India.

Methodology

The research is based on secondary data. For analyzing the proposed research questions the study relied on the techniques of time series analysis. For analyzing the link between the information and communication technology exports and economic growth of the country the study employed the time series data from 1992 to 2023. ARDL model has been used to calculate the results. Before estimation, unit root tests using the Augmented Dickey-Fuller (ADF) method were performed to determine the variables' order of integration. The findings indicated a combination of I(0) and I(1) series, supporting the use of the Autoregressive Distributed Lag (ARDL) model. The ARDL bounds testing approach was selected because it handles regressors with mixed integration orders, provides reliable results in small samples, and enables the concurrent estimation of short-term and long-term relationships.

Long-run coefficients were estimated using the ARDL model, with short-term dynamics captured through an error correction model (ECM). The ECM not only measures the immediate effects of explanatory variables but also indicates how quickly the system adjusts toward the long-term equilibrium. This method helps determine whether deviations caused by shocks are temporary or lasting. To ensure the results are reliable, diagnostic tests such as serial correlation, heteroskedasticity, and stability assessments were conducted.

This methodology combines theoretical foundations with strong econometric methods to systematically examine the macroeconomic factors influencing Pakistan’s ICT exports. It fills a

significant research gap by offering context-specific insights into the short- and long-term determinants of ICT exports.

lnICT exports= αo+ α1 FDI ICT+ α2ln exchange rate+ α3ln HC+ α4ln ED+ μ

ICT_Exports = Value of ICT exports from Pakistan (USD million)

FDI_ICT = Foreign direct investment in the ICT sector

Exchange_Rate = Official exchange rate (PKR/USD)

Human_Capital = Proxy variable using enrollment in higher education

External_Demand = Proxy using the weighted GDP of major ICT-importing countries

μ= Error term

Results

Unit root testing was done using the ADF method, a regression model estimates the main results and an ECM is used to analyze the short-run interactions. The main aim is to find out how macroeconomic factors affect the amount of ICT goods exported from Pakistan.

1. Unit Root Test (ADF Test)

To determine the stationarity of the time series data, the Augmented Dickey-Fuller (ADF) test was applied. The test results indicate that:

When we consider levels, most of our variables (LITEXP, LER, LHC, LED) are not stationary.

Once the data are first differenced, all variables are stationary and, therefore, are I(1).

Foreign direct investment variable is stationary at level I(0).

Table 1: ADF Test Results

Variable	ADF Statistic (Level)	p-value	ADF Statistic (1st Difference)	p-value	Order of Integration
LITEXP	-1.371634	0.8495	-6.403241	0.0000	I(1)
LFDI	-3.725161	0.0354	—	—	I(0)
LER	-2.508342	0.3219	-4.639296	0.0009	I(1)
LHC	-0.318783	0.9863	-4.253315	0.0023	I(1)
LED	-1.808999	0.6760	-4.838961	0.0005	I(1)

Long-Run Relationship (Levels Regression)

Regression analysis provide the long-term relationships between IT and communication technology exports and the foreign direct investment, exchange rate, human capital and external demand variables. It has been found through the results that:

Foreign Direct **Investment** and **External demand** are significant for the purpose of this study at the 10% significance level.

Exchange Rate (LER) and **Human Capital (LHC)** did not make a difference in the long-run model. In the long-run version of the model, experiments with LER and LHC did not make a difference.

Table 2: Long-Run Regression Results

Variable	Coefficient	t-Statistic	Significance
LFDI	-0.571728	-2.018209	** (10%)
LER	-0.341577	-0.245651	Not Significant

Variable	Coefficient	t-Statistic	Significance
LHC	0.225872	0.443331	Not Significant
LED	0.915204	2.120988	** (10%)

ECM Regression Highlights

Variable	Coefficient	t-Statistic	Significance
D(LFDI)	-0.067977	-2.487326	(5%)
D(LFDI(-1))	0.216153	5.707873	***(15%)
D(LER)	-0.153145	-3.197691	* (5%)
D(LHC)	1.134946	4.727451	* (5%)
D(LED(-1))	2.784348	3.859146	** (10%)
D(LED(-2))	2.918075	3.953901	** (10%)
CointEq(-1)	-0.505483	-5.561043	* (5%)

Notes: *, *, *** *denote 5%, 10%, and 15% levels of significance respectively.*

Discussion

FDI in ICT in Pakistan is negative in the short run due to import of the technology likewise equipment, software, infrastructure. The adjustment cost is also very high, profit repatriation and structural transition are also main causes of negative FDI in ICT of Pakistan. On the other hand in long run technology transfer, skill development, infrastructure improvements market expansion and knowledge economy growth causes positive effect of FDI in ICT of Pakistan in the long run. FDI greatly improves ICT exports in the initial years and remains a positive factor in the exports model after a long time. This is what endogenous growth theory predicts, claiming that capital

flows from outside such as FDI, support the spread of technology, encourage research and development and result in knowledge being passed among the local population (Romer, 1990). A drop in the exchange rate temporarily lessens ICT exports, but this effect does not remain strong with time. Such arguments fit with the **j curve** logic, where the depreciation of a country's currency makes imported technology and services used by ICT firms more expensive, causing them to lose their competitiveness in exports during the short run. According to Sahoo & Nauriyal[14], Uncertainty caused by exchange rate fluctuations leads to unpredictable prices for ICT service exports, putting exporting firms at risk. CIET exports increase due to human capital in the short run, yet this is not the case in the long run.

Human Capital **Theory** states that developing skills and education increases work efficiency which is highly relevant for demanding areas of work, so in ICT. Following upgrades in education such as more students enrolled in higher education, the number of skilled ICT labor immediately rises. In both short- and long-term periods, ICT exports are strongly helped by rising external demand for LED. It supports the theory that expanding exports is mostly influenced by demand from foreign markets. With more countries reliance on digital services, exporters in Pakistan can take advantage of this situation. Having a strong and negative ECM term (-0.505) proves that there is a stable equilibrium point for the model. The model assumes that economies should regain equilibrium after being disturbed by shocks. The ICT sector appliable part of yearly disequilibrium (about 50.5%) shows a slow pace of the sector returning to steady long-lasting growth trends.

Conclusion and Suggestions

Strengthen Digital Infrastructure Nationwide

Rural and semi-urban areas need more attention when it comes to building reliable, fast internet and cloud networks. PPPs encourage a quick increase in digital connectivity, lower the digital gap between rural and urban areas and support more people to get involved in information and communication technology-related activities. ITCT gives people more opportunities to gain education and training.

Enhance Human Capital through ICT Education and Training

The government should add ICT training to the usual curriculum, broaden vocational education and help develop STEM programs. More effort and support should be put into programs like DigiSkills and the National Freelance Training Program, while also strengthening industry relationships and providing good quality help.

Improve Policy Coherence and Institutional Support

Form a main ICT export promotion body to help different ministries (IT, commerce, education) coordinate and guide all efforts towards Pakistan's overall export strategy. Clear rules in these areas are needed to bring in foreign investors and support local entrepreneurship.

Facilitate Export-Oriented Foreign Direct Investment (FDI)

The research shows that FDI's current impact on GDP is negative, implying that some activities are not well distributed. For better results, money from FDI ought to go to BPO centers, software parks and similar entities that allow for ICT exports. Having clear rules and perks motivates companies to invest again, share new technologies and make more jobs. Expand your orders from abroad and sell to a wide range of buyer countries.

Leverage External Demand and Diversify Export Markets

Since ICT exports mainly depend on demands from abroad, ICT trade diplomacy has to handle digital agreements, work together on cybersecurity and establish acceptance of online credentials. Accessing new markets in Africa, Southeast Asia and the Middle East should work together with efforts in the US and UK.

Monitor and Evaluate ICT Sector Performance

Having an ICT export monitoring system at the Ministry of Commerce in real-time will help inform policy decisions with data. Refining the approach and making changes more visible can be achieved by doing impact assessments and consulting stakeholders on a regular basis.

Digital technologies have emerged as a potent force for systemic change, societal advancement, and economic growth in the current global environment. The 21st century has

ushered in a fundamental shift from traditional, production-based economies to those centered on digital knowledge, driven largely by the rapid growth of the information and communication technology (ICT) sector. ICT has reshaped how companies' function, how governments serve citizens, and how people engage in economic life. Through data-centric trade, online commerce, and seamless international communication, it has accelerated globalization, increased productivity, and stimulated innovation.

ICT exports are now a vital component of service-based trade worldwide. Nations like India, Ireland, and the Philippines have used their ICT industries strategically to boost foreign earnings, generate employment, and lessen reliance on older industries. According to the OECD, the global digital economy is worth about $12 trillion, with ICT-based services making up a large share of global GDP and trade expansion. E-commerce alone accounts for over 15% of the global economy and has grown nearly twice as fast as GDP over the past 15 years.[8]

Pakistan, on the other hand, continues to rely largely on traditional industries like cotton, rice, and textiles—sectoral areas that have experienced slow growth and dwindling global competitiveness. With an export-to-GDP ratio of just 10.37% (World Integrated Trade Solution, 2023), Pakistan is among the least export-focused economies. The nation has not yet fully tapped into the potential of the digital economy, despite having a sizable and youthful workforce. The ICT sector contributes only about 1% to the national GDP, indicating a significant missed opportunity.

The global services industry has grown significantly over the last 20 years. Services have shown greater adaptability in times of crisis, like the COVID-19 pandemic, and resilience to economic disruptions than manufacturing or agriculture. Research by Altman and Bastian found that while most industries shrank during the pandemic, digital services such as online education, e-commerce, internet use, and information sharing grew by over 50%.

Recently, the Pakistani government has started to treat ICT as a national priority. Launched in 2019, the “Digital Pakistan Vision” seeks to reduce the digital gap, raise digital skills, improve internet access, and promote online governance and commerce. Public programs like

the National Freelance Training Program (NFTP) and DigiSkills have been created to train young people in ICT-related abilities. The creation of Special Technology Zones (STZs) aims to draw investment, support innovation, and make the business environment more conducive to local startups and foreign tech companies. Nevertheless, despite these encouraging steps, implementation has been uneven, with numerous initiatives hampered by bureaucratic red tape, financial problems, and a lack of cooperation between the public and private sectors.

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