

Role of Information and Communication Technology (ICT) for Economic Growth in Nepal

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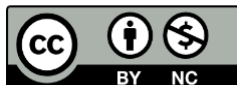
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Abstract

Information and communication technology (ICT) refers to a broad range of technological resources and techniques used to send, store, produce, share, or exchange data or information as well as a number of technologies that make it easier to communicate, such as the internet, wireless networks, mobile phones, and other channels of communication. In this research, key informant interviews (KII) were conducted with NTA representatives, executive members, Mayor, Deputy Mayor, Ward Chairpersons of Pokhara Metropolitan City, representatives from Nepal Telecom. ICT has played a significant role in economic growth by enabling business to increase productivity, reduce costs, and improve efficiency. It can benefit a number of economic sectors, including health, education, industry, tourism, service, agriculture, culture, banking and entrepreneurship. ICT has transformed education by making it more accessible, flexible, personalized, and effective enabling learners to access educational resources from anywhere. OCE can be benefitted through ICT with respect to re-engineering of EMIS. It improves healthcare delivery by enabling remote consultations, telemedicine, and digital health records facilitates disease surveillance, monitoring, and research and improves financial inclusion through access to mobile banking, digital payments, and online financial services. Investing in human capital is critical to promoting ICT use in all sectors of the economy. Although ICT has many positive effects, it is crucial to acknowledge and deal with any negative effects in order to guarantee that technology is used responsibly and with respect.

Keywords: digital Nepal, economic growth, FTTH, ICT access, internet

Introduction

The communication industry has been instrumental in promoting economic development in Nepal and has emerged as a dynamic key sector for the economic growth and development of a country (Pokhrel, 2022). Telecommunication sector is

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significant to the development of multiple of economic sectors as education, agriculture, banking, commerce, healthcare, tourism, environmental management and energy. Information technology as a driver of socio-economic development is a vital issue for developing countries like Nepal (Pradhan & Metcalfe, 2002). Declining hardware and software cost, increasing benefits and intense competition have made telecommunications companies to diversify their offers and propose varieties of services at the public level. Information technology includes transmission of data, voice and video through electronic media. It refers to a wide range of technological tools and resources used to transmit, store, create, share, or exchange data or information and a variety of technologies that facilitate communications including the internet, wireless networks, mobile phones and other means of communication. The telecom industry has been one of the fastest-growing industries in Nepal, contributing significantly to the country's economic growth (MoF, 2022).

Information and communication technologies (ICTs) play a significant role in all aspects of modern society at micro and macro-economic levels. The role of ICT in economic development is viewed within a conceptual framework of multiple dimensions that impact on socio-economic development as production, consumption, distribution, exchange, business, technology, society and culture (Boateng et. al, 2008). To secure a multi-dimensional transformation of the economy, Digital Nepal Framework is put forward by the government of Nepal for smooth public service delivery through digital technology. ICT has transformed the way we live, work and interact with each other. As ICT affect everyday lives, they also impact the macroeconomic growth. Digital Nepal Framework (DNF) seem to be the government's ambitious strategy for promoting digital literacy and advancing ICT in Nepal. The framework was designed as a guide for how digital initiatives might support economic expansion. It looks for innovative ways to effectively solve significant societal issues and pinpoint opportunities for Nepal to participate in the global economy (MoCIT, 2019). The activities that make up the DNF are represented by eight categories as the digital foundation, agriculture, health, education, energy, tourism, finance, and urban infrastructure (Bajracharya, 2022).

The telecom industry is often referred to as a "recession-proof" industry because it has consistently shown resilience in times of economic downturns. This is due to the fact that telecommunication services have become an essential part of modern society, and are needed for both personal and business communication. It is a universal need. The demand for telecom services is not limited to any particular sector, situation and region and will continue to increase in every situation.

According to the Central Bureau of Statistics (CBS, 2020), information, Communication and Technology (ICT) sector has been contributing Rs77.16 billion to the Gross Domestic Product (GDP) of the country. The telecom sector has made a significant contribution to the GDP of Nepal over the years. According to the Nepal Telecommunications Authority (NTA), the telecom sector contributed 2.7%

to Nepal's GDP in the fiscal year 2019/2020. According to CBS, in the fiscal year 2019/20, ICT contributed to 2.22 percent to the GDP.

Briefly probing to the relevant literature, smart cities aim to integrate technological advancement with various functions/components including mobility, management of energy, natural resources, water, and the waste cycle, air quality, land use, service network, construction, but also the economy, social participation, more employment, and citizen safety (Campisi et al, 2021). The ability of business to raise production, cut costs, and improve efficiency has made telecommunication and information technology a vital contributor to economic growth. It has also generated fresh chances for expansion and development across a number of industries (Soja, & Weistroffer, 2019).

ICT tools manage and analyze massive data efficiently and allow businesses to communicate with customers, suppliers, and employees in real-time, irrespective of their location. Technology based automatized processes of businesses lead to increased efficiency and productivity and reduces errors, saves time, and frees up employees to focus on more valuable tasks (Dwivedi et al. 2021).

In this context, this research was conducted to explore the development of ICT services and to analyze telecommunication and information technology for economic growth of Nepal.

Methods and Materials

Study Area

Pokhara Metropolitan City is one of the 753 local governments, and is located in the Gandaki Province of Nepal. Being one of the most popular tourism cities, it has unique socio-economic importance. This study employed a case study of Pokhara Metropolitan City, with the case study approach allowing an in-depth analysis of the roles of ICT in various socio-economic sectors.

Key informant interviews (KII) were undertaken with NTA representatives, executive members, Mayor, Deputy Mayor, Ward Chairpersons of Pokhara Metropolitan City, representatives from Nepal Telecom. The programme was organized by Techpana to explore their views and opinions. The Key informants were selected employing an ethnographic approach. The focus group discussions (FGDs) with local bodies, Telecom service providers and regulatory body (NTA) were conducted to draw their experiences and perceptions (Bohnsack, 2004).

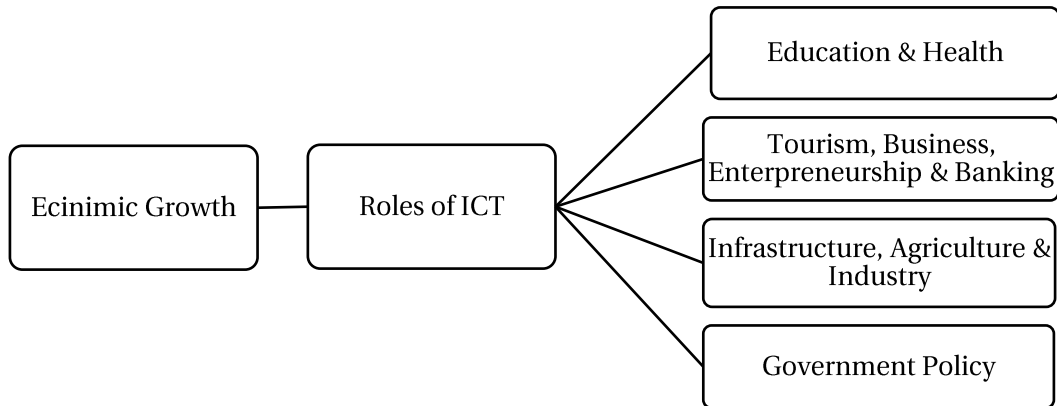
Methods

The study used explanatory design with qualitative methodology. During this process subjective realities were collected by qualitative approach. Justifying the use of qualitative research in ICT to collect subjective realities involves exploring the unique strengths and advantages of the issue. This method prioritizes understanding over measurement, embraces complexity and offers space for the

respondents to share their own perspectives and helps the researcher to unveil the diversity of the experience.

Conceptual Framework

The conceptual framework starts with the goal of economic growth and show how ICT plays a crucial role in achieving it highlighting the roles of ICT in different economic sectors. This design shows the contribution of ICT in economic growth from both the supply side and demand side.



Results and Discussion

Roles of Communication and Information Technology in Different Economic Sectors

Information and communication technology has played a significant role in economic growth by enabling business to increase productivity, reduce costs, and improve efficiency. It has also created new opportunities for growth and development in various sectors (Soja, & Weistroffer, 2019). The use of Information and Communication Technology (ICT) has become an essential element in promoting economic growth and development in developing countries like Nepal. The conceptual framework of the use of ICT for economic growth can be viewed from different perspectives, including the following:

Use of ICT in Education. ICT can improve access to education by providing online learning resources, virtual classrooms, and distance education. It can also enhance the quality of education by enabling personalized learning, interactive teaching methods, and real-time feedback (Halim et al, 2022). ICT enables the development of e-learning platforms and resources, such as online courses, educational videos, and digital textbooks which makes education more accessible, flexible, and personalized, enabling learners to study at their own pace and from any location, with collaborative learning, where learners can work together on

projects, share resources, and communicate with each other through digital platforms.

Most of the participants agreed that ICT improves student engagement and teamwork skills, and also makes it easier for teachers to manage and monitor student progress. It enables distance learning, where learners can participate in classes and interact with teachers remotely through video conferencing and other online communication tools. Thus, makes education more accessible for learners from remote areas or with other constraints that prevent them from attending traditional face-to-face classes, enables the analysis of student performance, helps to identify areas where students need additional support to improve student learning outcomes. Overall, ICT has transformed education by making it more accessible, flexible, personalized, and effective enabling learners to access educational resources from anywhere, collaborate with peers and teachers, and receive more personalized instruction. As technology continues to evolve, we can expect ICT to have an even greater impact on education in the future. Most of the teachers in Nepal required to teach online during the pandemic in spite of lack of ICT knowledge, skills and devices. On the other hand, they had to go through the learning process quickly to teach their students especially in inaccessible areas (Niraula, 2021).

The integration of ICT into the re-engineering of examination management information system significantly improves efficiency, transparency, accuracy and effectiveness of university examinations. To fulfill this goal, the office of the Controller of Examinations undertakes the responsibility of students' evaluation.

- ICT enables online registration and application process for exams and reduces paper work, minimizes errors and makes total process convenient. Students can fill out forms, upload necessary documents and make payments electronically through online portal.
- Office of the Controller of Examination can be benefitted through ICT with respect to examiner roster management, question bank management, exam center management, exam copy collection, copy packaging, dispatch and collection, scrutiny management, result processing and publishing, transcript and provisional certificate management, original certificate management, convocation management, finance management, administration and store management, online certificate verification system. And thus, helps to build trust among the education stakeholders.

Incorporating ICT into the re-engineering of EMIS increases efficiency, enhances transparency and reduces administrative burden and improves overall quality of examination.

Use of ICT in Health. ICT improves healthcare delivery by enabling remote consultations, telemedicine, and digital health records facilitates disease surveillance, monitoring, and research. It enables the delivery of medical services

and consultations remotely through video conferencing and other communication technologies which makes patients easier to access medical care, especially for those who live in remote areas or have mobility constraints. ICT promotes electronic health records, which allow healthcare providers to access and share patient information securely and efficiently improving the coordination of care and reduced medical errors. It enables the development of wearable devices, such as fitness trackers and smart watches that monitor vital signs and health indicators to track their health status and receive alerts if there are any changes (Shei et al, 2022). ICT based development of health information systems collect and analyze data about disease outbreaks, public health trends, and healthcare service utilization to monitor and respond to health emergencies. It enables medical researchers to collaborate and share data more effectively, improving the speed and efficiency of medical research and leads to the development of new treatments and therapies for a variety of health conditions. ICT, as such, has transformed health by making it more accessible, efficient, and effective and has enabled patients to access medical care more easily, improved the coordination of care, and enabled healthcare providers to make more informed decisions. As technology continues to evolve, we can expect ICT to have an even greater impact on health in the future.

Use of ICT in Infrastructure Development. ICT improves infrastructure development as roads, smart cities, smart transportation, and smart buildings (Mboup, 2017). It facilitates efficient energy and development of smart infrastructure, which uses sensors, data analytics, and automation to optimize the use of resources, reduce energy consumption, and improve safety. It enables the remote monitoring and management of infrastructure, as power grids, water systems, and transportation networks to improve the efficiency of infrastructure operations and reduce downtime and maintenance costs. It develops communication networks, as broadband internet, mobile networks, and satellite systems. These networks collectively develop smart infrastructure, which improve communication and collaboration between different parts of the infrastructure and enable remote access to information and services. Development and expansion of ICT services offers broader connectivity. ICT enables the collection and analysis of data about infrastructure operations, as traffic flow, energy consumption. This helps infrastructure managers to make more informed decisions and optimize the use of resources. ICT enables the use of advanced modeling and simulation tools for infrastructure planning and design and improve the accuracy and efficiency of infrastructure projects and enable the testing of different scenarios and solutions before implementation. ICT helps to transform infrastructure by making it smarter, more efficient, and more sustainable. It enables the optimization of resource use, improved safety concerns.

Use of ICT in Agriculture. ICT offers access to information for farmers about new farming techniques, weather forecasts, market prices, and other critical information which helps them make informed decisions about when to plant, harvest, and sell their crops, ultimately increasing their yield and profitability. It enables precision farming, where farmers can use technologies such as GPS,

drones, and sensors to monitor and manage crops in real-time and optimize their use of resources as water, fertilizer, and pesticides, reducing waste and increasing efficiency. ICT makes the farmers easier to access markets and connect with buyers. Farmers sell their products directly to consumers through online market, mobile apps, and e-commerce platforms that minimizes the role of intermediaries and increase profit margins. ICT enables financial inclusion for farmers, who were previously excluded from formal financial systems. Mobile banking, microfinance, and other digital financial services have made it easier for farmers to access credit, savings, insurance, and other financial products. It helps farmers build climate resilience by providing early warning systems for extreme weather events and enable them to take preventive measures to protect their crops and livestock. In this way, ICT has the potential to transform agriculture by making it more productive, sustainable, and profitable.

Use of ICT in Industry. ICT replaces manual labor through the automation of many industrial processes and increases efficiency. Automation allows for continuous production, reduces downtime and increasing output. It enables the collection and analysis of large amounts of data from industrial processes to identify inefficiencies, improve processes, improve supply chain management and reduce costs by tracking inventory, shipments, and orders in real-time improving customer satisfaction. It establishes communication and collaboration among employees, suppliers, and customers, making it easier to share information and effective coordination to increase efficiency and productivity. ICT enables companies to develop new products and services by providing access to new technologies and markets for further development of new industries and the creation of job opportunities. It has transformed industry by making it more efficient, productive, and innovative to reduce costs, improve quality, and better serve their customers, ultimately leading to increased profitability and competitiveness.

Use of ICT in Tourism. ICT facilitates travelers to book flights, accommodations, and tours online reducing the role of travel agents and intermediaries and make travel more affordable, accessible and reliable. It provides travelers with easy access to information about destinations, attractions, activities and events and help travelers to plan their trips more effectively, improving their travel experience. It also enables tourism businesses to reach a wider audience through digital marketing channels, as social media, search engines, and email marketing. It helps to increase tourism revenues and promote local businesses. The development of mobile apps for tourism, such as travel guides, translation tools, and navigation systems make travelers easy to navigate and enjoy their destinations and promotes smart tourism. Smart tourism destinations may use sensors to monitor crowd levels, provide personalized recommendations, and optimize resource allocation. Thus, ICT has transformed tourism by making it more accessible, affordable, and enjoyable for travelers. It has enabled tourism businesses to reach a wider audience and improve their marketing efforts, leading to increased tourism revenues and economic growth.

Use of ICT in Business. ICT improves business efficiency online collaboration tools, remote work, and supply chain management; facilitates e-commerce, online marketing, and customer service. Email, video conferencing, instant messaging, and social media have revolutionized businesses communication with the stakeholders. It promotes E-commerce and allows businesses to reach a broader customer base without the need for a physical store. Cloud computing allows businesses to access computing resources, software, and data storage on-demand, without the need for expensive hardware and infrastructure. This enables businesses to scale up or down their computing resources as needed, without incurring significant costs. The integration of ICT into businesses has transformed the way they operate, communicate, and compete in the global market with new opportunities for growth, increased efficiency, and improved decision-making.

Use of ICT in Entrepreneurship and Innovation. Entrepreneurship and innovation are closely related concepts that refer to the use of technology to create new businesses, products, and services. ICT promotes entrepreneurship and innovation in the economy. It creates new business opportunities, enhances existing businesses, and improves productivity and efficiency. ICT reduces the cost for entrepreneurs to start businesses and launch a business from anywhere in the world and reach a global market. They can also access tools and resources to manage their business, such as accounting software, marketing tools, and cloud-based storage solutions. It provides new business models powered by ICT platforms to develop and test new ideas quickly. It creates new markets and opportunities for entrepreneurs. The rise of e-commerce has created a massive market for online retailers, while the growth of social media has created new opportunities for digital marketing and advertising through local and global collaboration. With online collaboration tools, entrepreneurs can work with partners and team members from around the world, allowing them to tap into diverse talent pools. ICT has empowered entrepreneurs and innovators to develop new products and services, disrupt traditional industries, and create new markets. It has lowered the barriers to entry, accelerated innovation, and enabled collaboration on a global scale.

Use of ICT in Banking. ICT improves financial inclusion through access to mobile banking, digital payments, and online financial services. It also enhances financial transparency, risk management, and fraud detection. It offers customers access to banking services online or through mobile apps. This enables customers check their account balances, transfer money, pay bills, and apply for loans, without visiting a physical bank branch. ICT enables banks to provide 24/7 access to their services through ATMs that allow customers to withdraw cash, deposit checks, and perform other transactions outside of regular banking hours. ICT helps banks to analyze large amounts of data to identify patterns and trends, which can inform business decisions and help banks better understand their customers' needs and preferences. ICT improves the security of online banking by providing advanced authentication technologies to protect customers' data and transactions from cyber threats. ICT has enabled the rise of Fintech, which refers to technology-based companies that offer financial services such as payments, lending, and

investing which disrupts traditional banking by offering innovative solutions that are faster, more convenient, and more. ICT has revolutionized the banking industry by providing innovative solutions that improve customer experience, increase efficiency, and enhance security. As technology continues to evolve, the banking industry will need to adapt to meet the changing needs and expectations of its customers.

Use of ICT in Governance Policy. The effective use of ICT for economic growth requires the development of appropriate policies and governance frameworks. Governments must create appropriate environment for ICT use by promoting competition, protecting intellectual property rights, and ensuring data privacy and security. It enables governments to provide services and interact with citizens online and make data available to the public. Governments engage citizens in policy-making processes through online forums, social media, and other digital channels and get creative feedback, logical opinions and broader views useful for policy decisions. ICT strengthens cyber security policy to protect critical infrastructure and sensitive data from cyber threats. It helps to highlight the digital divide between those who have access to technology and those who do not to bridge the divide by providing access to technology and digital literacy training to underserved communities. Thus, ICT has enabled governments to become more efficient, transparent, and responsive to the needs of their citizens.

Impact of ICT on Culture. Digital archives, online libraries, and virtual museums allow people to access and explore cultural heritage from around the world and promotes preserve and share cultural artifacts and knowledge. People from different cultures communicate and share ideas more easily through ICT tools. Social media platforms and other digital channels facilitate cross-cultural dialogue and exchange and foster understanding and respect. ICT provides people with access to information about different cultures and traditions. Online resources such as blogs, videos, and podcasts can provide a wealth of information and insights into different cultures. ICT provides new opportunities for people to express themselves creatively. Digital media, such as music, film, and art, can be shared and distributed online, reaching audiences around the world.

Development for the Expansion of ICT Services

Development of network by coordinating with the road division becomes sustainable for long distance trunk network for Nepalese telecom services. To materialize the concept of Smart City, the fiber network need to be underground by coordinating with different agencies of the government. Expansion of 4G Network coverage and development of FTTH Network should support the infrastructure for 5G. The expansion of Services with new technology should target 2 Lakh FTTH customer to 10 Lakh within 5 Years with quality enhancement through copper less (All Fiber Network) network. Telecom has been testing 5G using different bands under trial operation, and once the piloting is successful will start to begin its 5G project. Proper sharing policies of company owned infrastructures, as land, building, shelter, tower, power, and fiber network, should be adopted for optimum

utilization of telecommunication resources. Service delivery should be prompt, uninterrupted and quality assured (365*7*24hrs) with timely and effective maintenance. Prompt, responsive, quality services can assure customer care.

Major Challenges

There are challenges associated with ICT and governance. The governments must address data privacy, cyber security, and digital exclusion, while embracing technology in their operations and policy-making processes. Global media and popular culture can dominate local cultures, leading to a loss of diversity and uniqueness. ICT can lead to cyberbullying, which can be harmful and destructive to individuals and communities. It can be addictive, leading to excessive screen time and social isolation, which can have negative impacts on mental and physical health. It can raise concerns about privacy, as personal data can be collected, shared, and used for commercial or other purposes without people's consent. Inadequate infrastructure in rural areas and high cost of services are other challenges in this regard. ICT can also be used to spread disinformation and misinformation, which can undermine the democratic process and create confusion among citizens. Social media platforms, in particular, have been used to spread false information and propaganda during election campaigns.

Conclusion

In conclusion, the contributions made by ICT in different economic sectors can have a big impact on economic expansion and economic growth. ICT promotes entrepreneurship, encourages innovation, facilitates communication, boosts productivity, enhances access to information, and increases connectivity. Governments and businesses can increase efficiency, save costs, and open up new trade and investment opportunities. ICT can benefit a number of economic sectors, including health, education, industry, tourism, service, agriculture, culture, banking and entrepreneurship. ICT optimizes production processes, and enhances supply chain management.

Thus, ICT is a crucial enabler of economic growth. By investing in ICT infrastructure and technology, countries can accelerate their economic growth, reduce inequality, and improve the quality of life of their citizens. It has brought many benefits, it is important to recognize and address its negative impacts to ensure that technology is used in a responsible and respectful manner. Governments, businesses and other stakeholders need to work together to address the challenges and fully realize the potential of ICT for economic growth. Investing in human capital is critical to promoting ICT use in all sectors of the economy. Our daily lives and business practices are constantly being altered by the internet. E-governance is a set of procedures that government organizations must create and implement in order to successfully deliver services to the general public.

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