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Digital policy imperatives for advancing Nepal's digital economy

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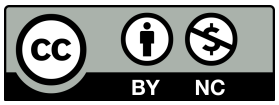


Abstract
While neighboring economies have successfully diffused modern digital technologies including information and communication technologies (ICTs) to transform a significant share of economies, Nepal is struggling at the initial planning stage of designing digital policies and adopting to digital technologies. This policy research paper puts an effort to analyze Nepal's digital economy policies, strategies, and key practices. The author reviewed literatures, digital policies and reports, and conducted key informant interviews (KIIs) and In-depth Interviews (IdIs) with leadership, policymakers, thematic experts, and private sector stakeholders. The findings show that macroeconomic outlook and indicators are deeply interconnected to transformative digital vision and commitments of leadership, followed by executive capacities of policymakers and private stakeholders with confusions on foundational digital policies and strategies and taking investment initiatives for infrastructure development and digital integration. Engaged governments, policymakers, ICT professionals and experts are struggling to develop an integrated vision for digital economy in multi-dimensional digital ecosystems, convincing digital governance framework, crystalize macroeconomic and sectoral policies, digital actions and develop result-paths for state and non-state stakeholders. A review on governing policies for productive sector penetration strategies with a *balance scorecard, enterprise architecture, legal and regulatory framework* (BSE-SELF) regulatory architect, and collaborative investment strategies are key recommended actions to enhance domestic supply side reform. A sequential design of governance framework and roadmap are required for foundational interoperable digital public infrastructures (DPIs) to unlock the digitalization of sectoral platforms and develop infrastructure funding approaches to enable scaled platforms, foster export growth potentials, and ensure human capital development.

Keywords
Digital economy, digital policy, digital governance, application of ICTs, digital transformation

1 Introduction

Learning from the more recent international experiences, the Government of Nepal (GoN) is slowly adopting the emerging digital technologies and ICTs for development planning and public service delivery (PSD) to drive socio-economic transformation and changing lives and societies. Concurrently, the emerging private sectors are looking for investible ICT enhanced projects. The Corona Virus 2019 (COVID-19) pandemic accelerated the digital adoption in Nepal's business, education to health sectors, which led to surge in startups focusing on telemedicine, online education, and e-commerce. The impacts of digital adaptation appear on improved macroeconomic outlooks with the digitally and technologically-enhanced systems of production or with internet penetrated production, besides the subsequent distribution and consumption of goods and services. However, Nepal's macroeconomic contexts hardly exhibit an effective growth rate in key sectoral outputs that can be directly attributed to effective digital applications. This reluctance to change and the persistently slow pace of digital solutions adoption indicate deeper macroeconomic policy issues and structural rigidities within the economy. Even at this initial stage of digital progress, significant urban-rural disparities in access to digital technologies and services remain stark.

The digital economy in its operation is defined as the total economic value earned through the use of digital technologies to transform production processes, supply channels, and consumption patterns across core sectors. So, the operational boundaries links digital inputs to macroeconomic outputs. Therefore, existing binding constraints, policy-output disconnection, investment and public finance are the major questions of this time on this transformative digital pathway. Particularly, what is status of macroeconomic indicators connected to existing rigidities and bottlenecks that impede on improving macroeconomic outlook and impact on overall gross domestic product (GDP) through digitalization process in Nepal? Secondly, why is Nepal lagging in adapting emerging digital technologies across the production, distribution and consumption systems to increase sectoral outputs? Thirdly, how can Nepal undertake collaborative initiatives to reform its public expenditure frameworks and broader policies with a sufficient degree of disruption to strengthen the most crucial digital priorities and digital capabilities in both public and the private sector? This paper explores these critical concerns and analyzes the digital journey in the economy of Nepal.

2 Review of Literature

Evolving Digital Economies

The focus during the 1990s when the internet services had just begun was more on how emerging digital channels impact consumers and businesses. Thereafter, the digitalization process didn't only grow rapidly on itself at an unprecedented speed and scale but also transformed economic activities at the global levels. Digital economy is a rising economic model that relies on ICTs and emerging technologies across the industry sectors and society (Feijao & et. al, 2021). Literatures show that the 2019 pandemic accelerated digital adoption across the global economies and underlying sectors (OECD, 2020). The digital economy is leapfrogging with underlying ICTs infrastructures, innovation, employment impacts, governance, and partnership initiatives (UNDP, 2023). As a result of the embedded emerging technologies and innovation, optimization on demand and supply side penetration of an economy is rapidly moving ahead with a higher level of coverage (Yang & et. al, 2022).

Definitions of Digital Economy

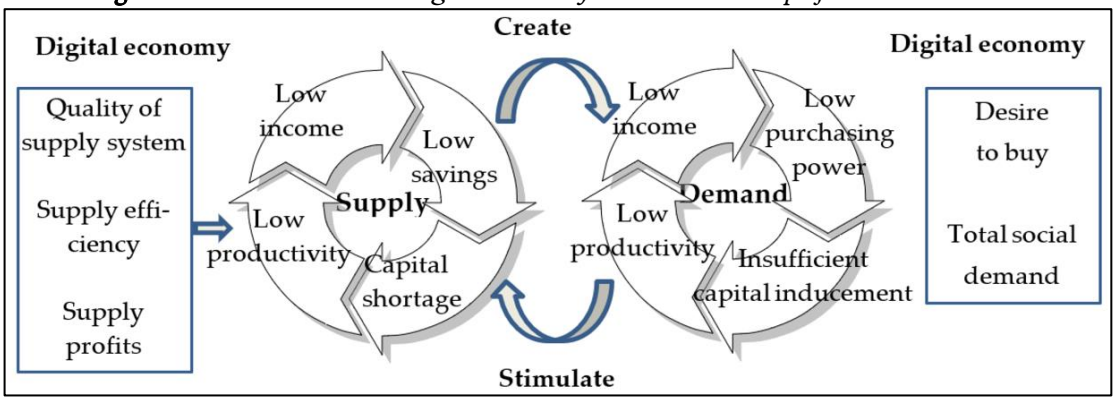
According to the World Bank defines, 'digital economy is a system of economic, social and cultural relations based on the use of ICTs.' The G20 digital economy task force (2021) added 'the broader range of activities using digitized information and knowledge as the key factors of production, modern

information networks, and effective use of ICTs for productivity growth and economic structural optimization'. In addition, OECD (2020) connects to 'the all producers and consumers including government, that are utilizing the digital inputs in their economic activities'. Therefore, differences between a traditional and a digital economy come down to paper-based works and manual processes versus emerging technology adapted systems, physical products and services versus digital products and services, brick-and-mortar versus ecommerce and digital platforms, and cash versus cashless payments in different sectors of the economy.

Intervention for an Efficient Supply and Demand Sides

Yang & et. al (2022) claims that intervention on the digital economy breaks the trap of vicious circle from both supply and demand side perspectives of digital economy (Ref. figure-1). On one hand, digitalization enhances the quality supply chain by the digitization processes and halts the cycle of poverty trap, which then helps to improve the production and supply chain efficiency in economies. On the other hand, the digital economy stimulates the demand side activities with a higher level of purchasing power and aggregate demand.

Figure 1 *Intervention on the Digital Economy to Break the Trap of Vicious Circle*



Note. Adopted from Yang & et. al, 2022

Prospects of Digital Economy of Nepal

A thorough review of structural impediments attribute to policy implementation gaps along with a fine tuning of governing policies, evolving technological paradigms such as the AI, blockchain, analytics, and Industry 4.0 can build up a future digital journey of Nepal, and improve the transformative ICT potentials and digital technologies (Chaudhary & et. al, 2021). Therefore, it is said that the 21st century is being shaped by code, algorithms, and digital networks. The speed, scale and impact of the digital economy moves faster than the traditional economy. So, this shift from a traditional economy to a digital economy is equally important to not only transform landlocked Nepal to global integration but also for being a rich nation.

Ideal Models of Digital Economies

For advancing digital economy, three regulatory and governance models for replications and / or customizations are globally well known: (a) a rapid and strategically aligned large scale investment made on national projects of 'Digital China' model that basically addressed a top-down intervention on infrastructure, data and skills by the Government of China to support on her national political goals with strict rules and regulations, (b) strong regulations with the protection of fundamental human rights, privacy, and public values for a fair market, sustainability, and inclusiveness as framed by the European Union across the Europe, and (c) a light regulatory framework that motivates the private sector-led innovation at sectoral levels governance and regulations as practiced by the USA (UNCTAD, 2025). Nepal needs to select a model from these institutional logics: state-led for speed and scale, right based regulatory for fairness, and market driven approach for innovation and vitality respectively. The common

institutional initiatives among these models are the required coordinated actions and collaborative investment initiatives integrated in governing policies, infrastructures, data security, digital skills, and entrepreneurship development in the economies.

Adoption to the International Best Practices

While observing the international best practices, Nepal can better decisively adapt to the SMS service model from Rwanda to digitized governance service model for the rural public or learn a model of Estonia to provide online service for its citizen by using the *National Identity* card and connecting creatively to small and medium scale entrepreneurs (SMEs) by offering an option through the social media commerce / mobile payment system for the different needs in various policy contexts. Observing a look at the South Asian countries, Nepal can draw lessons from India's Aadhaar-enabled Payment System and the Unified Payments Interface (UPI), which have significantly improved its financial inclusion and facilitated the sectoral digitalization. For a meaningful transformative journey through public and private sector organizations, Nepal needs to integrate its digital lens on its dozens of sectoral and sub-sectoral policies, strategies, and governing frameworks, and develop its digital toolkits to measure returns on investment.

Challenges of Developing Digital Economy

Rapidly growing connectivity surges with fiber broadband subscriptions and mobile data usage. It didn't only turn on the productive sectors of economies into teleworking, distance learning, e-commerce, and emerging technologies, but also created a digital divide, challenges on cybersecurity, and different levels of policy responses. Therefore, the way forward is to focus more on inclusive access, robust data security, and data governance to build up a resilient governance in economies. Digital growth across the globe isn't with a homogeneous rise but with diverse business applications and demographics. (OECD, 2020). Having a majority of population around 30 years of age, Nepal can take challenge of taking demographic advantage of exporting digital services to global business communities (Dhakal, 2025). In addition, a regulatory vision of integrated business mechanisms such as the *balance scorecard (BSC), enterprise architecture (EA) frameworks, legal and regulatory framework* with specific attention to BSE-SELF design on their policy review provides an opportunity of operational legal integration of private sector business with their stakeholders, financial capacities, internal business process, performance management, and learning and development of business. (Pham & et. al, 2025).

Definitions of Digital Public Infrastructure

According to G20 (2023), DPIs refer to 'a set of shared digital systems that should be secure and interoperable, and can be built on open standards and specifications to deliver and provide equitable access to public and or private services at societal scale'. OECD (2024) adds 'common, foundational digital systems that enable the delivery of services in the digital age'. Similarly, the World Bank defines as the foundational, reusable digital building blocks like digital identity, payments, and data sharing systems, designed for public benefits. The definition of International Telecommunication Union (ITU) focuses on the foundational digital systems and technologies that support the delivery of public and private services to individuals and organizations.

Challenges of Developing Digital Public Infrastructure

According to the definitions and frameworks of the International Telecommunication Union (ITU), Digital Cooperation Organization (DCO), United Nations (UN), and G20 countries, the forms of interoperability, data security, inclusive infrastructure, and digital access are the foundational parts of DPIs that help governments and private sectors to leverage their baseline frameworks, digital platforms, and digital networks to enable digital ecosystem, business transactions, and PSD. It empowers governments and business societies with effective PSD and economic opportunities. Therefore, the developing DPIs are

crucial steps for creating innovation and efficiency for digital economies, reform governance, advance technology, and integrate the global markets. Successful and resilient DPIs connect people to generate economic opportunities such as in education and health care services and social inclusion that eventually create spillover effects across sectors. But, some challenges of developing DPIs are related to existing legal and policy issues, regulatory hurdles, a large size investment required for digital infrastructures development and inclusive transformation, interoperability and technical challenges, data sovereignty, privacy and data security, etc. (DCO, 2025).

Digital Banking and Challenges

The digital adoption in Nepal's banking and financial institutions (BFIs) is primarily driven by demographic factors like gender, age, education, and occupation, with a higher adoption among males, middle-aged adults, and those having with a higher education. Some of the key predictors of the digital adoption include a perceived ease, convenience, credibility, and usefulness among the users. To increase the rate of adoption, BFIs should therefore focus more on simplifying interfaces, improving security, and tailoring solutions for specific user segments like professionals and tech-savvy individuals, ensuring their platforms meet evolving users' expectations, and promote wider accessibility. (Kandel et. al, 2024) The policy imperatives of digital banking are not only about building the foundational infrastructures, but also to treat them as a national strategic priority for DPIs development, removing tax barriers, mandate interoperability, integrate with the government service, improving digital literacy, enabling the AI and analytics, and international investment opportunities.

3 Methodology

This study relied basically on the qualitative research methodology. The author reviewed the extensive literature, international policy research papers, journal articles, books, theories and international practices on digital economy and digital growth strategies, and Nepal's governing policies on the productive sectors to explore the digital integration status and perspectives of sectoral growth strategies for an integrated digital economy vision. The author also observed the overall digital development contexts, priorities given for developing digital integrated policies and digital infrastructures, and various roles and initiatives played by the different stakeholders engaged in the sectors. While discussing the emerging challenges and contemporary issues on sectoral development, key gaps and concerns emerged on thematic analyses as key trends and patterns are reflected on the sections of macroeconomic contexts, sectoral status, digital infrastructures, etc.

The analytical themes were observed with an aim to reduce the gaps and constraints and advance the digitization process across the economy. The author consulted with key stakeholders of the Nepali economy including the political leadership, policymakers, private sector stakeholders, and academia. The review output followed the purpose of verification and validation through 22 KIIs and 7 IdIs that were conducted with the political leadership, professors of economics and IT engineering, practitioner economists, policymakers, and ICT experts and IT engineers.

Table 1 *Sampling Framework and Sample Interviews, 2025*

Sample Categories	Key Informant Interviews	In-depth Interviews	Representation
Politicians: Political Leadership	4	1	Leadership
Bureaucrats: Engaged in Policymaking	4	1	Governments
Academia: Prof. of Economics and ICT Engineering	5	1	Academicians
Practitioner-I: Economists and Policy Analysts	5	2	Public, Private
Practitioner-II: ICT experts and Engineers	4	2	Public, Private
Total	**22**	**7**	

The approach of selecting sample experts was based on the expertise observed through their publication, sectoral domain knowledge and experience, policymaking engagement, etc. The ethical process covered by the author includes an informed consent (oral), confidentiality, anonymity and privacy, non-harm and justice with the experts. The KIIs and IdIs covered broader ideas, information, experiences, and opinions shared with the author basically on digital and ICTs-based solution, socio-economic transformation and relevant policy discourses. The following table 2 incorporate the interview themes:

Table 2 *Research Questions and Primary Themes, 2025*

Research Question	Primary Themes
Macroeconomic indicators, growth rigidities and bottlenecks	Growth performance, trade deficit, M1 and M2 growth, public debt, revenue collection, sectoral priorities and coordination
Why is Nepal lagging behind in digital adaptation?	Regulatory rigidities and hurdles, policy deficit, disruptive thinking and digital development vision and readiness, institutional silos, tax barriers, policy deficit, human capital, private sector gap
Collaborative reform initiatives	Vision and sectoral priorities, Expenditure reform, tax reform, regulatory reform, human capital formation,

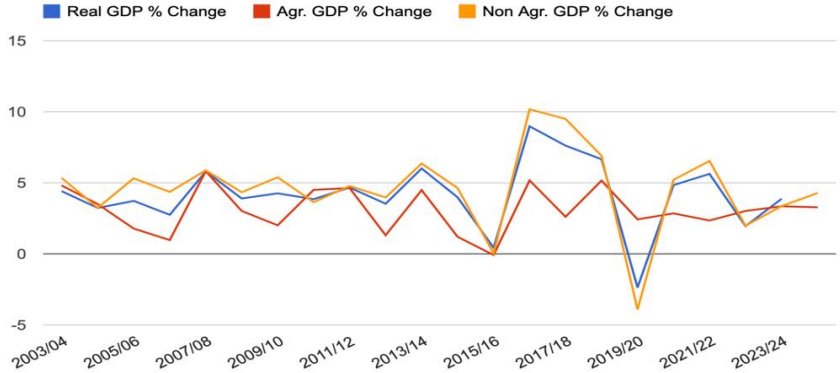
The arguments, opinions and ideas shared by the experts during the interview (25-30 minutes each) were cross checked with the concerned stakeholders, relevant experts, decision and policy documents, literatures landscape, and international benchmarks. The information collected in the interviews were transcribed and synthesized to meet the paper's objectives. Thereafter, the draft paper was presented at a national conference to get the feedback and constructive comments for improvements and validation of the findings.

4 Results and Discussion

Digital Imperatives on Macroeconomic Contexts

Nepal's macroeconomic contexts showed a sluggish business environment, poor initiatives of investment, and poor economic growth realities in the last two decades. The relative economic growth rate of Nepal compared to its neighboring countries is lower and stagnated at around four percent. The growth patterns and sectoral performance indicators show that Nepal's supply chain is still highly dependent on the traditional production systems (Ref. figure 2). The sectoral inefficiency situation is such that agriculture employs the most of the people, the service sector is generating GDP, and the growth potential is more in industrial development. The dominant sectors aren't the ones that experience a good growth performance. In FY 2023/24, the growth rate of electricity, gas, and air conditioning supply had a standout performance followed by a good performance of the accommodation and food service. But the dominant sectoral growth doesn't depict an integrated growth performance of ICT on the traditional sectoral growth. The digital imperatives and implications of monetary and fiscal policies aren't significantly reflected in creating transformative development cycles to gain momentum in the supply sides.

Figure 2 *Growth Rate of Real, Agriculture, and Non-Agriculture Sectors*

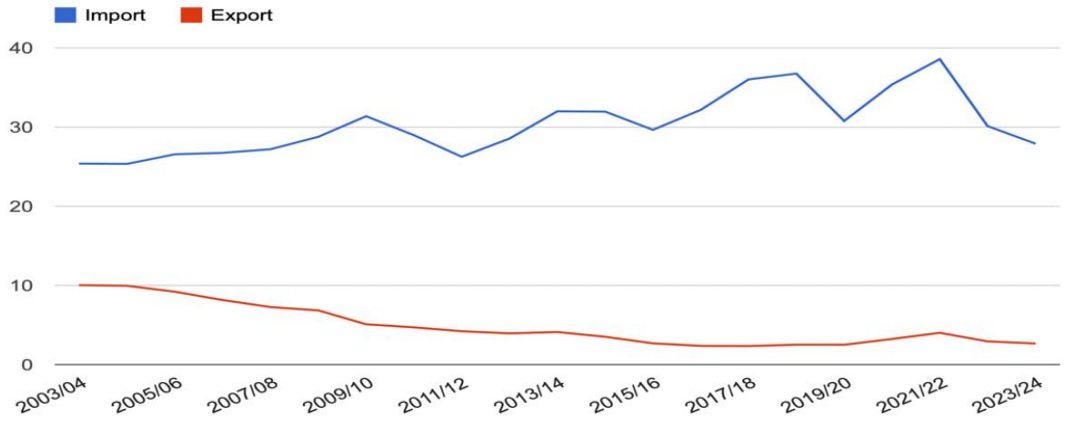


Note. Ministry of Finance, 2025

These indicator scenarios connect to the growth vulnerabilities and possess the interconnected institutional constraints that prevent to develop an efficient digital economy of Nepal. As digital solution initiatives, technological integration, and regional and sectoral adaptation to AI adoption are still lagging in those traditional modes of production and supply chain. In fact, they have not made any significant momentum and progress towards transparent governance and PSD, allocative efficiency in large scale infrastructures, and institutional reform for internal business environment and sectoral optimization. As a result, the overall economic environment remains costly due to the weak information supply, limited large scale infrastructure, highly unstable governments, and regulatory hurdles. By a shift in business models, disruptions of traditional players and new market entrants generate revenue (by subscription and data), profit, and the competitive business dynamics. The impacts of digitalization across the various industries influence on asset structure by the opportunity of automation, optimization and cost reduction strategies and value creation. Experts opined during the interviews that a high level of disruption is observed on Nepal's media sector and retails, while disruption made by telecommunication, insurance, and banking hasn't a clear outcome and impact. The disruption on health, education, energy, and logistics are limited.

The trade balance of Nepal has a persisted and largely grown on its deficit trend - import to GDP ratio is over 30 percent while export to GDP ratio is less than 5 percent (Ref. figure 3). While Nepal's economy is overwhelmingly dominated on its imports of goods and services from India and China, and strategic investment and efforts made on public finance for supply side capacity enhancement is less observed in the last few decades.

Figure 3 *Import and Export as percentage of GDP of Nepal*



Note. Ministry of Finance, 2025

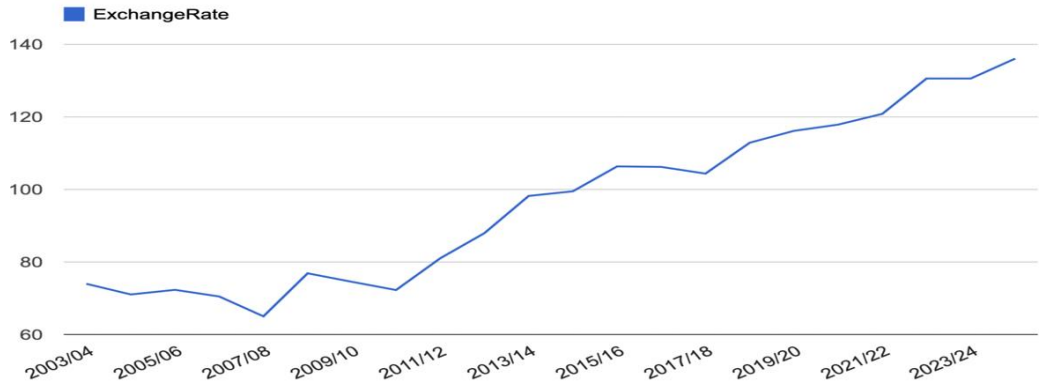
The existing physical imports are hardly being substituted by the possible digital means and application services such as the digital finance, digital banking and reduced cost of capital, e-commerce and formalization of informal sectors, online education, etc. to decrease the on-going deficit trade balance. Similarly, existing narrow and low valued baskets of exports are not yet fully diversified by the digitally advanced export base to result into an increased export-to-GDP ratio. The inflow of remittance is balancing the trade deficit.

The digital readiness, inflows of public and private sector investment to establish data centers, cloud service, IT outsourcing, fintech, e-commerce platforms, etc. and supply chain integration to develop the digital solutions are observed at the slow pace. In lack of proper digital infrastructures, digital skills, and DPIs, the initiatives to inflow foreign direct investment (FDI) growth also remained insignificant. Similarly, the strength of Nepali currency against the USD is gradually deteriorating in the last few decades (Ref. figure 4).

Similarly, ongoing rising debt service obligations are going to crowd out public investment in possible DPIs and reduce the expansion of fiber optic, digital literacy, and these realities are going to create limitations on fiscal space, cost reduction, revenue enhancement, and fiscal sustainability. While the

government financing and debt to GDP ratio are growing over the last decade, growth of governments revenue, M1 and M2, and inflow of FDI show a sluggish performance (Ref. figure 5).

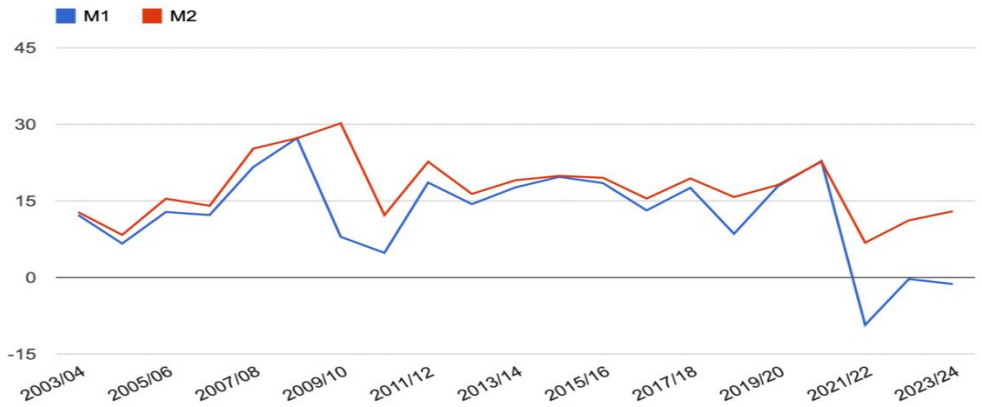
Figure 4 *Exchange Rate of Nepali Currency with US Dollar*



Note. Ministry of Finance, 2025 (Figures-2-3)

The digital payments system helps economy to increase velocity circulation and formalize ongoing informal transactions in Nepal, while the possible digital lending can help to expand credit and increase the monetary base subject to banking system multipliers.

Figure 5 *Growth Rate of M1 and M2*



Note. Ministry of Finance, 2025 (Figures-4-5)

Transformative Vision, Strategic Targets and Implementation Gaps

To gain momentum in the supply side economy, Nepal's digital vision, sectoral policies, and strategies require a strong leadership focused on comprehensive regulatory reform with a thorough review of policy tools based on the governing policies toolkits of the BSE-SELF, substantial investment in critical infrastructure, robust data governance, and widespread digital skills and digital literacy programs. To harness this digitalization process for socio-economic growth in Nepal, Government of Nepal (GoN) launched a 1-8-80 governance model - '2019 DNF' to target eight priority sectors - agriculture, health, education, energy, tourism, finance, urban infrastructure, and digital foundation through 80 specific initiatives with an ambitious goal to generate NPR. 800 billion by 2022 (MoCIT, 2019). The GoN took some initiatives – the announcement of the digital decade 'IT Decade: 2024-2034' to create 1.5 million jobs and over 22 billion incomes in service exports. Meantime, GoN also promulgated Social Media Operation, Usage and Regulation Bill 2081; IT and Cybersecurity Bill, 2080 including a view of censorships.

The disappointing fact of DNF and digital sector are the approach of fragmented initiatives of poor political and institutional leadership established under the MoCIT and its coordination and prioritization mechanism failure to integrate with economy, government entities, and private sectors to create overall digital ecosystem and investment environment. In addition, some conflicting objectives are observed between the innovation and control regime, policy and regulatory uncertainties, infrastructure gaps and

collaborative partnership with the private sectors, taxation and start-ups provisioning, censorship efforts on the media bill, policies of data privacy and cybersecurity, etc. Some of these visionary weaknesses also helped to the Gen-Z uprising and subsequent political changes. It indicates the dual practices and visionary issue on the governing digital policy framework, development of ICT alignments to integrate regulatory of the GoN. While the need of the time were to conduct a thorough review of the '2019 Digital Nepal Framework (DNF)', governing digital policies in a standard framework to establishing digital standards and frameworks for policy coordination, refining old laws including governing sectoral growth policies and Telecommunication Acts 1997, addressing the challenges faced by the private sectors on technological adoption, investment in critical infrastructures, envisioning data privacy, artificial intelligence, and modern means.

The 2019 DNF and its revised version were comprehensive policy frameworks that set to encourage private sectors for an adoption of open-source emerging technologies in the digital transaction to reduce the operational cost and improve efficiency by leveraging AI driven chatbot and blockchain technologies so that governing institutions can attract investors and streamline customer service. However, these policy frameworks failed to take an account of the overarching responsibilities of the political leadership and institutional accountability and address key governance challenges. The NPC, MOF, and MoCIT have mandates, authority, and access to formulate and implement such digital policies with a proper allocation of resources, public expenditure management, resource mobilizations, and strengthen public enterprises. However, the DNF vision and its collaborative ties ended up with the weak commitments of the political leadership, bureaucratic hurdles and capacity constraints, poor executive plan, and insignificant transformative activities in place. The BCG frameworks and benchmarks include some dedicated methodologies for reforming public administration and addressing similar structural challenges faced by the public and private sectors, and overcome the systemic risks and failures. The BCG framework with its analytical components for policy evaluation is outlined in table 3, below:

Table 2 *Mapping of the BCG Components and National Policy Dimensions*

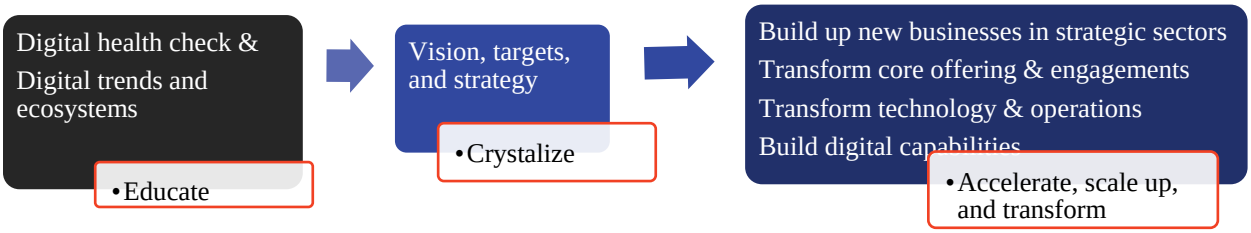
Components	National Policy, Institutional and Governance Dimension
Ambition and key performance indicators	National digital vision and measurable targets were set with DNF's 8 sectors, 80 initiatives, a goal of NPR. 800 billion by 2022 (from 2019) and IT decade's 1.5 million jobs.
Organizational anchoring and governance	Mandates of the Steering Committee at the MoCIT and NPC as the planning authority and coordination mechanism, but their capacity constraints of the organizations with direct authority to break the inter-ministerial logjams
Financial resources and allocation	MoF allocates fragmented budget annually, heavily depend on the financial partnerships with development partners, long-term planning is difficult in development finance coordination. The MoF presumes that digitalization is operational expenses than capital investment, while the strategic allocation instrument, returns on investment, and outcome efficiency are not realized.
Legislation and regulations	Regulatory reforms and enabling legal frameworks are essential for national digital strategies, digital identity for economic acceleration, and creating agile frameworks, such as through the Telecom Act (1997), IT and Cybersecurity Bill (2080), Social Media Bill (2081), and sectoral policy deficits and gaps.
Process re-engineering and citizen – centricity	Limited within the departmental silos, and heavily lacking of interoperable public services to reduce the steps, time and friction for citizens and business that redesign user journey, interfaces, and ease of access. Nepal needs physical papers to one office, digital data to another unit, and tax filling to third one. It is stuck more on digitization – scanning a form – than transformation - eliminating the form.
IT architecture standards and interoperability	Digital infrastructure standards, government-wide system interoperability, and overarching government enterprise architecture with common data standards, DPIs, etc. are essentials to reduce costs but some fragmented efforts are taken by NTA for telecom standard, SEBON for securities, NRB for financial market, nascent efforts on national ID, etc. The fragmented foundational layers of developing identity, payments, data exchange from scratch is waste of time, resources, and capital.

Components	National Policy, Institutional and Governance Dimension
Digital critical infrastructure and resilience	This is non-negotiable foundation for universal service obligations enforcement but the regulatory powers are not used by the authority. Limited mobile and broadband connectivity, redundant data centers, reactive cybersecurity protocols, etc. are some issues.
Capabilities and skills	Limited digital skills and talent development programs, workforce upskilling program, digital literacy programs, etc.

Note. Field Notes of the Author, 2025

The government efforts to adapt to global digital initiatives and trends, and to improve the weak digital ecosystem through the educational practices with the participation of its different stakeholders, remained weak and insufficient in the digital transformative journey. As a central focal ministry, the Ministry of Communication and Information Technology (MoCIT) has hardly been able to crystalize the agenda of Nepal's digital economy journey and lead the integrated vision. Therefore, moving forward for the digitization process requires a strong and visionary leadership to overcome systemic challenges on governance, deep-seated administrative reform, and building up the robust and digital infrastructure resilience to reduce the digital divide. Government's policy formulating stakeholders and entities now need to thoroughly review their digital visions and policies, initiate a transformative and collaborative leadership style to further facilitating with private sector entities. Studies recommend improving interoperable services and user interfaces, conducting launching digital literacy programs, developing an effective communication strategy, and implementing robust security measures to optimize digital PSD (Phuyal, 2024).

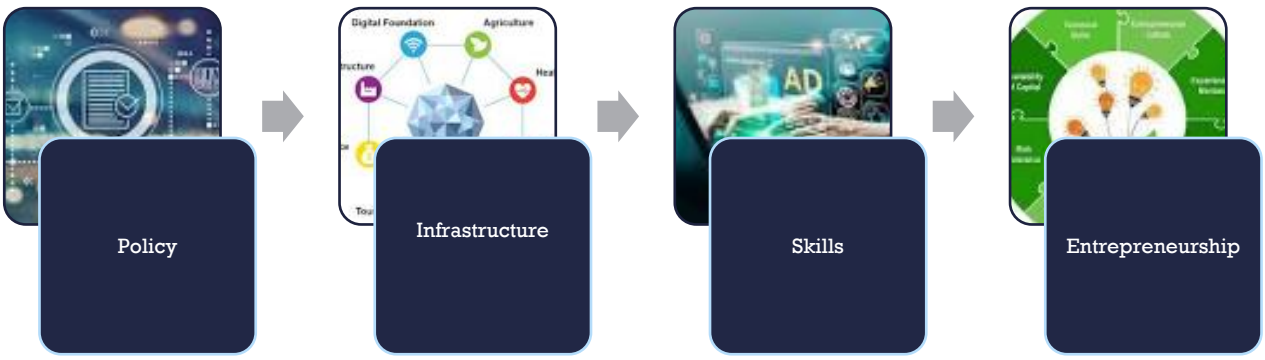
Figure 6 *BCG Analysis for Digital Transformation Journey of Nepal*



Note. Adapted from the BCG Analysis for Digital Transformation Journey (Ref. figure- 6)

The GoN hardly realized the existing poor digital health status, specifically a large digital divide in the rural area caused by moving forward along with poor vision and weak digital infrastructures in lack of adequate investment and skilled labors. As far the collaborative stakeholders of Nepal are able to educate its state mechanisms, private sector, and people, and make crystalize the digital vision, integrated strategies and policies, and the digital transformative approach can gain a high potential to drive Nepal's economy through the DPIs (Ref. figures 5 and 6).

Figure 7 *Transformative Pathways of a Digital Economy*



The scale up initiatives of ambitious private firms should improve their digital capabilities by acquiring digital talent through outsourcing measures and then build up internal capabilities to create start-up incubators through a joint venture or partnerships. They should lead and sustain a digital change then adapt to the strong change management processes for digital ventures. Depending on the nature of

industries, they may require a full digital penetration for a significant digital solution to transform their operation, process and business models to leverage digital technologies.

Digital Infrastructures, Ecosystem, and Investments

Through an expansion of telecommunication infrastructure, growth of broadband, mobile phone penetration and cellular networks, digital payments and e-commerce have demonstrated impressive growth in Nepal. According to the Nepal Telecommunications Authority's Annual Report of 2080/81, the broadband service density has reached 149.23%, reflecting a significant growth in internet connectivity. While this metric – calculated as total subscriptions per 100 inhabitants - it means 1.49 subscriptions for every single Nepali has internet and it is inflated by the use of multi-device ownership, dual-SIM prevalence, and interactive prepaid machine to machine connection. Mobile device penetration is increasing with affordable smartphones and expanding 4G and 5G networks and improving internet connectivity. Broadband and data center development are ongoing government projects but they are facing coordination and prioritization challenges. More recent studies showed enhanced digitalization resulted in improved information, system, and service qualities as well as greater net benefits; but also indicated the need for additional support to enable centralized data retrieval using national ID systems to streamline processes (Maharjan, 2024). A large proportion of the population are still out of the ICTs' radar due to the slow pace of quality broadband penetration, internet service in rural areas and telecommunication infrastructures indicates the limited supply of opportunities in education and health, economic opportunities, and public services. In lack of effective coordination and an institutional integration, government institutions are still in struggle to transform their competitive business environment and strengthen governance for PSD through the strategic applications of ICTs, and digital technologies (Chaudhary & et. al, 2021). According to the Global Information Technology Report 2016 ranked Nepal at 110 positions out of 139 low-income group countries on the Network Readiness Index. The Environment Readiness Subindex (which measures the overall political, regulatory, and business and innovative environment contexts) the Readiness Index (which measures the overall infrastructure, affordability, and skills contexts) shows Nepal's overall poor position and systemic challenges on its total transformative pathways.

Nepal is actively working to implement standards, interoperability, and regulatory frameworks for digital finance and investment. The Nepal Telecommunications Authority (NTA) guided by the National Cyber Security Policy, works to ensure digital infrastructure is secure. In the capital market, the Securities Board of Nepal (SEBON) establishes regulatory frameworks and ensures interoperability within the securities market ecosystem, while Nepal Clearing House Ltd. (NCHL) is a clearing and settlement operator creates operational procedures and facilitates the clearing, settlements, and payment switch operations for securities trading and transactions. The Trade Management System (TMS) connects investors directly to brokers and the Nepal Stock Exchange (NEPSE), allowing them to execute purchase and sale orders online, thereby simplifying the investment process. Nepal Rastra Bank broadly ensures interoperability among different financial systems. Nepal Development Finance Information Management System (DFIMS) - operated by the Ministry of Finance (MoF) – ensures transparency by providing real-time insights through customizable reports, project and development partner profiles, and informative geospatial maps. By improving access to critical financial data, the DFIMS supports better planning, resource allocation, and oversight (DFIMS, MoF). Finally, the new IT Bill aimed at enhancing data protection and privacy standards is currently under development in Nepal.

A few government-driven initiatives aimed at financial inclusion and digitization are fostering a startup ecosystem, contributing to job growth in both finance and digital investment sectors. Several incubation centers are being established with a focus on advancing digital finance and investment to provide startups with resources, mentorship, and networking opportunities to foster innovation. The expansion of digital investment platforms such as MeroShare and Nepse have led to increased demand for professionals in areas like investment analysis, blockchain development, and digital portfolio

management. However, policy initiatives on BSE-SELF are not yet fully envisioned by the policy measures and ready to leverage and disrupt the digital technological solutions such as in reducing the average transaction cost to optimize public spending, leveraging PPP for infrastructure investment by private sector, generating revenue from digital services to establish a self-sustaining service model, etc. The meaningful applications of ICT and digital technologies to impact the supply side economies, growth and development of the business sector and achievement of sustainable development goals (SDGs) are yet to be realized in Nepal. The experts opined that the digital policy and contextual actors - such as MoCIT, MoF, MoTCS, MoEST, and NPC - are failing to operationalize their integrated ideas on the technical and social elements of core digital economy policies, ICT policies, and broader overarching sectoral policies to expand digital infrastructure and build its digital ecosystem. The digital foundation and adoption rate observed by the government officials inform that a lower ratio of commercial websites penetration out of registered business indicates that a large section of business communities is not leveraging digital platforms.

Capacity Building for Digital Skills in Labor Force

The ILO (2021) advocates the layers of skills for the digital economy development and that begins from the basic, early digital education, digital literacy, secondary school, awareness of digital tool relevance/usefulness, and tertiary education and digital related education. The basic skills refer to the proportion of population that has completed secondary schools, and level of literacy and numeracy, while digital literacy refers to the labor with the knowledge, skills, and confidence to adapt to technological change and can be proxied with the schools with internet access. The intermediate digital skill is basically for a use of digital technologies in a more meaningful and beneficial way which can critically evaluate the technologies and create contents for the use such as desktop publishing, digital graphic design, and digital marketing jobs. Advanced digital skills integrate the specialists and ICT professionals who work with computer programming, network management, artificial intelligence, virtual reality, big data, cyber security, digital entrepreneurship, IoT, etc. The status of human capital formation in Nepal is observed at the under foundational level. The digital transformation isn't a top-down model, but it requires a bottom-up process in which staff need to strengthen their skills and abilities to use digital service and AI powered tools in daily practices and gradually translate these skills into improved workforce, processes, collaboration, and delivery across their organizations.

A successful transition into the digital workforce rely on the mix of core works and technical skills remain foundational parts for the further digital skills development, where active and meaningful involvements of government, academia, workers, and business societies (ILO, 2023a). The digital literacy rate and skilled human resources in Nepal are at the bottom layer of its total population and it is much lower in rural women, indicating the gender inequality. It may require a focused initiative of a smart classroom, online platform, biometric system, etc. in education and governance systems to reform the inequalities status in near future. A good majority of students who receive higher education in Nepal are still learning non-technical rather than technical one. However, the attraction of students and service providers towards ICT and technical education is growing in more recent times, specifically in major cities. The school education syllabus is paying attention to covering digital literacy and limited numeracy. With regards to work categories, Nepal has growing digital platform work in two categories: (a) online web-based platforms for sales and marketing support, and (b) location-based platforms such as the riding service, food and parcel delivery, cleaning services, etc. The growing numbers of Nepali students who specialized IT skills abroad and a few Nepali IT companies are exporting IT service and remote work from Nepal.

Conceptually, the digital skills training has two dimensions: The upskilling covers on teaching participants additional skills to complement the pre-existing skills, while reskilling includes teaching participants new skills which are not necessarily to the pre-existing skillset or knowledge. Out of the total labor force of the age above 15 years, the proportion of the labor force participation rate is 38.5 percent and

the employment to population ratio is 34.3 percent. In addition, the unemployed population is 11.4 percent. Similarly, nearly 0.4 million youths are the new entrants annually. (NSO, 2018) Labor force data show that a large share of this young people not in employment, education, or training (YNEET) provided with relevant insights and lived realities, educating them with self-reported skills is the potential sources that needs to be digitally equipped with upskilled or reskilled advantages for an increased productivity. The demand for digital skills is outpacing the supply, and the digital skills set directly impacts businesses and foreign employment. As the digitalization and application of emerging technologies accelerate in an economy, demand for new roles sometimes specific ones emerge across the industries and digital skills. This poses a revised mode of education systems to prepare for the new market places and working environment. Meantime, digital and social inequalities affect opportunities to develop digital skills. A range of barriers that affect digital infrastructure and digital skills related to blockchain, cloud computing, AI and advanced analytics, big data and cyber security, reshape economic landscapes and efficiency levels in firms' outputs. (Feijao & et. al, 2021).

The Central Department of Economics and Institute of Engineering (IOE), Tribhuvan University, and Kathmandu University, and affiliated colleges etc. have some specialized courses in digital economy, fintech, digital banking, and digital health informatics with a basic level information on IT system and measurement approach with their digital skillsets. In addition, vocational short courses for preparation of digitally skilled workforce are highly demanding in the national and international labor markets. So, it is high time to jointly organize such capacity enhancement programs by the public and private sector entities as some important measures to contribute to the digital economy. Building digital skills of civil servants, strengthening policy and legal frameworks, fostering local IT innovation and starting up to create digital solutions will be some measures to achieve the sustaining vision with enhanced abilities to change and improve the time and cost of public service delivery.

Digital Imperatives on Agriculture Sector

The GoN has made some digital policy initiatives to improve farm productivity through various instruments including agriculture development strategy (ADS), but their progress has been limited on the ground due to limited integration on traditional farming practices and existing market systems. Only 24 percent share of the GDP and 2.5 percent growth of the agriculture sector were observed in FY 2024/25, while a good majority of Nepali people are engaged in agriculture. Though a large proportion of the labor force (65%) occupies the agriculture sector, most of the labor force are left with limited digital skills, women with limited access to digital skills, services and market information, and low productive human resources. It doesn't only indicate a lower productive capacity of Nepali farmers but also informs the institutional inefficiencies and market mechanisms, including a large urban rural divide given by the connectivity gaps and limited access of digital practices. The existing agriculture policies, plans and programs are performing a slow sectoral growth rate. The agriculture contexts also face the poor governance connected to several issues such as poor leadership vision and weak engagement of stakeholders, weak sectoral provisions and low institutional capacities, limited inter-sectoral coordination, limited review and evaluation activities of policies and programs, etc. Therefore, political stability, vision and commitment of leadership, strong alignments of the agriculture sector, regular review of policies, and holistic approach of transformation with strong coordination, monitoring and evaluation are needed to ensure the agriculture sector's growth and consistency are empowered with the fundamental of digital transformation (Khanal & et. al, 2020).

Nepal took a few but fragmented initiatives and institutional provisions for agricultural transformation like agriculture management information system (AMIS) to disseminate data and information on product market prices; weather patterns, and crop statistics to bridge the policy gap and public decisions; National Incubation Center (NIC) and NARC knowledge management system (KMS) to advance traditional practices and disseminate agriculture research based information; digital payment gateway system (like e-Sewa, Khalti, etc.) to secure digital transactions; Nepal Wireless Networking Project

(NWNP) to offer insightful information on weather, markets, and crops; and mobile applications such as Smart Krishi/Krishi Guru/Kisan Call center to provide localized farming guidance, pest management, and need based solutions. The technological adoptions and digital applications such as mobile network (3G, 4G, &5G), GIS, remote sensing, e-Haat bazar and other private sectors' online trading platform to reduce the layer of intermediaries. However, these initiatives have limited coverage with significant adoption barriers and fragilities.

When farmers are ensured by an improved access of digital infrastructures, an advanced agriculture information and communication system, they can start a better practice of blended digital agriculture and technologies (such as mobile advisory service, drone assisted farming, blockchain supply chain) and connect to agro-market linkages, advanced data security and privacy, and sustainable farming practices are beyond the engaged farmers to reduce their digital divide and improve the digital inclusion. An access to real time information on the product market price, weather, pest, soil health, water, quality seeds and fertilizers, and other resources enable farmers to inform and optimize on their farming practices and harvesting decisions. The use of digital practices helps farmers to connect with prompt buyers, sellers, and product and financial intermediaries who then enhance their strategic business decisions, optimized production with minimized risks in the general agriculture practices.

In the context of Nepal's agriculture sector, a few policy priorities for coordinative actions such as farmers' education on farming with digital integration, roles of ICT and emerging digital technologies to reduce farming cost and maximizing products' revenues, leveraging technologies and investment funds to finance informed farming and best practices, etc. are some important transformative approaches. Targeting information, investment, and technologies to high value products, climate resilient and organic farming, building post-harvest, and cold chain infrastructures can add value through advisory apps, agri-tech information and investment, market platforms for exports, reduced post-harvest losses, and localized digital solutions. To improve from the digitally low intensity agriculture sector, some of the agenda of digital agriculture transformation could be useful, such as educating and upskilling the agriculture workforce through mass digital literacy activities in local language, use of GIS, remote sensing, and data analytics in training youths at the academia, etc.

Digital Imperatives on Industrial Sector

As Nepal is a highly import-based (and low manufacturing-based) economy, industrial domains of the manufacturing, electricity, gas and water supply, construction, and communication and storage are largely limited, and their gross share of GDP is around 15 percent during the last decade. Therefore, the industrial base of Nepal is limited to a few products and most of the industrial products consumed in Nepal do not have its own comparative advantages. However, a private sector established with comparative advantage can improve their customers' experience or offering of digital products/services or digitizing the internal functions and processes basically in the business to business (B2B) models. Many SMEs in Nepal face challenges related to business safety nets and security policies and protocols, outdated technology of production, critical cyber security gaps, limited capital resources, a shortage of skilled workers, and low awareness (Thapa and Thapaliya, 2025). The financial access of SMEs in Nepal face gaps at policy and operational levels and BFIs are not adopting to the modern technologies to improve the access in scales (Adhikari, 2022).

The growth of the electricity sector stands at a large share on the industrial base due to their high potentials, effectively aligned public private partnerships, and transformative institutional leadership qualities of the Nepal Electricity Authority. To take the industrial transformative initiatives, the digital strategies execution, regulatory frameworks of governments must take facilitative and collaborative cultures and supportive roles over the existing controlling and regulatory measures. The digital solution of waste management is an emerging issue in the cities. The overwhelming effects of the emerging technology augment occupations, rather than to automate the mechanization. Therefore, proactive

policies are required to focus on job creation by the digital solutions at the local, sub-national, and national levels.

To transform the status of the industrial sector, strategic investments in the public infrastructures, public-private partnership mechanisms, establishments of digital funds, and digital skills development programs are essentials. The greatest impacts of technologies are likely to occur more in the upper-middle-income areas due to a higher share of employment in the clerical occupations. As clerical jobs are an important source of female employment, the digital effects are highly gendered. The industrial insights from the proactive digital policies should focus more on the import of capital and digital talent at the initial stage, followed by a focus on job quality, ensure fair transitions, and design dialogues and adequate regulations.

Digital Imperatives on Service Sector

The service sector has the largest share of the GDP in Nepal. The GoN has set ambitious targets for 'IT decades: 2024-2034' to create 1.5 million jobs and over USD 22 billions in service exports. So, the digitization process of the largest service sector is the fundamental driver for getting a higher efficiency and inclusive economic growth and job creation in Nepal. The service sectors' domains such as the financial services, health, public administration had a moderate growth rate, and the critical sector for job and productions in service sector such as trade had negative growth rate. Most trade establishments are import-based, and they demand for a transformative support to overcome the poorly developed supply chains, optimize intermediaries on market systems, and put challenges on structural and institutional rigidities. Though a large share of service sector on GDP indicates a low value addition possibilities, negligible backward linkages, and less transformative realities with a warning sign and economic vulnerabilities caused by a shrinked domestic production, higher cost on production, infrastructure development issues on the supply chain, and weak investment mechanisms, creating an integrated digital policies for investment ecosystem and start-up, building digital infrastructure, and offering digital skillset are some of the foundational measures to unlock the future potentials. The trade sector provides a large share of self-employment and urban focused employments in Nepal.

Compared with the public sector entities, the value generated by a growth of digital service is more promising among private sectors' establishments. Therefore, GoN has made a target for digital service export in this digital decade. Use of digital technologies and ICT are increasingly adopted by public individuals, business society, and governments. The global export of ICT has significantly grown up (Sarker, & et. al, 2021). Transport sector is a digitally high intensity transformation sector. However, owners of the road transport sector in Nepal are the small-scale service suppliers struggling at the early phase of business development, while air transportation service has transformed its traditional practices into digital marketing and digital ticketing strategies. The other high intensity digital sectors include the telecommunication, IT and other information service, finance and insurance, advertising, market research, etc. The business practices of education tech, health tech, and real estate business are at the infant stages.

The financial sector is mostly a digitized sub-sector by an increasing interconnectedness and effective governance model that demonstrated an example DPI with collaborative efforts in the regulatory frameworks, interoperability and digital payment gateway mechanisms, consumer protection with systematic risk issues, and fintech digital platforms. As the DNF envisioned the financial ecosystem to drive digital transformation with the initiatives such as the national payment gateway, credit ratings, mobile wallet services, digital payments, and development and promotion of e-commerce (MoCIT, 2019), the GoN made significant efforts to digitize payments, promote mobile banking, and create a regulatory framework for electronic transactions further reinforcing the idea of a clear digital vision for Nepal's financial future. While the adoption to mobile banking, digital wallets, and e-commerce platforms are growing, collaborative efforts are addressing the challenges related to regulatory frameworks, interoperability, low internet penetration, and digital literacy. The Nepal Rastra Bank (NRB) is developing

regulations to ensure seamless operation of mobile banking, digital wallets, and payment systems, enhancing interoperability across platforms. The NRB is integrating the financial service architecture for scalability, minimizations of cost and operation redundancies. In addition, the NRB is efficiently enhancing the national payment gateway and integrating digital payment channels for nationwide transactions with a security of digital transaction, conducting digital literacy activities to improve financial inclusions in the financial sector and leverage fintech industries by monetary policies (NRB, 2022). Digital financial services have also introduced cybersecurity, fraud, and infrastructure vulnerabilities that could undermine stability. Cyber security measures are being strengthened through regulations. The collaboration between financial institutions, telecom operators, and fintech startups, along with government initiatives, reflects a comprehensive approach to integrating digital finance and evolving DPIs in the financial and payment ecosystem, expanding financial inclusion into the national economy, empowering individuals, and supporting broader economic development (MoCIT, 2019). The simplified investment process, professional investment analyst, and blockchain development on the sub-sector made it possible on the foundation of demographic advantages. Digital payment gateways have become key players in this transformation, with platforms such as CellPay, eSewa, Fonepay, Khalti, PrabhuPay, and NamastePay driving convenience, user-friendliness, affordability, and accessibility in digital transactions. Digital platforms like eSewa, Fonepay, and MeroShare are making financial services more accessible, while the NCHL-ECC enhances the efficiency of cheque processing. But an increasing interconnectedness of the financial system, driven by non-bank financial institutions, cooperatives, and fintech, poses some systemic risks.

A striking example of ICT's impact on the tourism sector can create an immense opportunity for tourism businesses. The issues on the information segregation, storage, and processing for communication with tourists is the best possible way by the use of ICT frameworks. Digitally skilled bloggers can create a significant increase of destination visits of foreign tourists at the Nepali destinations. Therefore, the measures of ICTs and digital technology offer long-term-benefits for strategic and long-term goals in business models. However, Nepal is unable to fully utilize ICTs in the tourism industry. A very limited digital service integration and poor interoperability for marketing, booking and payments systems are limiting the creation of values and scalable tourism business solutions. A vast majority of tourists (62%) discover Nepal through the internet, while only a small fraction (2%) relies on traditional travel agencies. This highlights the critical role of the internet in promoting Nepal as a tourist destination. Furthermore, a remarkable share (94%) of visitors to Nepal utilize ICTs during their trips, underscoring the importance of having high-quality, informative websites to attract and serve tourists. Common uses of ICTs by tourists include booking accommodations and flights, communicating via email, and accessing online information. A pilot survey-based article informed that significant portion of tourists (over 50%) believe that ICT has reduced the cost of their trip to Nepal, while the remaining half perceive no change in cost (Shrestha & et al., 2021).

5 Conclusions and Policy Implications

Nepal has persistent visionary, policy, and leadership gaps on digital economy to develop the digital infrastructures that are responsible not only for reducing sectoral inefficiencies and the digital divide among a large proportion of rural population but also preparing for the skilled human resources. The 2019 DNF and revised versions provide a primary and poorly executed digital economy roadmap. Existing slow pace of digital development is the result of conflicting and poor digital vision, fragmented governance from the MoCIT, NPC, MoF, and sectoral ministries, and their weak policy coordination in regulatory practices. Economic transformation through the digital approach does not only demand for crystalizing the visionary policies and building the digital infrastructures, but also integrating the simultaneous execution of physical networks, digital skills, and collaborative practices. The speed of stakeholders and winning initiatives in the digitization process matter a lot. Digitalization is generally built on the foundation of competition of the private sector actors and transparency of government sector entities. The

size of the workforce involved in agriculture is large enough but its share of GDP is disproportionately low despite the ADS indicating the systemic issues of the agriculture sector. Nepal has made notable progress in expanding telecommunication infrastructure and digital payment systems but this foundation is insufficient to create the DPIs in the productive sectors.

While digitalization offers significant potentials for accelerating growth, addressing the gaps observed on the visions of digital infrastructure financing, improving regulatory framework and standards, and promoting digital literacy are essential for a successful implementation of digital solutions. The broadband penetration with modernizing the economic sectors facilitates GDP growth. The digital economic policies, strategies, and collaborative efforts should be revised with an aim of digitally consolidated institutional reform. A sequential design on governance framework and roadmap for foundational DPIs are essential roadmaps ahead to promote the digitalization of sectoral platforms and digital infrastructures in Nepal. In an incremental and iterative business model, a transformative leadership model is a strategy to improve digital economy by taking a risk of failure of investments and willingness to invest on ICTs by acquiring digital talents to develop digital capabilities for entrepreneurships. The digital penetration with technology transfer can transform the nature of work and location such as through automation, robotics, artificial intelligence and generative AI, machine learning, 3D printing, internet of things, and digital platforms. Adopting to a mixed digital economy model and BSE-SELF framework, the GoN has a way forward to reformulate the governing integrated visions and policies (including the monetary and fiscal policy initiatives) on digital solutions to minimally invest in large-scale infrastructure projects and prepare an agile private sector for investing in small scale infrastructures and entrepreneurship development strategies. As the way forwards for digital solutions, a thorough review is required on existing vision of digital economy, fragmented digital governing policies and regulatory frameworks to foster a collaborative partnership for a digital change, investing on critical digital infrastructures, and development of digitally skilled workforces for breaking the existing capacity constraints. Nepal must take multiple initiatives to develop the digital capabilities, scale up its successful initiatives. The private sector firms should strengthen their digital capabilities with a high degree of disruption to improve the most crucial digital priorities. Firms should assess their readiness with the quality data, IT architecture, capability on innovation, employees with digital skills on programming, and data analytics, IT implementation, transformative leadership and cultures.

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Reference

Adhikari, J. (2022). Expanding access to finance for small and medium enterprises: An analysis of demand and supply side constraints of Nepal. *The Journal of Economic Concerns*. Retrieved from: https://doi.org/10.3126/tjec.v13i1.57062

Chaudhary, D., Koirala, D. P., Pandey, B. R., Sharma, H., Ghimire, R., & Acharya, K. K. (2021). Policy and institutional review of federalism implementation in Nepal. *Nepal Public Policy Review, 1*(1), 101–144. https://doi.org/10.59596/nppr.2021.411004

Clark, J.; M., G.; Ardic Alper, O.P.; Galicia R., G.A. (2025). Digital public infrastructure and development: A World Bank Group approach. *Digital Transformation White Paper*; Volume 1. © World Bank. http://hdl.handle.net/10986/42935

Dhakal, M. (2025). *Digitalising Nepal: Why it cannot wait*. South Asia@LSE. https://blogs.lse.ac.uk/southasia/2025/10/06/digitalising-nepal-why-it-cannot-wait/

Digital Cooperation Organization. (2025, June). *Digital public infrastructure: Unlocking economic opportunity and resilience*. https://dco.org/wp-content/uploads/2025/06/DPI-Policy-Paper.pdf

Fæste, L., Scherer, M., & Gumsheimer, T. (2015). *How to jump-start a digital transformation*. Boston Consulting Group. https://www.bcg.com/publications/2015/digital-transformation-how-to-jump-start-a-digital-transformation

Feijao, C., Flanagan, I., van Stolk, C., & Gunashekar, S. (2021). *The global digital skills gap: Current trends and future directions*. RAND Corporation. Retrieved from: https://www.rand.org/content/dam/rand/pubs/research_reports/RRA1500/RRA1533-1/RAND_RRA1533-1.pdf

G20 Digital Economy Task Force. (2021). *G20 collection of digital identity practices*. Retrieved from: https://assets.innovazione.gov.it/1628073752-g20detfoecddigitalid.pdf

G20. (2016). *G20 digital economy development and cooperation initiative. G20 China Summit*. Retrieved from: http://www.g20chn.org/English/Documents/Current/201609/P020160908736971932404.pdf

G20. (2023). *G20 framework for the systems of digital public infrastructure. G20 India summit 2023*. Retrieved from: https://g7g20-documents.org/fileadmin/G7G20_documents/2023/G20/India/Sherpa-Track/Digital%20Economy%20Ministers/2%20Ministers%27%20Annex/G20_Digital%20Economy%20Ministers%20Meeting_Annex1_19082023.pdf

G20. (2023). *G20 Outcome of the 2023 G20 summit in new Delhi, India*. Retrieved from: https://www.europarl.europa.eu/RegData/etudes/ATAG/2023/751474/EPRS_ATA(2023)751474_EN.pdf

International Labor Organization. (2021). *Changing demand for skills in digital economies and societies: Literature review and case studies from low- and middle-income countries*. Retrieved from: https://www.ilo.org/sites/default/files/wcmsp5/groups/public/%40ed_emp/%40ifp_skills/documents/publication/wcms_831372.pdf

International Labor Organization. (2023a). *Changing demand for skills in digital economies and societies (policy brief)*. Retrieved from: https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@ed_emp/@ifp_skills/documents/publication/wcms_884840.pdf

ITU. (n.d.). *Digital Public Infrastructure*. International Telecommunication Union. Retrieved from: https://www.itu.int/en/ITU-D/Technology/Pages/dpi.aspx

Kandel, M., Timilsina, J., Basnet, B. J., & Joshi, R. D. (2024). Adoption of digital banking in Nepal: An Analysis of Customer Perceptions and Behaviors. *NPRC Journal of Multidisciplinary Research*, 1(9), 24–44. https://doi.org/10.3126/nprcjmr.v1i9.74143

Khanal, N. R., Nepal, P., Zhang, Y., Nepal, G., Paudel, B., Liu, L., & Rai, R. (2020). Policy provisions for agricultural development in Nepal: A review. *Journal of Cleaner Production, 261*, 121241. https://doi.org/10.1016/j.jclepro.2020.121241

Maharjan, S. Sharma, G., Poudel, S., and Subedi, B.and et. al (2024). Assessment of digitalization in government office with reference to department of transport management. *American Journal of IR 4.0 and beyond*. Retrieved from: https://doi.org/10.54536/ajirb.v3i1.3526

Meinel, C., Jagtiani, S.L., & Hagebolling, D. (2023). *Towards a multilateral framework for digital public infrastructure. T20 policy brief*. Retrieved from: https://www.global-solutions-initiative.org/wp-content/uploads/2025/03/T20_PB_TF7_38_Towards_a_Multilateral_Framework_for_Digital_Public_Infrastructure.pdf

Ministry of Communication and Information Technology, Nepal. (2019). *2019 digital Nepal framework (2019)*. Retrieved

from: https://giwmscdnone.gov.np/media/pdf_upload/digital_nepal_framework_english_matgc8r.pdf

Ministry of Finance. (2025). Macroeconomic indicators of Nepal. Retrieved from: https://data.mof.gov.np/macroeconomicChart.aspx

National Data Portal. (n.d.). *National data portal of Nepal.* Government of Nepal. Retrieved from: https://data.nsonepal.gov.np

National Statistics Office. (2018). *Report on the Nepal labor force survey, 2018*. NSO Data Portal. Government of Nepal. Retrieved from: https://data.nsonepal.gov.np/dataset/a095d482-4f68-4aec-809b-ae8041d3817c/resource/dfb34154-3625-4467-adec-3ac19e6e1f60/

Nepal Rastra Bank. (2022). *Financial literacy framework 2022*. Retrieved from: https://www.nrb.org.np/contents/uploads/2023/07/Financial-Literacy-Framework-2022.pdf

OECD .(2020). *OECD digital economy outlook 2020*, OECD Publishing, Paris, Retrieved from : https://doi.org/10.1787/bb167041-en.

OECD. (2014). *Measuring the digital economy: A new perspective*, OECD publishing, Paris, Retrieved from: https://doi.org/10.1787/9789264221796-en.

OECD. (2020). *A roadmap toward a common framework for measuring the digital economy*. OECD Publishing. Retrieved from: https://www.itu.int/en/ITU-D/Statistics/Documents/publications/OECDRoadmapDigitalEconomy2020.pdf

OECD. (2020). *OECD digital economy outlook 2020*, OECD publishing, Paris. In OECD. Retrieved from: https://doi.org/10.1787/bb167041-en

OECD. (2024). *Digital public infrastructure for the digital governments*: OECD public governance policy papers no 68. OECD publishing. Retrieved from: https://www.oecd.org/content/dam/oecd/en/publications/reports/2024/12/digital-public-infrastructure-for-digital-governments_11fe17d9/ff525dc8-en.pdf

OECD. (2024). *OECD digital economy outlook 2024: Embracing the technology frontier*, Vol. 1. OECD Publishing, Paris. Retrieved from https://doi.org/10.1787/a1689dc5-en.

Pham, S., Dang, D., & et. al. (2025). *Towards a framework for enterprise architecture in mobile government: A case study*. Retrieved from: https://doi.org/10.48550/arXiv.2501.09401

Phuyal, P. (2024). Digitalization of government services and citizen satisfaction: A case study in Dhankuta district, Nepal. Retrieved from: https://doi.org/10.3126/prashasan.v56i1.67336

Sarker, T., S. Tandukar, and S. R. Dey. 2021. *Promoting sustainable development through realizing the demographic dividend opportunity in the digital economy: A case study of Nepal*. ADBI Working Paper 1225. Tokyo: Asian Development Bank Institute. Retrieved from: https://research-repository.griffith.edu.au/items/c025fadf-2c8f-4ffc-88c3-6a59479a7126

Shrestha, D., Wenan, T., Rajkarnikar, N., & Niroula, S. (2021). Analysis of ICT infrastructure and tourism informational needs: A case study of Nepal. SSRN. http://dx.doi.org/10.2139/ssrn.3984232

Thapa, G.B, & Thapaliya, S. (2025). Cybersecurity challenges in small and medium enterprises, in Nepal. *IJMIR Journal.* Vol. 2 (6) Retrieved from: https://doi.org/10.58806/ijmir.2025.v2i6n05

United Nations Conference on Trade and Development. (2025). *Technology and innovation report 2025: Inclusive artificial intelligence for development*. Retrieved from: https://unctad.org/system/files/official-document/tir2025_en.pdf

United Nations Development Programme (UNDP) Nepal. (2015). *Sustainable development goals 2016-2030*, National (Preliminary) Report, National Planning Commission, Government of Nepal. Retrieved from: https://www.undp.org/sites/g/files/zskgke326/files/publications/SDG%20final%20report-nepal.pdf

United Nations Development Programme (UNDP) Nepal. (2023). *Our common future: Nepal's 2023 SDG progress review* (Report No. 978-9937-0-8283-2). https://www.undp.org/sites/g/files/zskgke326/files/publications/SDG%20final%20report-nepal.pdf

United Nations Development Programme. (n.d.). *SDG digital acceleration agenda*. SDG Digital. Retrieved on 11.12.2025, from https://www.sdg-digital.org

World Bank. (2025). *Digital economy*. ¥World Bank Group. Retrieved from: https://www.worldbank.org/en/topic/digital/brief/digital-economy.

World Bank. (n.d.). *Digital public infrastructure*. World Bank Group. Retrieved from: https://www.worldbank.org/ext/en/topic/digital-and-ai/digital-public-infrastructure-and-services

Yang, J., Zhang, X., & Du, Q. (2022). An analysis of the impact of the digital economy on high-quality economic development in China—A study based on the effects of supply and demand. *Sustainability, 14*(24), 16991. https://doi.org/10.3390/su142416991