Connectivity to Prosperity: ICT Adoption Strategies for Asian LDCs

Deepak Thapa*

Abstract

This paper explores the link between ICT adoption and socioeconomic challenges in the least developed countries. It highlights the role of ICT components, such as mobile network coverage, internet connectivity, and social media, in addressing poverty, unemployment, and slow economic growth. However, a lack of investment, poor infrastructure, and flawed government policies hinder the adoption of ICT, resulting in a 'Technology Gap' that hinders socioeconomic reform. Prioritizing ICT adoption can reduce poverty and unemployment and increase economic growth.

Keywords: mobile user, internet user, socioeconomic improvement

Introduction

Least Developed Countries (LDCs) face numerous socioeconomic challenges, often due to their inability to adopt digital technologies. Digital technology innovation has significantly improved financial access for low-income communities through digital banking, e-payments, and alternative funding models. However, low income and human development are often associated with limited access to technological components such as mobile network coverage, internet users, and social media penetration. These factors can influence digital inclusion and overall socioeconomic progress. (Wade, 2002, Wanof, 2023).

During the COVID-19 pandemic, ICT usage increased significantly as a coping tool, fostering social connection and mitigating future anxiety. ICT plays a vital role in data processing and business operations, enhancing operational efficiency and improving customer experiences. Addressing socioeconomic challenges requires comprehensive and innovative solutions, which are further compounded by vast geographic diversity, cultural variations, linguistic differences, underdeveloped infrastructure, and inequities in health and education systems(Lee et. all, 2021; Turban et. all, 2018).

Socioeconomic accounting applies accounting principles to the social sciences, including sociology, political science, and economics, with a focus on measuring and analyzing the social and economic impacts of activities. ICT connects these sectors to achieve better outcomes. The impact of Information and Communication Technologies (ICT) on socioeconomic development is substantial, as it can influence GDP, employment, and quality of life (Bhusal, 2011; Ross et al., 1995; Palvia et al., 2018).

This research aims to investigate the relationship between socioeconomic challenges and ICT components of digital technology and analyze how the prioritized adoption of such tools can be leveraged to address and improve these challenges. By addressing the technology gap, the study offers insights into fostering inclusive economic participation and reducing the digital divide in the least developed countries.

Current Internet Coverage Situation in Developed and Underdeveloped Countries

LDCs, home to 40% of the world's poor and, often face conflict. The UN portal for LDCs states that these countries account for 13% of the global population but less than 1% of global trade and investment. Internet access is limited to under 35% in LDCs till 2022, as **shown below.**

Bridging the digital divide in Least Developed Countries (LDCs) requires prioritizing ICT adoption—mobile networks, internet access, and digital finance—to unlock socioeconomic progress, mitigate systemic inequities, and empower inclusive growth despite infrastructural and policy barriers

* Mr. Thapa is an MPhil Scholar at Nepal Open University and a faculty member at Texas International College, Kathmandu
Email: dipkthapa1@gmail.com

Table 1 Current internet coverage situation

Year	World	Change %	Developed countries	Change %	Least Developed Countries (LDCs)	Change%
2005	13%		50%		3%	
2006	15%	15.38%	53%	6.00%	4%	33.33%
2007	17%	13.33%	56%	5.66%	5%	25.00%
2008	19%	11.76%	59%	5.36%	6%	20.00%
2009	21%	10.53%	62%	5.08%	7%	16.67%
2010	24%	14.29%	65%	4.84%	8%	14.29%
2011	27%	12.50%	68%	4.62%	9%	12.50%
2012	29%	7.41%	71%	4.41%	10%	11.11%
2013	32%	10.34%	74%	4.23%	12%	20.00%
2014	35%	9.37%	77%	4.05%	14%	16.67%
2015	38%	8.57%	80%	3.90%	16%	14.29%
2016	41%	7.89%	83%	3.75%	18%	12.50%
2017	44%	7.32%	86%	3.61%	20%	11.11%
2018	47%	6.82%	89%	3.49%	22%	10.00%
2019	50%	6.38%	92%	3.37%	24%	9.09%
2020	53%	6.00%	95%	3.26%	26%	8.33%
2021	56%	5.66%	98%	3.16%	28%	7.69%
2022	59%	5.36%	100%	2.04%	30%	7.14%
Avrage	35.71%	9.35%	76.94%	4.17%	15.24%	14.69%
median	35.00%	8.57%	77.00%	4.05%	14.00%	12.50%
Sd	13.79%	3.08%	14.60%	0.99%	8.28%	6.66%
min	15%	5%	53%	2%	4%	7%
max	59%	15%	100%	6%	30%	33%

Source: world economic forum -worldwide internet coverage 2023

Social media and web-based technologies serve as powerful platforms for global connection, information exchange, and socioeconomic empowerment - transforming communication habits, strengthening communities, and creating new opportunities in e-commerce and digital literacy.

About 30% of people in Least Developed Countries have internet connectivity by the end of 2022, according to Table 1. This suggests that there is a substantial digital gap in these areas, with 70% of the population remaining disconnected. The four main categories in the diagram might be greatly impacted by a rise in ICT use. Growth is seen in Table 1, rising from 13% in 2005 to 59% in 2022. Penetration median: 35%, average: ~35.7%. Growth peaked in 2006 at 15.38%, and it continued to expand by double digits until 2013. Over time, the growth rate has decreased, reaching about 5% in recent years. There is moderate fluctuation, with a standard deviation of change of 3.08%. Although there has been a consistent improvement on a worldwide scale, progress is slowing, most likely as a result of high-penetration nations approaching saturation. Social Media as Components of ICT

Carr and Hayes(2015) and Brahm and Dutta (2020) conducted many studies on social media and web-based technologies. These technologies enable users to share information, ideas, and personal messages within virtual communities. Global usage is highest for keeping in touch with friends and family, followed by reading news stories. Social media enhances connectivity, fosters social cohesion, and supports e-commerce, consumer awareness, and skill-building.

Literature review

The strategic implementation of ICTs plays a crucial role in socioeconomic development by enhancing digital access, fostering innovation, and enabling inclusive growth, ultimately reducing poverty and promoting sustainable regional progress(Rahman, 2007). So access to ICT is vital for overall development nowadays. ICT infrastructure and digital connectivity play a crucial role in socioeconomic development by enhancing digital literacy, economic opportunities, and overall growth, particularly in developing countries (Jeremic et al., 2011). Roztocki et. al. (2019) conclude that socioeconomic development through ICT is driven by the interplay of policy, business, technology, and society, enabling inclusive growth, digital empowerment, and economic advancement. So, ICT can play a vital role in the socioeconomic sector in any situation. According to Rachmawati et al. (2021), the COVID-19 pandemic significantly accelerated the use of ICT to support work-from-home (WfH) systems, which became essential for maintaining productivity and reshaping workplace dynamics in both government and private sectors. However, despite rapid technological advancements, Least Developed Countries (LDCs) face significant challenges in accessing and benefiting from these innovations due to limited investment in research and development, inadequate infrastructure, and a lack of skilled human capital (UN Chronicle, 2018). This digital divide hinders economic growth, exacerbates poverty, and limits participation in the globalized knowledge economy. Closing this gap requires concerted efforts to invest in education, improve digital infrastructure, and foster

innovation ecosystems in LDCs, empowering them to harness the transformative potential of technology for sustainable development. Furthermore, the successful adoption, scaling up, and sustainability of technology-supported health and care programs depend on addressing challenges across multiple domains, including technology users, organizations, societal context, and their dynamic interactions over time (Greenhalgh et. al., 2017). Therefore, promoting the use of various technologies for development and other purposes is crucial in the modern era.

Despite these imperatives, LDCs often struggle to adopt new technologies due to various constraints. Microeconomic perspectives examine the factors influencing technology adoption, including financial returns, social learning, externalities, credit constraints, and individual decision-making, to better understand the barriers to technology diffusion and its impact on productivity and economic outcomes (Foster & Rosenzweig, 2010). Due to their inability to effectively adopt ICT tools, LDCs face numerous socioeconomic challenges, commonly referred to as technological backwardness. The Disguised unemployment and underemployment are high on those countries. Underemployment occurs when individuals work in jobs that do not fully utilize their skills or availability, while disguised unemployment, a specific form of underemployment, refers to workers engaged in low-productivity activities where their labor is inefficiently used but not officially counted as unemployed (Streeten, 1989). These constraints not only limit economic progress but also widen disparities between developed and underdeveloped nations, reinforcing cycles of poverty and restricting opportunities for sustainable development. Addressing these barriers requires a comprehensive strategy that integrates economic policies, investment in digital literacy, and infrastructural improvements to enhance ICT accessibility and utilization in LDCs.This conceptual framework (Figure 2) shows that the prioritized adoption of ICT in Asian LDCs can significantly contribute to socioeconomic development.

Strategic ICT adoption is pivotal for socioeconomic transformation in LDCs—bridging digital divides, fostering inclusive growth, and combating technological backwardness—yet requires targeted investments in infrastructure, education, and policy reform to overcome systemic barriers to equitable development

Social Network Theory, Diffusion of Innovation, and Human Capital Theory collectively demonstrate how ICT adoption in LDCs can be accelerated through targeted node-based strategies, peer influence dynamics, and digital skill development— transforming connectivity into tangible socioeconomic progress

This study tackles the underexplored nexus between ICT adoption and socioeconomic development in LDCs—navigating data scarcity and methodological complexity through rigorous quantitative analysis to establish actionable, evidence-based linkages often missing in fragmented prior research

Social network theory explores complex social structures through nodes (individuals) and edges (relationships), allowing for the analysis of interactions within a broader social context(Krause et. all, 2007). By applying this approach to research on ICT adoption for socioeconomic improvement, it becomes possible to understand how digital connectivity influences cooperation, information exchange, and innovation within communities, ultimately driving poverty reduction and economic growth. It is instrumental in understanding and facilitating the adoption of ICT in LDCs by identifying influential individuals and leveraging existing social ties to disseminate information and overcome barriers to technology access. The Diffusion of Innovation Theory explains how innovations spread through social networks, categorizing adopters into five groups: innovators, early adopters, early majority, late majority, and laggards (Kaminski, 2011). This theory further emphasizes the role of peer influence and communication channels in accelerating the adoption of digital technologies, thereby enhancing digital literacy and promoting economic growth in the least developed regions. Human Capital Theory emphasizes the importance of human connections and knowledge exchange in promoting innovation and economic development (Wuttaphan, 2017). By integrating this perspective with human capital theory, prioritized ICT adoption can enhance digital skills, collaboration, and resource access, driving socioeconomic improvement in underdeveloped regions.

Research problems and gaps

The research topic is broad, spanning multiple sectors. There is limited research on adopting technology to address socioeconomic challenges, and some studies have focused solely on adopting modern technology in the least developed countries. Due to the broad research topic, finding accurate data to support the hypothesis is significantly more complicated, as is interpreting

and drawing conclusions from the results. This causes considerable confusion and creates dilemmas about initiating the research, particularly when connecting socioeconomic factors with technology adoption. Results may not be valid without continuous effort, expert guidance, and proper use of study materials that align with a well-structured study. Previous research has shown a lack of depth, expert insight, or accurate data. By emphasizing these factors, this research highlights the importance of a rigorous research methodology and comprehensive resources in bridging research gaps and enhancing the study's credibility.

Research methodology

This study employs a step-by-step method that begins with collecting numerical data from secondary sources, such as websites and published resources. Increasingly relevant and related materials are being utilized to inform this research. I hope such practices and implied methods will encompass general trends and detailed viewpoints. This research employs Pearson correlation coefficients. SPSS software, WPS Office, and Google Sheets are used to process the data for analysis and to present the findings. A multiple linear regression Model is established in the following way.

Results and discussion

A comprehensive understanding of the current socioeconomic status of each Least Developed Country (LDC) in Asia is crucial for informed discourse grounded in this research. In the context of socioeconomic improvement, it is crucial to examine key indicators such as internet penetration, social media usage, mobile network coverage, and poverty rates, as they are directly related to the study's independent, mediating, and dependent variables. Therefore, the following tables have been structured to present data aligned with these critical factors.

Table 2 Mobile network, internet users, social media, GDP, poverty rate, and unemployment in the least developed countries

Sampled LDCs	Total Popula-tion	Percentage of Population covered (up to 2023) by			Dependent Variables		
		Mobile Net-work	Inter-net Users	Social Media Users	GDP-Per Capita (PPP)- US Dollar	Poverty Rate (%)	Unemployment Rate (%)
Afganistan	42.8	64.6	20	8.6	2213.3	47.5	15.4
Bangla-desh	173.8	108	45	30.34	9147.8	18.7	5.06
Cambodia	17.03	144.7	56.7	68.4	7425.5	17.8	0.24
Lao PDR	3.75	88.5	66.15	48.8	9291.8	16.87	1.2
Myanmar	54.78	117.4	44	33.8	5953.4	49.7	2.84
Nepal	31.07	120.6	51	43.5	5393.6	20.27	10.68
Timor-Leste	1.37	122	54	42.2	4804	45.8	1.52
Yemen	34.83	59.8	18	10.3	3164.3	75	17.22
average	44.92875	103.2	44.35625	35.7425	5924.213	36.455	6.77
Sd	55.2589	29.74352	17.12516	19.84182	2588.747	21.31144	6.746055
Min	1.37	59.8	18	8.6	2213.3	16.87	0.24
Max	173.8	144.7	66.15	68.4	9291.8	75	17.22
Median	32.95	112.7	48	38	5673.5	33.035	3.95
Q1	13.71	82.525	38	25.33	4394.075	18.475	1.44
Q3	45.795	120.95	54.675	44.825	7856.075	48.05	11.86
interquar-tile	32.085	38.425	16.675	19.495	3462	29.575	10.42

Source -Various websites

This study systematically analyzes ICT's socioeconomic impact in LDCs through quantitative analysis—leveraging Pearson correlation on secondary data to empirically validate the transformative role of digital adoption in driving development outcomes

This dataset provides a **snapshot of digital access and development indicators (as of 2023)** for eight Least Developed Countries (LDCs). It compares mobile, internet, and social media usage with economic and social metrics, including **GDP per capita, poverty, and unemployment**.

According to the data, there are notable differences in ICT adoption between LDCs. With an average of 103.2% and a median of 112.7% (59.8%-144.7%), mobile network coverage shows the highest penetration, suggesting that users who frequently keep numerous SIM cards have widespread cellular access. But with an

average internet adoption rate of only 44.36% (median: 48%; range: 18%-66.15%), more than half of the population is unconnected. With an average penetration rate of 35.74% (median: 38%; range: 8.6%-68.4%), social media usage is even more restricted. This reflects several additional barriers, such as limited device ownership, pricing concerns, and difficulties with digital literacy. Although basic mobile infrastructure provides nearly universal coverage in many LDCs, these gaps show that addressing deeper structural issues beyond network availability is necessary for real digital inclusion.

Table 3 Correlation table

	Mobile user %	Internet user %	Social media user %	GDP	Poverty rate %	Unemployment rate %
Mobile user %	1	.721*	.852**	0.485	-0.583	-.762*
internet user %	.721*	1	.896**	.782*	-.773*	-.880**
social media user% %	.852**	.896**	1	0.654	-.723*	-.825*
GDP	0.485	.782*	0.654	1	-.777*	-.746*
Poverty rate %	-0.583	-.773*	-.723*	-.777*	1	0.591
Unemployment rate %	-.762*	-.880**	-.825*	-.746*	0.591	1

While mobile networks achieve >100% penetration in LDCs, stark gaps persist in internet (44%) and social media access (36%), revealing that true digital inclusion requires addressing literacy, affordability, and device barriers beyond mere connectivity

The correlation matrix shows numerous noteworthy connections between digital connectivity and socioeconomic variables. Significantly, the percentage of mobile users is positively correlated with the percentage of internet users ($r = 0.721$, $p < 0.05$) and social media users ($r = 0.852$, $p < 0.01$), suggesting that higher internet and social media usage is supported by higher mobile penetration. Additionally, a moderately and statistically negative correlation ($r = -0.762$) between mobile usage and the jobless rate indicates that nations with greater mobile access may have lower unemployment rates. The relationship between internet usage and socioeconomic characteristics is considerably more pronounced. It is strongly and negatively correlated with the unemployment rate ($r = -0.880$, $p < 0.01$) and poverty rate ($r = -0.773$, $p < 0.05$). However, it has a highly significant positive link with social media usage ($r = 0.896$) and GDP ($r = 0.782$, $p < 0.05$). This suggests that internet accessibility is a powerful indicator of social progress and economic growth and reflects digital improvement. The notion that digital participation increases as economic conditions improve is further supported by the significant negative correlations between social media usage and unemployment ($r = -0.825$), poverty ($r = -0.723$), and the significant positive correlations with internet and mobile usage. It indicates a favorable trend even though its positive association with GDP ($r = 0.654$) is not statistically significant.

GDP has a significant negative correlation with unemployment ($r = -0.746$) and poverty ($r = -0.777$), and a positive correlation with social media and internet use ($r = 0.782$). These correlations highlight how better national income levels typically accompany labor market conditions and increased digital inclusion. Lastly, a positive correlation exists between unemployment and poverty rates ($r = 0.591$), suggesting that more unemployment frequently coincides with increased poverty. Both variables' constant negative connections with digital indicators highlight a digital gap where less connected communities experience greater economic suffering. In conclusion, the matrix shows a distinct pattern: greater access to digital resources, including social media, the internet, and mobile devices, is closely associated with greater economic prosperity as well as lower rates of unemployment and poverty.

Conclusion

The data highlights a glaring digital divide across LDCs, with mobile network penetration ranging from extensive multi-SIM usage in more connected countries to restricted access in economically fragile and conflict-affected countries. Some LDCs still face challenges with essential connection, despite others having nearly universal coverage and surpassing population-based subscription rates. This reflects wider differences in infrastructure, economic stability, and the efficacy of policies.

Reference

Brahma, A., & Dutta, R. (2020). Role of social media and e-commerce for business entrepreneurship. *International Journal of Scientific Research in Computer Science, Engineering and Information Technology, 1*, 1-18.

About least developed countries-*https://www.un.org/ohrlls/content/about-least- developed-countries*

Bhusal, B. P. Social Inclusion and its Relevancy in Developing Countries like Nepal: A Brief Review.

Carr, C. T., & Hayes, R. A. (2015). Social media: Defining, developing, and divining.

Atlantic Journal of Communication, 23(1), 46-65.

Digital Technology- *https://www.studysmarter.co.uk/explanations/business- studies/business-development/digital-technology/*

Foster, A. D., & Rosenzweig, M. R. (2010). Microeconomics of technology adoption.

Annual Review of Economics, 2(1), 395-424.

García-Avilés, J. A. (2020). Diffusion of innovation. In *The international encyclopedia of media psychology* (pp. 1-8).

Greenhalgh, T., Wherton, J., Papoutsi, C., Lynch, J., Hughes, G., Hinder, S., ... & Shaw, S. (2017). Beyond adoption: A new framework for theorizing and evaluating nonadoption, abandonment, and challenges to the scale-up, spread, and sustainability of health and care technologies. *Journal of Medical Internet Research, 19*(11), e8775.

Digital connectivity is strongly linked to economic prosperity, with higher mobile, internet, and social media use associated with increased GDP and lower poverty and unemployment

GDP per capita, PPP (current international $) - Least developed countries: UN classification- International Comparison Program, World Bank

https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD?locations=XL

Jeremic, V., Markovic, A., & Radojick, Z. (2011). ICT as Crucial Component of Socioeconomic Development. *Management (1820-0222)*, *16*(60).

Lee, J. (2016). Impact of ICT on work: Introduction. In *The Impact of ICT on Work*

(pp. 1-6). Singapore: Springer Singapore.

Lee, Y. C., Malcein, L. A., & Kim, S. C. (2021). Information and communications technology (ICT) usage during COVID-19: Motivating factors and implications. *International Journal of Environmental Research and Public Health, 18*(7), 3571.

Liu, W., Sidhu, A., Beacom, A. M., & Valente, T. W. (2017). Social network theory. In *The international encyclopedia of media effects* (pp. 1-12).

List of Least developed counties - *https://unctad.org/topic/least-developed- countries/lis*

LDC portal UNO- *https://www.un.org/ldcportal/content/countries-approaching-graduation-and-graduated*

Kaminski, J. (2011). Diffusion of innovation theory. *Canadian Journal of Nursing Informatics*, *6*(2), 1-6.

Krause, J., Croft, D. P., & James, R. (2007). Social network theory in the behavioural sciences: potential applications. *Behavioral Ecology and Sociobiology*, *62*, 15-27.

Marshall, A. (1890). *Principles of economics*.

Mobley, S. C. (1970). The challenges of socioeconomic accounting. *The Accounting Review, 45*(4), 762–768. http://www.jstor.org/stable/244213

Palvia, P., Baqir, N., & Nemati, H. (2018). ICT for socioeconomic development: A citizens' perspective. *Information & Management, 55*(8), 1031-1045. https://doi.org/10.1016/j.im.2017.05.003

Rachmawati, R., Choirunnisa, U., Pambagyo, Z. A., Syarafina, Y. A., & Ghiffari, R.

A. (2021). Work from home and the use of ICT during the COVID-19 pandemic in Indonesia and its impact on cities in the future. *Sustainability, 13*(12), 6760.

Rahman, H. (2007). Role of ICTs in socioeconomic development and poverty reduction. In *Information and communication technologies for economic and regional developments* (pp. 180-219). IGI Global Scientific Publishing.

Ross, C. E., & Wu, C. L. (1995). The links between education and health. *American Sociological Review*, 719-745.

Roztocki, N., Soja, P., & Weistroffer, H. R. (2019). The role of information and communication technologies in socioeconomic development: towards a multi- dimensional framework. *Information Technology for Development*, *25*(2), 171-183.

Streeten, P. (1989). Disguised unemployment and underemployment. In *Joan Robinson and Modern Economic Theory* (pp. 723-726). London: Palgrave Macmillan UK.

Technological Gap of LDC s- *https://www.un.org/en/chronicle/article/closing- technology-gap-least-developed-countries*

Technology Adoption by Firms in Developing Countries- *https://www.worldbank.org/en/topic/competitiveness/publication/technology- adoption-by-firms-in-developing-countries*

Technology for development- *https://www.aiu.edu.sy/ar/1-13531/book/19203/978-3- 319-91068-0/Technologies-for-Development*

Total population of internet acccess around the world.

https://www.weforum.org/stories/2023/09/broadband-no-luxury-basic-necessity/....

Turban, E., Pollard, C., & Wood, G. (2018). *Information technology for management: On-demand strategies for performance, growth and sustainability*. John Wiley & Sons.

Thapa, D. (2024). Revitalization of the Nepalese Agriculture Sector for Economic Prosperity: Gap Analysis between Agricultural GDP and Investment Trends. *The Journal of Economic Concerns*, *15*(1), 101-115.

Wanof, M. I. (2023). Digital technology innovation in improving financial access for low-income communities. *ResearchGate*. https://www.researchgate.net/publication/374125371_Digital_Technology_Innovation

_in_Improving_Financial_Access_for_Low-Income_Communities

Wade, R. H. (2002). Bridging the digital divide: new route to development or new form of dependency?. *Global governance*, *8*, 443.

Wuttaphan, N. (2017). Human capital theory: The theory of human resource development, implications, and future. *Life Sciences and Environment Journal*, *18*(2), 240-253.