Use and Challenges of ICT in Rural Development in Nepal (A Case Study of Bagmati Rural Municipality of Lalitpur, Ward: 1)

Nabaraj Bhattarai
Department of Rural Development, Tri-Chandra Multiple Campus, TU
Email ID: newkopila@gmail.com
DOI: https://doi.org/10.3126/barunj.v3i01.91586
ORCID ID: 0009-0000-1108-8237

Man Bahadur Sunuwar
Department of Population Studies, Tri-Chandra Multiple Campus, TU
(Email ID: manbahadur44@gmail.com)
DOI: https://doi.org/10.3126/barunj.v3i01.91586
ORCID ID :0009-0004-5752-2966

Keshav Thapa
Department of Population, Tri-Chandra Multiple Campus, TU
Email ID: thapakeshav595@gmail.com /keshab.thapa@trc.tu.edu.np
DOI: https://doi.org/10.3126/barunj.v3i01.91586
ORCID ID: 0009-0002-0031-8003

Subardhan Khadka
Department of Rural Development, Tri-Chandra Multiple Campus, TU
Email ID: subarml@gmail.com
DOI: https://doi.org/10.3126/barunj.v3i01.91586
ORCID ID 0009-0002-0640-2871

Abstract

Information communication technology ("ICT) is the broad range of technologies that facilitate communication and the processing and transmission of information through electronic means, including computing, telecommunications, and digital media. Main purpose of this study is to analyze the use and challenge of ICT in Rural Development in Nepal (A case study of Bagmati Rural Municipality of Lalitpur, Ward -1). Out of total population, 140 ICT users were direct interviewed with purposive non-probability

sampling method applying the pre-structured questionnaires. Descriptive research design, Quantitative research method was applied for the whole process. Both primary and secondary data have been used. The primary data were collected through direct interview to the potential respondents and secondary data were collected through different published and non-published national and international publications i.e. Journal, books, scholarly articles, google articles, reports of government offices etc. Out of 140 respondents, almost all are using the ICT. ICT is being their life line. ICT is milestone of the rural development. They are using ICT in almost in all areas, agriculture, business, service, marketing. Individual people are highly benefited from the ICT in the grass root level.

Keywords: ICT, Use, Development, Impact, Challenge,

Background

Information communication technologies (ICT) relate to a wide range of technological tools and resources used to store, create, transfer, and share/exchange information. These resources and technological tools include the internet (email, websites, blogs), computers, recorded broadcasting technologies (podcasting, video players, podcast storage devices), live broadcasting (television, webcasting, and radio), and telephonic technologies (satellite, mobile, video-conferences). However, "Information and communication technology (ICT) encompasses a wide range of technological tools and resources used for information creation, management, storage, and dissemination." Examples of this technology include computers, the internet, television and radio broadcasts, and telephones. Furthermore, ICT stands for information and communications technology, and it refers to all technologies that use broadcast media, video processing, intelligent building management systems, telecommunications, and network-based control and monitoring. It includes software, telecommunications, computers, the internet, and other digital technologies used for data processing, storage, and transmission. Many authors and organizations describe information and communication technology (ICT) (UNESCO, 2009).

Implemented Land Record and Information Management System (LRIMS) for agriculture and smart livestock management. A skilled training program for farmers. (Sharma L.R., 2024).

The Oxford Dictionary of Computing Law and Pelgrum (2003) state that "ICT is the convergence of computing, telecommunications, and broadcasting technologies, enabling the processing and distribution of data in digital form."

Radio and Television-Based Education: Radio and television have long been used to transmit instructional content in areas with poor internet connectivity. For instance, the Telesecundaria program in Mexico has effectively employed television to educate rural kids in secondary school. Notwithstanding these developments, obstacles like poor infrastructure, low levels of digital literacy, and exorbitant technology costs continue to be major obstacles to the broad use of ICT in rural education. (World Bank, 2018).

"ICT is a range of technological tools and resources used to transmit, store, create, share, or exchange information." (Blurton,1999)

"ICT is defined as a broad range of technologies that facilitate communication and the processing and transmission of information through electronic means, including computing, telecommunications, and digital media" (Heeks, 1999).

Telemedicine: Telemedicine has enabled rural patients to consult with specialists in urban areas, reducing the need for travel and improving access to quality care. For instance, Brazil's Telehealth Program has connected rural health clinics with urban hospitals, facilitating remote diagnosis and treatment (WHO, 2019).

Health Applications: Disease surveillance, maternity and child health monitoring, and health awareness campaigns have all made use of mobile health applications. Programs like Uganda's mTrac have used SMS-based services to enhance healthcare delivery in sub-Saharan Africa (GSMA, 2021). However, poor infrastructure, low levels of internet knowledge, and financial limitations frequently pose a threat to these programs' survival.

There is no single universal definition of ICT because devices, technologies, and concepts about information communication and technology (ICT) continually changing. Furthermore, the phrases "ICT" is commonly used to refer to all networking, components, devices, and applications. Thus, the combination of those are useful to individuals and is organizations for interacting in the digital world. However, the key components of ICT include computers, robotics, digital TV, smart phones, middleware, software, hardware devices, data, wired networks, wireless networks, communication technologies, communication protocols and interfaces, information security and governance rules, and so on. (Mary K. P., 2018)

Insufficient digital literacy, insufficient training, cost barriers, cyber security threats, digital divide, privacy concerns, lack of access to technology, poor infrastructure, insufficient training, difficulty of integrating ICT into existing systems and practice,

hard drive failure/replacement, network crashes, unauthorized changes, disruptions, power outages, employee incompetence, software failure are the main problems or challenges in ICT sectors (Kharel, S., (2018). Individuals, companies, and society have all faced new challenges and problems as a result of ICT. The increased use of high-speed internet, data digitization, and the expanding global network have all contributed to new prospects for social crime.

Connectivity and Digital Infrastructure- In remote areas, mobile network coverage and internet access are restricted. Investments in cell tower deployment and broadband growth are necessary.

However, the emergence of numerous institutional arrangements and policy attempts to build Nepal's ICT sector indicates a lack of a unified strategy in line with the technological advancements that have transformed the business throughout time. Among the significant advancements shaping the ICT environment have been the rapid adoption of the Internet and mobile wireless communications. These innovations have had a range of policy implications. With the growing use of social media, for example, the Internet has truly gone mainstream and is now part of many people's daily life (UIS, 2009)

As GOV of Nepal (2015). Information and communication technologies are becoming more and more vital to plans meant to safeguard sustainable development objectives and promote economic expansion in nations all over the world. Among other things, these technologies are fundamentally changing how public services are provided and how social interactions occur. In keeping with this, the Nepali government has given significant weight to the transformative potential of ICTs and to situating them within the broader framework of its ambitious development goals, which are based on the principle that poverty alleviation is the main objective.

According to Kharel (2018), the primary issues or challenges in the ICT sector include inadequate digital literacy, inadequate training, cost barriers, cyber security threats, digital divide, privacy concerns, lack of access to technology, poor infrastructure, insufficient training, difficulty integrating ICT into existing systems and practices, hard drive failure or replacement, network crashes, unauthorized changes, disruptions, power outages, employee incompetence, and software failure. Digital Payments & Financial Inclusion Digital payment methods and mobile banking are used to encourage financial access. Knowledge and instruction on online transactions and mobile wallets. Early Warning and Disaster Management Systems Early warning systems for earthquakes, landslides, and floods that are powered by ICT. Digital

platforms for catastrophe response and coordination. Opportunities for Employment and Entrepreneurship internet platforms for employment and skill development, as well as online job sites. encouragement of entrepreneurship and ICT-based enterprises in rural regions. Problems & Answers. Even though we are aware of the difficulties with ICT in many rural locations, numerous ICT companies are still providing their services and building various infrastructures. However, fact-based information about the current state of ICT and its difficulties is lacking. Therefore, the researcher conducted this study after posing the topic on the state of ICT infrastructure and the difficulties in rural areas.

Objectives

The main purpose of the study is to analyzed the use, challenges and opportunities of ICT in rural development.

Significance

ICT is being life line of each individual in Nepalese societies. This is primary information-based article which is useful to all, researchers, teachers, students and other academicians and scholars. This is also significance to local planners and other who are interested in this field.

Limitation

In this primary based information study, only 140 respondents are selected as a sample size for interview. Thus, the result can not be generalized whole of the nation due to the small size of sample. The authors did not cover other information besides the ICT use and challenges in the study area. Researcher has collected information through non-probability, purposive sampling methods. Therefore, sampling methods, study area are other limitations.

Methods and Materials

The research is based on deductive approach, descriptive research design, quantitative research method. The data were collected applying non-probability purposive sampling methods. Total 140 potential population were directly interviewed using the pre-structured questionnaires. Both primary and secondary data were used. The primary data were collected through direct interview with the respondents in the field. The secondary data were collected through different published and non-published national and international journal articles, publications, reports and policies papers etc. The primary data were analyzed using the data analysis software (SPSS 25v)

Result and Discussion

Table 1:
Age Group of the Respondents

Age group	Number	Frequency
20-29	64	45.7
30-39	49	35.0
40-49	15	10.7
50-59	8	5.7
60 Years and above	4	2.9
Total	**140**	**100.0**

Source: Field Study 2024

The findings show that the majority of respondents (80.7%) are between the ages of 20 and 39, with the 20-29 age group accounting for 45.7% of the sample. Representation drops dramatically with age, with only 2.9% of respondents aged 60 and up. This suggests a youth-dominated sample, implying that younger people were more involved or accessible during the field investigation. The study's findings may thus be more reflective of younger perspectives, and age-related generalizations should be approached with caution due to the underrepresentation of older age groups.

Table 2:
Gender Status of Respondents

Gender	Number	Percent
Male	97	69.3
Female	43	30.7
Total	**140**	**100.0**

Source: Field Study 2024

The gender breakdown of the 140 respondents is clear: 69.3% are male and 30.7% are female. This demonstrates a gender imbalance in the sample, with males twice more than females respondents. The study's findings may thus be more representative of male perspectives, and caution should be given when generalizing results across genders, particularly if gender influences the subject under study.

Table 3:
Literacy Status of Respondents

Literacy Status	Number	Frequency
Literate	135	96.4
Illiterate	5	3.6
Total	**140**	**100.0**

Source: Field Study 2024

The data reveals that the vast majority of respondents are literate, with 96.4% (135 out of 140) reporting literacy, while only 3.6% (5 respondents) are illiterate. This indicates a high literacy rate among the participants, suggesting that the respondents are likely to be capable of understanding and engaging with written content, which may have influenced their participation in the study. The low number of illiterate respondents may reflect the general literacy level of the population surveyed or indicate that illiterate individuals were less likely or less able to participate.

Table 4:
Qualification of Respondents

Educational Qualification	Number	Percent
Primary	14	10.4
Lower secondary	5	3.7
Secondary	12	8.9
Intermediate	55	40.7
Bachelor	35	25.9
Master Degree and above	14	10.4
Total	**135**	**100.0**

Source: Field study 2024

Among the 135 literate respondents, the largest group (40.7%) holds an Intermediate level qualification, followed by 25.9% with a Bachelor's degree. Only 10.4% have education at the Primary level, and another 10.4% hold a Master's degree or higher. Smaller proportions have Secondary (8.9%) and Lower Secondary (3.7%) education. This data indicates that the respondent group is relatively well-educated, with over two-thirds (67%) having qualifications at the Intermediate level or higher. The low percentage of lower educational levels suggests that the study may reflect the views of a moderately to highly educated population, which could influence their responses, awareness, and engagement with the study topic.

Table 5:
Occupational Status of Respondents

Occupational Status	Number	Percent
Farming	48	34.3
Business	32	22.9
Students	27	19.3
Teachers	6	4.3
Government Service	5	3.6
Others	22	15.7
Total	**140**	**100.0**

Source: Field Survey 2024

The results show that respondents work in a range of occupations, with farming being the most frequent, accounting for 34.3% of participants. This is followed by Business (22.9%) and Students (19.3%), suggesting a high proportion of economically active persons and youngsters in education. Teachers (4.3%), government employees (3.6%), and others (15.7%) account for smaller percentages. This distribution indicates a primarily rural and semi-urban sample, with a mix of agricultural, entrepreneurial, and intellectual backgrounds. The high proportion of farmers and students suggests that the community is likely involved in both traditional livelihoods and developing educational pursuits, which may influence the study's viewpoints and priorities.

Table 6:
Different ICT means Using Status

Different ICT means Using Status	Yes		No		Total	
	N	%	N	%	N	%
Use of Phone by family members	140	100.0	0	0.0	140	100.0
Use of Internet service	139	99.3	1	0.7	140	100.0
Use Television	140	100.0	0	0.0	140	100.0
Use of social media	130	92.9	10	7.1	140	100.0

Source: Field Survey 2024

The data highlights high penetration of Information and Communication Technology (ICT) among the 140 respondents and their families. Phone usage and Television usage are universal (100%), with all 140 families using these technologies. Internet service is used by 99.3%, showing near-universal access, with only one respondent not using it. Social media is used by 92.9%, indicating widespread digital engagement, although a small portion (7.1%) still does not participate. This suggests that the community is highly connected and tech-savvy, with most respondents and their families regularly using phones, internet, TV, and social media. Such high ICT usage implies strong potential for digital outreach, communication, and education initiatives within the population.

Table 7:
Purpose of using ICT

Purpose of Using Social Media	Number	Percent
Entertainment	39	27.9
For News	30	21.4
For knowledge	68	48.6
For Just time passing	3	2.1
Total	**140**	**100.0**

Source: Field Survey 2024

The data outlines the primary reasons respondents use social media, based on 163 total responses (indicating multiple responses per person may have been allowed): The most common purpose is "For knowledge", cited by 48.6 percent, suggesting that nearly half of the respondents use social media as a tool for learning and information gathering. Entertainment is the second most popular use, at 27.9 percent, followed by News consumption at 21.4 percent, showing that social media is also a key source of leisure and current affairs. Only 2.1% use it purely for time passing, indicating that most respondents engage with social media purposefully rather than aimlessly. This reflects a mature and intentional usage pattern of ICT, particularly social media, where respondents value it not only for leisure but significantly for informative and educational purposes.

Table 8:
Mode of Social Media

Mode of Social Media	Number	Percent
Youtube	94	67.1
Facebook	32	22.9
Tiktok	14	10.0
Total	**140**	**100.0**

Source: Field Survey 2024

The data shows the preferred platforms for social media use among the 140 respondents: YouTube is the most widely used platform, with 67.1% of respondents engaging with it. This suggests a strong preference for video-based content, likely for both educational and entertainment purposes. Facebook is used by 22.9 percent, indicating it still holds relevance, possibly for social interaction, news, or community engagement. TikTok is the least used among the listed platforms, with only 10.0% of users, suggesting lower popularity or lesser acceptance in this group. Overall, the data highlights that YouTube dominates as the primary mode of social media, aligning with earlier findings that social media is largely used for knowledge and entertainment. The usage pattern suggests a preference for visual, informative, and engaging content.

Table 9:
Challenge of ICT

Mode of Social Media	Number	Percent
Management difficulties	37	26.4
Security Control Mechanism	45	32.1
Proper Policy implementation	33	23.6
Proper utilization of ITC	25	17.9
Total	**140**	**100.0**

Source: Field Study 2024

The data presents the key challenges faced by respondents in the use of ICT: The most commonly reported challenge is Security Control Mechanism, cited by 32.1% of respondents. This reflects concerns over data privacy, cyber threats, or digital safety. Management Difficulties follow at 26.4%, indicating issues in organizing, operating, or maintaining ICT resources. Proper Policy Implementation is a challenge

for 23.6%, suggesting that even if ICT policies exist, their execution is lacking or ineffective. Proper Utilization of ICT is the least cited issue at 17.9%, though still significant, pointing to gaps in skills, awareness, or resource usage. Overall, the findings highlight that while ICT access is high, effective use is hindered by security concerns, management issues, and policy gaps. Addressing these areas could enhance the impact and efficiency of ICT in the community.

Table 10:
Opportunities of ICT

Positive Impact	Number	Percent
Easy in communication	16	11.4
Easy to life style	16	11.4
Easy to information flow	17	12.1
Supporting in agricultural production	18	12.9
Easy to education achievement	16	13.6
Easy in business	19	11.4
Easy in migration and remittance sending	14	10.0
Easy in overall development	11	7.9
Easy in health facilities receiving	13	9.3
Total	**140**	**100.0**

Source: Field Study 2024

The data highlights various positive impacts of ICT as perceived by the 140 respondents. The most recognized benefit is "Easy in business" at 13.6%, showing ICT's role in facilitating commercial activities. Supporting agricultural production follows closely at 12.9%, reflecting ICT's contribution to improving farming practices. Easy flow of information (12.1%), easy communication (11.4%), and enhanced lifestyle (11.4%) also feature prominently, indicating broad benefits in daily life and connectivity. Other noted impacts include ease in educational achievement (11.4%), migration and remittance sending (10.0%), health facilities access (9.3%), and overall development (7.9%). This distribution shows that ICT is viewed as a multifaceted tool that improves various aspects of life from business and agriculture to education, health, and communication contributing to overall community development.

Table 11:
Challenges of ICT

Negative Impact	Number	Percent
Harmful in child education and development	48	34.3
Increment of social crime	37	26.4
Problems of cyber crime	35	25.0
Problems of ICT misuse	20	14.3
Total	**140**	**100.0**

Source: Field study 2024

The data highlights the main negative impacts of ICT as reported by the 140 respondents:

The most significant concern is that ICT is harmful to child education and development, cited by 34.3% of respondents. This reflects worries about distractions, inappropriate content, or excessive screen time affecting children. Increment of social crime is noted by 26.4%, indicating fears that ICT may facilitate or exacerbate issues like fraud, harassment, or social disorder. Problems of cybercrime affect 25.0%, showing concerns over hacking, identity theft, and online scams. Misuse of ICT is reported by 14.3%, highlighting improper or unethical use of technology by some users. Overall, while ICT offers many benefits, respondents recognize significant risks related to children, crime, and misuse, emphasizing the need for awareness, safeguards, and regulation to mitigate these negative effects.

Conclusion

The field study of 140 respondents in 2024 reveals several important insights into the demographics, ICT usage, and its impacts on the community: The majority of respondents are young adults aged 20–39 years (80.7%), with males constituting 69.3 percent of the sample, indicating a youth- and male-dominated group. Literacy is very high (96.4%), and most respondents have education at the Intermediate level or higher (67%), reflecting a moderately to highly educated population. Occupations are varied, with a strong presence of farmers (34.3%) business people (22.9%), and students (19.3%), suggesting a community blending traditional and modern economic activities. ICT adoption is nearly universal among respondents' families, with 100 percent phone and television use, 99.3% internet access, and 92.9% social media engagement. Social media is primarily used for knowledge (48.6%), followed by entertainment and news, with YouTube (67.1%) as the dominant platform. Major

ICT challenges include security concerns (32.1%), management difficulties (26.4%), and policy implementation issues (23.6%). Positive impacts of ICT are widespread, supporting business (13.6%), agriculture (12.9%), education (11.4%), communication, and information flow. ICT is seen as a catalyst for overall development. Negative impacts mainly concern child education and development (34.3%), social crime (26.4%), cybercrime (25.0%), and misuse of technology (14.3%). Overall, the study indicates that ICT is widely adopted and positively influences multiple life aspects, but also brings challenges requiring attention, especially regarding security, policy enforcement, and protecting vulnerable groups like children.

Recommendations

Based on the findings following recommendation would like to suggest.

Suggestions for Policy measures

- Government requires to develop and implement stronger cybersecurity measures to protect users from cybercrime and misuse and ensure effective enforcement of ICT policies to manage security risks and digital behavior.
- Provide digital literacy programs targeting all age groups, especially older and less-educated populations, to bridge gaps in proper ICT utilization, include awareness campaigns on safe and responsible use of ICT, focusing on risks such as cybercrime and social crime.
- Implement parental controls and digital education in schools to minimize the harmful impact of ICT on child development.
- Encourage the creation of child-friendly digital content and platforms.
- Support initiatives that use ICT to enhance agricultural productivity, education, business, and health services.
- Encourage social media content that is knowledge-driven and community-oriented.

Suggestions for further Research Operations

Researchers have conducted the small-scale study in particular geographical area with specific issues, thus there is still large potential issues need to operate further research on;

- ICT use and its impact in future generation
- Use and Challenge of ICT in Nepal

- ICT Infrastructure Development Challenges in Nepal
- ICT and its' impact in Banking Development Sectors in Nepal
- ICT and its' impact in Higher Education Sector in Nepal
- ICT and its impact in School Level Education

References

Blurton, C. (1999). *New directions of ICT-use in education*. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000112327

European Commission. (2001). *Communication from the Commission on e-Europe 2002: Quality criteria for services on the Internet*. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52001DC0300

GOV of Nepal, (2015). National Information and Communication Technology Policy.

GSMA (2021). mHealth in South Asia: Opportunities and Challenges. London: GSM Association.

Heeks, R. (1999). *Information and communication technologies, poverty and development* (Development Informatics Working Paper No. 5). University of Manchester.

Kharel, S. (2018). Information and communication technology for the rural development in Nepal. *Tribhuvan University Journal*, *32*(2), 177-190.

Mary, K. P. (2018). Components and infrastructure of ICT. *International Journal of Computer Applications*, 182(3), 25–30. https://doi.org/10.5120/ijca2018917201

Oxford Dictionary of Computing Law & Pelgrum, W. J. (2003). *ICT and education*. Oxford University Press.

Sharma, L. R. (2024). Role of ICT in agriculture and rural development in Nepal. *Nepal Journal of Agricultural Sciences*, 12(1), 33–47.

UNESCO. (2009). *ICT in education: A curriculum for schools and programme of teacher development*. UNESCO Bangkok. https://unesdoc.unesco.org/ark:/48223/pf0000184642

WHO (2019). Telemedicine in Developing Countries. Geneva: World Health Organization.

World Bank (2018). The Role of ICT in Education. Washington, DC: World Bank Group.