

# Practicability Assessment of Smart Village Project: A Case of Sandakpur Rural Municipality, Ilam Nepal

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### ABSTRACT

**Purpose:** Villages are the backbone of the nation and a smart village means such a village that can provide various services needed in day-to-day life to the villagers effectively and efficiently. The overall objective of this research is to assess the practicability of the smart village in the hilly region of Nepal with the case of a Sandakpur Rural Municipality (SRM).

**Design/Methodology/Approach:** The study covered the area within Maipokhari and Sulubung village of Sandakpur Rural Municipality. Ontology and Epistemology philosophy of research was used as positivism. This research was intended to propose the model of smart village examined through a scheduled questionnaire in village sample of SRM, literature reviews related to smart village, and smart rural. This research proposed the smart village with the characteristics as Smart Utilization of Resources, Smart Living, Smart Governance, Smart Village Services, Smart Technology, Smart Tourism, and Gender Equity and Women Equity which can comply with some of the United Nations Sustainable Development Goals (SDGs). Five points Likert scale was used on ranking smart village feature and Chi-Square test is done to determine the significance of respondent's opinions for the variables from the collected data. After the analysis of data with the Five-Point Likert Scale, ratings on smart features were given as Fair (2.82), Fair (3.02), Fair (2.93), Fair (3.17), Fair (3.2), Good (2.42), and Poor (3.46) respectively.

**Findings/Result:** The chi-square test showed that the majority of respondents supported the perspective toward Smart Village features as fair. Smart villages can only be possible with long-term planning, strategy and investment. With the adoption of features of the smart village, the study area can be converted into a smart village but it may take time to incorporate these features completely. The Smart village model is expected to be applied to villages in other regions by adjusting the characteristics of each region as every village has their own characteristics.

**Originality/Value:** It is action research to analyze the practicability of smart village development. It will be a method universal acceptable for assessing the feasibility of smart cities. The new concept will be fruitful for policymakers, Professionals, and nations for systematic development.

**Paper Type:** Ex-Post Facto Research.

**Keywords:** Smart Village, Information Technology, Sustainable Development, Equity, Services, SWOT analysis.

### 1. INTRODUCTION :

Nepal is a country with diverse geographic environments, including Terai (plain area), Hill, and Mountain, but in all these areas, the urbanization style is fast and uneven. The urbanization style is restricted normally in Kathmandu Valley and other some restrained cities of Terai. The result is that most of the massive cities are failing to cope with the demand of infrastructure offerings and job possibilities also are more and more dazzling beneath the penalties of the haphazard urbanization. In these large cities environmental degradation, congestion, city poverty, scattered settlements,

unemployment and lagging provisions of infrastructure offerings have emerged as an increasingly more seen phenomenon (Mishra and Shah, 2018) [1].

The greater part of the settlement is in the hilly region of Nepal as it covers about 68% of the absolute territory. In any case, the greater part of the settlements is distant and in reverses because of the absence of least improvement amenities. The reality of the matter is that it is exceptionally hard to overhaul country towns to created urban communities as there are dispersed settlements and the majority of the amenities effectively available in urban can be costly because of geological conditions (Poudel, 2013) [2]. Smart villages are one of the ideas of developed villages in India. This idea was proposed by Viswanadham and Vedula in their book "Smart Village Design". Smart villages imitate the smart city model, integrating innovation and renewal in remote areas (Aziiza, 2020) [3]. A smart village is an all-encompassing and comprehensive methodology for country advanced change towards accomplishing the SDGs in far-off and underserved communities where: (a) Rural inhabitants approach organize foundation using associated gadgets and services. (b) Citizens can get to significant and groundbreaking SDG-related advanced administrations, as they need them, on schedule, anyplace, and constantly. (c) Services are modified for the particular SDG needs of residents. (d) Integrated SDG-related administrations are persistently improving and adjusting to changes. (e) Partner associations included are consistently learning and adjusting their administrations (ITU, 2020) [4].

**2. PROBLEM STATEMENT :**

In Nepal, the municipalities are generally small and are given city status by consolidating a few Village Development Committees (VDCs). Indeed, the vast majority of the regions show rural characters, and the issues confronted are essentially contrasted with enormous urban communities of the populace at least 100,000. The most of the village lacks basic infrastructures like clean drinking water, sanitation, irrigation facilities and electricity.” Sandakpur Rural Municipality” located at the eastern part of Nepal Shares a border with India and also has very famous tourist spots but lacks basic infrastructures while it is considered deeply. Although agriculture is the basic occupation of this rural municipality and having potential for the medicinal herb industry people are backward as they even don’t have their land and lack basic needs like clean drinking water, irrigation, and even ICT-based services.

**3. OBJECTIVES :**

The overall objective of the research is to analyse the Practicability of Smart Village Project with A case of Sandakpur Rural Municipality, Ilam Nepal. Following are specific objective.

- (1) To develop an idea of the smart village with an institutional development plan and its integral features/attributes in the Nepalese context each for countrywide and local level via a literature assessment of worldwide practice cantered on developing countries.
- (2) To analyse the technological advancement needed for the progression of the smart village with a case of Sandakpur Rural Municipality.

**4. LITERATURE REVIEW :**

Smart Village is a concept developed for remote rural areas. It provides solutions to all problems that arise and improves the quality of life of the people living there. The Smart Village will provide the necessary framework for everyone's development to lead a quality life of respect, equality, happiness and education, safety and livelihood. It will also create a perfect and feasible state through the use of smart solutions. The smart village was created through five overlapping approaches: Redevelopment, Retrofitting, Greenfields, E-Pan, and livelihood (Eco Needs Foundation, 2016) [5].

**Table 1:** Smart Village Concept

S	Social, Skilled and Simple	No discrimination on any tribe, caste and religion, everyone is literate and Skilled with Simple living and high thinking.
M	Moral, Methodical and Modern	Moral of Mahatma Gandhi, Swami Vivekananda and so forth Methodical utilizing total literacy and most recent methods Modern like urban areas.

A	Aware, Adaptive and Adjusting	The most significant level of awareness on worldwide social, economic and financial issues. Adaptive and adjusting to quickly changing conditions.
R	Responsive and Ready	Responsive to aggregate intelligence, development and bigger social issues Ready to produce own assets for independence and self-reliance.
T	Techno-Savvy and Transparent	Techno-Savvy for IT and Mobile usage Transparent in harmonic relations and delivery of services.

(S. Rutuja, 2016, A. Tripathi, 2019) [6]

**Table 2:** Literature Review

S.N.	Title of paper	Country	Characteristics and focused area	Published on /By	Year of Publication
1	“Smart Village A Sustainable Model for Community Development”	Bhutan	Smart Village model approach focused on agriculture along with technology transfer	Noppawan Boontham, Chomchuan Boonrahong Sathaporn Sangsupoh and Surapol Dumronggittigule	2015 [7]
2	“Review on Development of Smart Villages”	India	Implementations of the Smart Village concept and the importance of digital transformation for rural areas	Prof. Shahid Arshad, Mohammad Mohsin, Rizwan Khan, Tanveer Khan, Twinkle Ramteke	2020 [8]
3	“Clean and Smart Village: Aspects and Alternatives”	India	Focus on water supply, sanitation, solid waste management development and implementation	Milind Kulkarni	2015 [9]
4	“Research on the Beijing rural villages’ classification & development under urbanization”	China	Village System Planning for sustainable development of rural areas	Zhao Zhifeng	2009 [10]
5	“Building Smart Villages: A blueprint as piloted in Niger”	Nigeria	Broadband infrastructure improves internet access in rural areas and promotes rural digital development and transformation.	International Telecommunication Union (ITU)	2020 [4]
6	“Smart Villages Through Information Technology – Need of Emerging India”	India	Application of ICT and GIS for Smart village Development	Pinak Ranade, Sunil Londhe, Asima Mishra	2015 [11]

7	“Smart village a case study of Kolavada Village”	India	Provide garbage disposal, sanitation facilities and other facilities to promote the development of the village and improve the standard of living and employment	Bhagya Niranjambhai Patel, Prof. Rinni Shah	2017 [12]
8	“Study and development of village as a smart village”	India	Focus on resource efficiency, local self-government and ensuring basic needs	Rutuja Somwanshi, Utkarsha Shindepatil, Deepali Tule, Archana Mankar, Namdev Ingle Guided By- Dr. V. S. Rajamanya, P. & A. Deshmukh	2016 [6]
9	“Smart Village Development Principles And Driving Forces: The Case Of Lithuania”	Lithuania	Smart Village development with public participation and LEADER approach	Vilma Atkočiūnienė, Gintarė Vazonienė	2019 [13]
10	“Smart Villages: New Thinking For Off-Grid Communities Worldwide”	University of Cambridge, UK	Energy for the development and employment generation in the village	Brian Heap	[14]
13	“Gender equity in access to and benefits from modern energy and improved energy technologies World Development Report Background Paper”	USA	Improve women's quality of life through the use of improved energy technologies	Joy Clancy, Tanja Winther, Magi Matinga and Sheila Oparaocha,	2012 [15]

### 5. RESEARCH GAP :

As of Nepal Budget Speech (2015/2016), Nepal Government proposed three cities to develop as a smart city named Palungtar from Gorkha District, Lumbini from Rupandehi District and Nijghad from Bara District and also process of developing 12 smart cities throughout the country moved forward. The Government of Nepal has not developed any regulatory documents which can illustrate the requirements for smart villages but the local government has proposed the smart village concept as the percentage of villages in Nepal is higher. So, it is beneficial to develop villages as a smart village rather than developing cities as smart. That is why the research is conducted with a view to analyze the international practice suitable in the Nepalese context and to assess the practicability of developing smart villages.



## 6. RESEARCH METHODOLOGY :

### 6.1 Study Area

Sandakpur Rural municipality is located in the eastern part of Nepal and is an exceptionally renowned tourist destination for trekking. The study area is famous for its cool weather, homestay, and Mai Pokhari. After the restructuring of the local bodies, Sandakpur Rural Municipality is formed by agglomeration of 5 existing Village Development Committees, namely Maimajhuwa, Mabu, Sulung, Jamuna, and Maipokhari VDCs. Out of these VDCs, Maipokhari VDC is partially merged whereas other VDCs are completely merged to form Sandakpur Rural Municipality. The study will be limited only to some specific settlement areas or villages of the Maipokhari and Sulung areas. The specific features of the study area are:

- Existing VDCs: Maipokhari, Sulung VDCs
- Restructured Structure: Sandakpur Rural Municipality
  - Ward 1 and 3
- Area: 48.86 sq. km (Ward -1 and 3)
- Location: 27.01 N, 87.93 E
- No. of household: 1374
- Population Details
  1. Male Population: 3027
  2. Female Population: 3220
  3. Total Population: 6247
  4. Population density: 127.85
  5. Average household size: 4

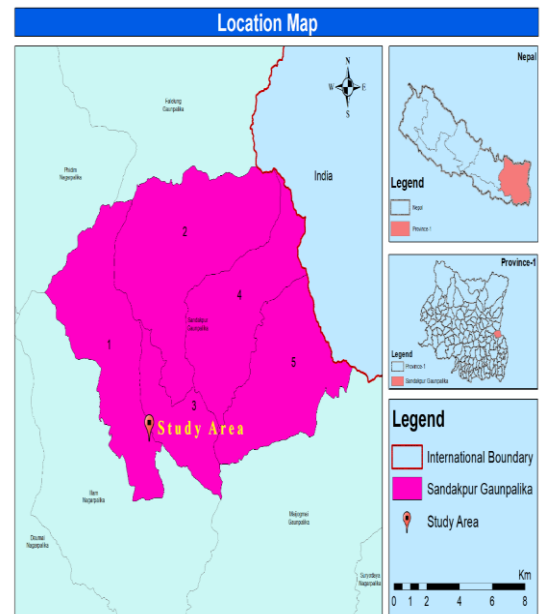


Fig. 1: Study Area

### 6.2 Primary Data :

Primary data was collected through household interviews, scheduled questionnaire surveys and Key Informant Interview (KII).

The data collection followed the concept of inclusivity and primary data related to different sectors of the society was collected by enumerators. The major sectors of the study were:

- Household Characteristics
- Land use and agriculture
- Social infrastructure (Sustainability, Equality, Security, Education, Health, and so forth)
- Economy
- Governance and public services
- Issues of environmental concern
- Access and Use of ICT infrastructure

### 6.3 Secondary Data :

Recent and reliable baseline data were extracted by secondary sources like office records or documents, municipality reports, ward profiles, distributed scholarly or expert reports, and information distributed by the Central Bureau of Statistics (CBS) [17] or other approved offices.

### 6.4 Analysis of Data :

Analysis was done utilizing Excel/SPSS programming, spatial investigation utilizing GIS programming, for example, ArcGIS and so on, and translation of aeronautical photos, maps accessible of various periods. Significant programming and framework were utilized to investigate the ICT situation. In this part, the following significant examination was done for assessing the specific objective of the research:

#### A. The Idea of the Smart Village and Institutional Development

- a. Local-level enthusiasm and challenges for smart village
- b. Local-level probability and need for ICT

- c. Land use
- d. Infrastructure improvement.
- e. Linkage of the proposed territory to local and national level
- f. Reliability/Sufficiency
- g. Sustainable Village and Communities
- h. Public Information
- i. Transparency and Accountability

## B. Practicability Assessment

### Likert Scale

To find the rank of the features of Smart Village, the Likert scale was used. The five-point scale ranged from one to five was adopted. Interpretation on the Likert scale was done as:

Interpretation      Range for Five-Point Likert Scale

1=Excellent              1.00-1.80

2=Good                    1.90-2.60

3=Fair                     2.70-3.40

4=Poor                    3.50-4.20

5=Very Poor             4.30-5.00

Average= (Sum of Opinion/Number of Respondents)

### Testing of Hypothesis

To determine the significance of respondent's opinions for the variables from the collected data, a non-parametric test, the Chi-square test was conducted.

It is calculated as,

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

Where,

$\chi^2$  = Chi-Squared

O = Observed Frequency

E = Expected Frequency

Null Hypothesis.  $H_0: \mu_1 = \mu_2$  i.e. There is no significant difference between the opinion of respondents.

Alternative Hypothesis.  $H_1: \mu_1 \neq \mu_2$  i.e. There is a significant difference between the opinions of respondents.

## 7. RESULTS AND DISCUSSION :

### 7.1 Idea of Smart Village:

After the literature review of different research of smart villages in the world, some of the characteristics are adopted that is suited the study area and the theme of the topic.

#### A. Smart Utilization of Resources:

For the upliftment of villages use of resources should be done in a well-organized manner. As agriculture is one of the main sources of income generation in the rural community. It is the most adopted employment by rural dwellers. Through the process of technology transfer and use of modern technologies like drip and sprinkler irrigation productivity can be increased. Natural resources and human resources available there, with their proper utilization, contribute to the development of villages. Pollution of the environment can be reduced by the use of natural resources and a friendly environment can be achieved by plantation (Rutuja, 2016) [18]. "The assessment of technology transfer achievement into the community economy is necessary to consider the important indicators which consist of progress, efficiency, effectiveness, impacts, relevance, sustainability, and equity" (Boontham, 2015) [7].

Smart Utilization of Resources is the key to a sustainable country, so many countries are using biological calculators, ecological calculators to make a balance between consumption and production of resources. During the questionnaire survey, it was found that the people here are mostly dependent on natural resources, agriculture, medicinal herbs and livestock. They are generating income with the

natural resource available i.e., tourists are attracted here because of the pleasant environment and natural beauty.

#### **B. Smart Living:**

Smart life is defined as the use of technology & the interest in things to pursue a more efficient, controllable & productive lifestyle. Use of recent technologies in the field of ICT along with better fundamental needs like fresh and good food, safe and clean drinking water, better sanitation, environmental protection, digester management and security. Not only are these enough, facilities like well-managed roads, sports areas and parks, banking are also the necessity of smart living.

There is a need of Smart Villages for both rural and urban areas for better livelihood and technology. Livelihood is affected in urban areas due to the migration of rural people as technological support already exists at the urban side (Shahid, 2020) [8].

Smart living changes the dimension of life with the improvement in lifestyle, environment and awareness. During KII it was found that the lifestyle of the people must be changed and the village lacks most of the facilities like health, better educational institutes, sanitation, well-managed roads, etc. which are the basic requirements for smart living. Infrastructure and awareness are needed which can change the lifestyle of the village.

#### **C. Smart Governance:**

Smart Village relies on good governance such as open (i.e., transparent), accountable, collaborative (i.e., involving all stakeholders) and participatory (i.e., citizens' participation) principles and on Electronic Government (e-Government) which sustains the smart village. To maintain transparency and public participation there is a need of smart governance.

Participation of local people in the local development plan to translate the foregoing activities into possible actions by using local and appropriate tools. Regular and punctual attendance of government staff with time-bound services and delivery inline in each department are some characteristics of smart governance (Rutuja, 2016) [18].

With the formation of local government local people are getting services a bit fast and efficiently but during the survey, it was found that upgrading of infrastructures and manpower was the prime need of the village.

#### **D. Smart Village Services:**

Essential services like health and education along with economic services like job availability, entrepreneurship and site for economic activities like shops, markets, etc. are required in the smart village.

Village development can only be accelerated if we promote urban-rural integrated development; combine the land development with industrial development; cluster these villages; and build a network of infrastructure and facilities for each village cluster (Zhifeng, 2009) [10].

When people become smart, definitely the surroundings they live on become smart. During the survey, the village services which are needed for the day-to-day life were found to lack well-equipped infrastructures and services provided by them were below the average.

#### **E. Smart Technology:**

To develop the village as smart village internet availability is the most. For that development and construction of IT infrastructure is most which can further develop appropriate rural technologies.

The deployment of IT in rural areas, helps rural communities to develop social innovation and to maintain residential development. Social innovation and the organizational culture of a rural area, which are a self-regulatory mechanism of the local community, helps in monitoring the adherence to the smart village principle (Atkočiūnienė, 2019) [13].

The knowledge of new and productive tools which make life easy is technologies. During KII it was found that most people use a mobile phone, schools were not able to provide computer education, there was no equipment in the health post and the recent technologies used in the field of agriculture were not seen. So there was a need for modern agriculture equipment, tools recent technologies in the health sector, awareness and education

#### **F. Smart Tourism:**

To increase the productivity and lifestyle of rural dwellers tourism is the most important factor. It flourishes the identity of the village at a national and global level. The village can further enhance and share their culture and tradition and attract tourists as a new tourist destination.

“To make village tourism sustainable and to promote it through the concept of sustainability, the especial target should focus on to host a high quality-low number of tourists rather than a low quality-high number” (Thapa, 2010) [19].



Tourism can change the prospectus of the village and the country. During the survey, it was found that the village has the possibility of tourism but it lacked well-equipped hotels, homestays, roads, and other infrastructure. The implementation of smart tourism, adventure tourism, accessible tourism, and agritourism can change the lifestyle of the village.

#### **G. Gender Equity and Women Empowerment:**

Gender equity recognizes that women and men have different needs and interests, and that to achieve equality in life outcomes, a redistribution of power and resources is required (Reeves and Baden, 2000) [16].

Self-respect and confidence can only be achieved by women when they have economic empowerment; it is a way for others to see them as equal members of society. Women play a significant role in the development of the family and the whole country (Rutuja, 2016) [6].

During The survey, it was found that children in the village are getting their primary education, women have participated in local government, and some are doing their own occupation. *Chaupadi Pratha*, which is a tradition that banishes females during menstruation is absent here which shows their condition is not worst. But the problem of child marriage was seen which hampered mostly girls' education which results in a female literacy rate of 69.11% which is lower than the male literacy rate of 82.21% according to census report 2011. Although women were self-empowered they were still dominated in society.

#### **7.2 Institutional Development Plan:**

For any city or village to develop, they require institutions that are central to sustainable and beneficial economic growth. Institutions create policies, mobilize and manage the resources, and deliver the services which stimulate and sustain development. If the institutions which guide them are dysfunctional, growth and prosperity are unlikely to be maintained (McGill R. 1996) [20].

#### **Goal and Strategy of Institutional Development:**

##### **(1) Smart and Dynamic Governance:**

To promote sustainable development and enhance residents' capacity to address the environmental and development issues local government plays an important role. For the government to be smart and dynamic it should possess characteristics like efficiency, transparency, social integration, effectiveness, continuous improvement with improved and advance use of modern technology and communication. The most important aspects of smart governance are E-governance and the involvement of the public in the decision-making process.

##### **(2) Ensure Public Participation:**

When public concerns, needs, and values are incorporated into governmental and corporate decision-making, it is called public participation. The overall goal of public participation is better decisions that are supported by the public which is followed by two-way communication and interaction.

In Nepal, the concept of public participation was visualized in the Local Self Governance Act 1999. Formation of local bodies and providing them with the power to establish the civil society based on a democratic process with transparency and accountability along with public participation was its main motto. The legislative provision of public participation was disrupted locally due to uncertainty of local election until 2016. Until 2016 the central government was only the body that continuously reformed the structure and processes of public participation so that people can participate in the local policy-making process. After the formation of local bodies in Nepal, with the increase in policy-making power, public participation became successful to some extent.

##### **(3) Ensure Local Legislation with Economic and Sustainable Development:**

Local legislation means the power of the local body to make its own rules and regulation and formulate and maintain within its boundary. After the formation of local government in Nepal, they make their own rule and regulation without crossing the limit of the constitution of Nepal which ensures the availability of relevant ordinances in support of social, economic development, and environmental management.

With the formation of local government, it prioritized areas with pronounced needs or inadequate services and areas that benefit the greater majority also identify areas of great economic potentials.

#### **Activities for Institutional Development:**

1. Development of e-municipal service system and related training and awareness programs.
2. Promotion and adaptation of e-procurement system.

3. Implementation of bylaws and building code.
4. Promotion of Gender Equality and Social Inclusion (GESI) in municipal organizational structure.
5. Promotion & Development of the public-private partnership.
6. Construction of digital information boards in each ward office

Smart Village can only be successful if there is good coordination between three levels of government i.e. local, state and central.

### 7.3 Technological Development Plan:

Smart Villages are the need of the present scenario of the world as development is needed for both rural and urban areas for better livelihood and Information technology will offer effective solutions. Geoinformatics helps to transform villages into smart villages because it can represent an important step towards the use and implementation of ICT in “smart villages” in terms of decision support systems. In order to support innovative solutions for management, governance and citizen participation practices that meet the goals of smart villages, recently developed technologies such as GIS, GPS, remote sensing, web services, and location-based services and technologies may be the best choice. Other than these some basic technologies most for smart villages are:

- a. ICT Infrastructures like the construction of network towers, an extension of fibre optics cable for communication and internet, public Wi-Fi, website and app of the village with regular update and control center of ICT services.
- b. Well maintained road with a drainage system, street light, Bus Park, market and park for refreshment.
- c. School and college with ICT facility.
- d. Health center with well-equipped instruments, ambulance, and manpower.
- e. Construction of Reservoir tank with treatment plant, manpower, and public stand post.
- f. The solar home system, biogas as cooking fuel, improved cooking stove, etc.
- g. Installation of devices for weather monitoring and training for the disaster management team.
- h. Use of handy agriculture tools like hand tractors for ploughing, sprinkler irrigation, and drip irrigation where water quantity is less.
- i. Solid Waste collection vehicles and solid waste treatment setup.
- j. Construction of public toilets with the sewerage system.
- k. Retrofitting of old houses and construction of the new house as earthquake resistance.
- l. Construction of area police station and installation of a security camera at the prime junction.

The study area is located in Sandakpur Rural Municipality [21-23] named Maipokhari and Sulubung village in Ilam district of Province 1, Nepal. It is approximately 13 km away from Ilam Bazar. The selection of the village is that it lies in the tourism loop on the way to the famous Sandakphur and also has a famous religious and tourist spot named Maipokhari. The area has a moderate climate prevailing the highest average temperature of 26°C in June and the lowest is 16°C in January. There is a lot of rainfall in summer & in the winter it is quite dry again. There is about 1157mm rain in a year.

### 7.4 Practicability Status of Sandakpur Municipality

Data collected through scheduled questionnaires were analyzed and interpreted using the **Likert Scale** to know the practicability status as shown in table 3.

**Table 3:** Likert Scale Table

Number of Respondents/Variables	Excellent	Good	Fair	Poor	Very Poor	Average	Interpretation
Smart Utilization of Resources	0	14	26	4	1	2.82	Fair
Smart Living	1	10	23	9	2	3.02	Fair
Smart Governance	1	11	24	8	1	2.93	Fair
Smart Village Services	0	6	26	12	1	3.17	Fair
Smart Technology	0	6	27	9	3	3.2	Fair

Smart Tourism	10	10	21	4	0	2.42	Good
Gender Equity and Women Empowerment	0	2	25	13	5	3.46	Poor

From table 3, it is very clear that at present in the village, resource utilization and their living are just fair and they are getting services from the government not in well managed but in a decent way. The village economy is dependent on agriculture and tourism and is giving more priority to infrastructures for tourism but the village is still behind the recent technologies that urban people utilize. Every feature needed for a smart village is on the way to improve but the women were found still backward from the surveyed data. To determine the significance of respondent’s opinions for the variables from the collected data, a non-parametric test, the **Chi-Square test** was conducted with a 5% level of significance. Table 4 shows the result of the Chi-square test.

**Table 4:** Result of Chi-Square Test

Statement	Chi-Square p-value	Result
<p><u>Null Hypothesis.</u> <math>H_0: \mu_1 = \mu_2</math> i.e. There is no significant difference between the opinion of respondents.</p> <p><u>Alternative Hypothesis.</u> <math>H_1: \mu_1 \neq \mu_2</math> i.e. There is a significant difference between the opinions of respondents.</p>	1.39577E-07	1.39577E-07 < 0.05, $H_1$ is accepted

Since the calculated value of the Chi-square p-value is less than 0.05, alternate hypothesis  $H_1$  is accepted. Therefore, there is a significant difference between the opinions of respondents. Hence, every respondent has a different opinion, the priority is given to the dominating value i.e., from table 4, the majority of respondents supported the perspective toward smart village features as fair.

### 7.5 Discussion Using SWOT Analysis on Practicability of Smart Village:

SWOT Analysis is a strategic technique for the analysis of Strengths, Weaknesses, Opportunities, and Threats [24] in any project or development plan. SWOT analysis of smart village features in the study area is done as:

**Table 5:** SWOT Analysis

S.N	Features	Strength	Weakness	Opportunity	Threat
1	Smart Utilization of Resources	<ul style="list-style-type: none"> <li>• More than 90% of the land is used for agriculture purposes.</li> <li>• Self-Sustained family.</li> <li>• Kiwi farming, Dairy products, medicinal herbs, etc. are the source of income.</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of well-managed irrigation facility.</li> <li>• Lack of proper market.</li> <li>• Lack of employment opportunity.</li> </ul>	<ul style="list-style-type: none"> <li>• Construction of dairy processing plants</li> <li>• Development of Agro-Based market</li> <li>• Employment opportunity in factory and market.</li> </ul>	<ul style="list-style-type: none"> <li>• Poor road connectivity</li> <li>• Land plotting</li> <li>• Climate change</li> <li>• Less interest of younger people in agriculture</li> </ul>
2	Smart Living	<ul style="list-style-type: none"> <li>• Ease in road access as connected to National</li> </ul>	<ul style="list-style-type: none"> <li>• The absence of blacktopped road and road are not</li> </ul>	<ul style="list-style-type: none"> <li>• National Highway linkage to the municipality</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of proper road services so the chance</li> </ul>

		<p>Highway in Barbote.</p> <ul style="list-style-type: none"> <li>• 90% of households have a clean and quality water supply</li> <li>• Management of solid waste at the household level</li> <li>• 100% electricity and telecommunication</li> <li>• Availability of health posts and more than 33 schools throughout the municipality.</li> </ul>	<p>accessed to the household.</p> <ul style="list-style-type: none"> <li>• Supply of water is only from RVT, no provision of rainwater harvesting</li> <li>• Lack of proper dumping site and no segregation of waste.</li> <li>• Fluctuation in the supply of electricity due to poor electric poles and poor connectivity.</li> <li>• Lack of college for higher education and absence of facilitated hospital.</li> </ul>	<ul style="list-style-type: none"> <li>• Enough water supply sources can be converted to 100%.</li> <li>• Biogas can be the best option for energy and have enough space for a dumping site.</li> <li>• Solar Energy can be the best option for regular electricity.</li> <li>• Educational institutions can be upgraded to higher secondary and under construction of 15 bedded hospital.</li> </ul>	<p>of migration.</p> <ul style="list-style-type: none"> <li>• There is no proper treatment plant for water supply so the chance of water-borne diseases.</li> <li>• Pollution of solid and incinerated waste within the entire municipality.</li> <li>• Poor infrastructure for the supply of electricity and poor internet connection.</li> <li>• Challenges in the up-gradation of educational institutions due to land availability and poor health education.</li> </ul>
3	Smart Governance	<ul style="list-style-type: none"> <li>• Formation of local government.</li> <li>• Having own infrastructure with integration of IT.</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of manpower in the office</li> <li>• Services are not provided at the proper time and the website is not updated frequently</li> </ul>	<ul style="list-style-type: none"> <li>• The decision-making power of local representatives</li> <li>• Plan and program don't rely mostly on the central government</li> </ul>	<ul style="list-style-type: none"> <li>• Planning is not well optimized.</li> <li>• Not fully Independent.</li> </ul>

4	Smart Village Services	<ul style="list-style-type: none"> <li>• Rural municipality services and other available services of office are a bit fast due to availability of internet.</li> <li>• Schools are providing computer-based subjects.</li> <li>• Under constructed hospital can start their services online and offline.</li> <li>• Job opportunities can be created in the field of agriculture with digitization.</li> </ul>	<ul style="list-style-type: none"> <li>• Services of office are not so fast</li> <li>• Transportation service is not easily available.</li> <li>• It is not sure how long it takes to upgrade schools and hospitals.</li> <li>• Resources available are not utilized properly because of manpower.</li> </ul>	<ul style="list-style-type: none"> <li>• ICT center and free Wi-Fi hotspot can be provided</li> <li>• E-government is possible if a fast connection to the internet is provided.</li> <li>• Mobile banking digital payment methods can be integrated.</li> <li>• The establishment of a medicinal herb processing plant can increase income generation.</li> </ul>	<ul style="list-style-type: none"> <li>• Availability of fund</li> <li>• Due to topography, it costs more, and not easy to provide a fast connection to the internet.</li> <li>• Digital apps can't be handy to all persons.</li> </ul>
5	Smart Technology	<ul style="list-style-type: none"> <li>• Availability of mobile internet, smartphones.</li> </ul>	<ul style="list-style-type: none"> <li>• Poor coverage of mobile signals and the internet most of the elderly people don't know to use smartphones</li> </ul>	<ul style="list-style-type: none"> <li>• Can strengthen mobile internet, providing proper training and connection of fibre internet.</li> </ul>	<ul style="list-style-type: none"> <li>• Topography is the only main reason for the hindrance of infrastructure development.</li> </ul>
6	Smart Tourism	<ul style="list-style-type: none"> <li>• Location of famous religious and tourist site i.e., Maipokhari Ramsar Site</li> <li>• Kiwi Zone of Minister Agriculture Modernization and cultivation of medical herbs.</li> </ul>	<ul style="list-style-type: none"> <li>• Hilly topography and infrastructure for tourism are not well managed.</li> <li>• Limited transportation facility.</li> </ul>	<ul style="list-style-type: none"> <li>• Possibility of the best tourist spot with the availability of the best infrastructures.</li> <li>• The medicinal herb industry can be established.</li> </ul>	<ul style="list-style-type: none"> <li>• Animal Trafficking and exploitation of medical herbs</li> </ul>
7	Gender Equity and Women	<ul style="list-style-type: none"> <li>• There is no discrimination in providing</li> </ul>	<ul style="list-style-type: none"> <li>• In villages there is still child marriage can</li> </ul>	<ul style="list-style-type: none"> <li>• Enforcement and education can prove</li> </ul>	<ul style="list-style-type: none"> <li>• Poverty and education are the reasons for women's</li> </ul>



	Empowerment	<p>education to all the gender.</p> <ul style="list-style-type: none"> <li>• Participation of women in local government.</li> <li>• Women are mostly engaged equally in agriculture, homestay business, and the cultivation of medicinal herbs.</li> </ul>	<p>be found which led girls to drop out of school at an early age.</p> <ul style="list-style-type: none"> <li>• Although women are engaged in local government, they have not been treated equally because of a male-dominated society.</li> </ul>	<p>girls and boys are equal in all aspects.</p> <ul style="list-style-type: none"> <li>• The establishment of the agriculture industry can provide an opportunity for women to rise.</li> </ul>	<p>backwardness .</p> <ul style="list-style-type: none"> <li>• Poor institutional development plan for the right of women.</li> </ul>
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## 8. CONCLUSION AND RECOMMENDATION :

The development of the village as a Smart Village is not a one-day target. It needs stepwise development and a plan. Going through the literature around the globe, it can be concluded that a smart village is only one step towards development that can provide basic facilities and infrastructure that can solve problems of the village without interfering with village rule and regulation. It just boosts up the village lifestyle so that village people can link directly or indirectly with the world.

### 8.1 Conclusion:

The research study shows that rural territories are now in the phase of development and the development process is not as fast and effective as expected. To implement the smart village features like Smart Utilization of Resources, Smart Living, Smart Governance, Smart Village Services, Smart Technology, Smart Tourism, and Gender Equity and Women Equity initially. There is a need of proper institutional documents comprising regulatory guidelines which guide every stage of development of the smart village and inspect the indicators or features. Findings indicate that the rural areas are now on the verge of development as they are recently linked with the national road network, infrastructures like the hospital, school, water supply, irrigation are in the phase of improvement which is making rural life easy. Therefore, the present situation is such that complete development of smart village cannot be achievable as it was found the majority of respondents supported the perspective of smart village features as fair and individual ratings on smart village feature were given as Fair (2.82), Fair (3.02), Fair (2.93), Fair (3.17), Fair (3.2), Good (2.42) and Poor (3.46) respectively from five-point Likert scale and the services and facilities available in the village doesn't completely comply with smart village features. With the proper policy, facilities and services which can assure the compliance of indicators and features, successful implementation of smart villages can be done.

### 8.2 Recommendation:

1. Institutions should adopt minimum indicators or features as Smart Utilization of Resources, Smart Living, Smart Governance, Smart Village Services, Smart Technology, Smart Tourism, and Gender Equity and Women Equity.
2. Proper training, guidance and user education must be provided to the consumers, stakeholders and implementing agency to overcome the incompetence of indicators or features.
3. Proper and sufficient security arrangements shall be made for the safety of visitors, existing biodiversity, and components of the area with cultural values.
4. Necessary by-laws act, a legal framework for carrying out various work like, construction, land acquisition and institutional documents comprising regulatory guidelines which guide every

stage of development of the smart village project is needed to be developed by the province and local government.

5. The establishment of an IT centre, a school with higher-level education, a hospital with adequate facilities, a proper water treatment plant with one tap one house policy and sanitation system, cheap electricity and fuel for cooking to every house, an awareness program to control child marriage and training for women empowerment and a well-furnished road with cheap transportation modalities is recommended initially for smart village project.

### 8.3 Recommendation for Further Study:

1. Smart Village is a concept adopted by developed nations so there must be much more planning, study, and homework before implementation of any projects.
2. Every village has different characteristics, so the development model of one village could be only a reference for the further analysis of a particular village.

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