

YANGON UNIVERSITY OF ECONOMICS
DEPARTMENT OF ECONOMICS
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ANALYSIS ON SOCIO-ECONOMIC DEVELOPMENT OF
SMART VILLAGE PROJECT
(A CASE STUDY OF PAINNEKONE AND KANPYAUNG
VILLAGES IN YANGON SOUTH DISTRICT)

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MDevS - 57 (18th BATCH)

JUNE, 2025

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Development Studies (MDevS) Degree

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This is to certify that the thesis entitled “**Analysis on Socio-economic Development of Smart Village Project (A Case Study of Painnekone and Kanpyaung Villages in Yangon South District)**” submitted as partial fulfillment towards the requirements for the degree of Master of Development Studies has been witnessed by the Board of Examiners.

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ABSTRACT

This study aims to explore the socio-economic impacts of the Smart Village Project (SVP) in rural Myanmar, focusing on Painecone and Kanpyaung villages in Yangon South District. Rural development is fundamental for Myanmar, given that most of its population resides in rural areas. The objectives are to assess the economic, social, technological, environmental, and infrastructural impacts from SVP implementation, and to examine the challenges and opportunities faced during its rollout. This study was conducted by the descriptive method, using structured questionnaires to collect primary data from 479 households surveyed between April and June 2025. Key findings indicate that the SVP boosted income, job creation, and market access, thereby reducing rural-to-urban migration. It enhanced education, healthcare, digital access, and eco-friendly practices. Despite challenges such as digital literacy gaps, the SVP presents substantial opportunities for integrated development and sustainability. This study provides actionable insights for community leaders, government agencies, and development partners to strengthen smart village initiatives and foster inclusive, resilient rural growth in Myanmar.

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
AI	Artificial Intelligence
AIT	Asian Institute of Technology
CERP	COVID-19 Economic Relief Plan
CFRD	Committee for Rural Development
CSA	Climate-Smart Agriculture
CSOs	Civil Society Organizations
DRD	Department of Rural Development
EU	European Union
EVDP	Evergreen Village Development Project
FAO	Food and Agriculture Organization
FDI	Foreign Direct Investment
FIZ	Federation of Industry Zones
GAD	General Administration Department
GDP	Gross Domestic Product
GIS	Geographic Information System
Govt	Government
ICT	Information and Communication Technology
IDA	International Development Technology
IFAD	International Fund for Agricultural Development
INGO	International Non-Governmental Organization
IoT	Internet of Things
IT	Information Technology
JFPR	Japan Fund for Poverty Reduction
JICA	Japan International Cooperation Agency
M&E	Monitoring and Evaluation
MMSIS	Myanmar Statistical Information Service
MOC	Ministry of Construction
MOEE	Ministry of Electricity and Energy
MOHS	Ministry of Health and Sports

MOI	Ministry of Information
MOALI	Ministry of Agriculture, Livestock and Irrigation
MOTC	Ministry of Transport and Communication
MoCRD	Ministry of Cooperatives and Rural Development
MoPF	Ministry of Planning and Finance
MRC	Mekong River Commission
MSME	Micro, Small, and Medium Enterprises
MSY	Mya Sein Yaung Project
NCDDP	National Community-Driven Development Program
NEP	National Electrification Project
NGO	Non-Governmental Organization
NRC	National Registration Card
O&M	Operations and Maintenance
ODA	Official Development Assistance
OHCHR	Office of United Nation
RBF	Rural Business Fund
RCDP	Resilient Community Development Project
RDT	Rural Development Theory
SDGs	Sustainable Development Goals
SMEs	Small and Medium Enterprises
SOP	Standard Operation Prodecure
SVP	Smart Village Project
UN	United Nations
UNDP	United Nations Development Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNICEF	United Nations International Children's Emergency Fund
USAID	United States Agency of International Development
VDP	Village Development Plan
VRFP	Village Revolving Fund Project
WB	World Bank
WHO	World Health Organization
WSAP	Western States Agribusiness Project

CHAPTER I

INTRODUCTION

1.1 Rationale of the Study

The persistent urban–rural divide remains a critical global development challenge. Rural areas consistently lag behind urban centers in terms of infrastructure, access to economic opportunities, healthcare, and education (United Nations, 2021). While urban areas rapidly evolve as hubs of innovation and economic growth, rural communities are often constrained by poverty, limited access to basic services, and restricted livelihood options (Kumar & Singh, 2018). This disparity undermines national development efforts, exacerbates rural–urban migration, and contributes to widening social and economic inequalities (World Bank, 2020).

According to the World Bank (2020), over 55% of the global population currently resides in urban areas—a figure projected to increase to 68% by 2050. This trend places considerable strain on urban infrastructure, contributing to overcrowding, environmental degradation, and social tensions. Conversely, rural areas continue to experience systemic underdevelopment, making it increasingly difficult to retain populations and sustain local economies (United Nations, 2021). Addressing this imbalance is essential for achieving inclusive and sustainable development, as emphasized in the United Nations Sustainable Development Goals (SDGs), particularly Goal 11: Sustainable Cities and Communities (United Nations, 2021). Rural development is thus integral to national stability and social cohesion and must extend beyond traditional interventions in agriculture and physical infrastructure (Kumar & Singh, 2018).

Historically, rural development programs have focused predominantly on physical infrastructure. However, these approaches have often failed to produce adaptable, self-sustaining rural economies (Mishra & Sharma, 2020). The global development agenda has since shifted toward integrated models that emphasize sustainability, technology, and community participation (Mukherjee, 2021). Contemporary rural development recognizes the vital role rural areas play in national

and global progress, and underscores the need to address structural challenges such as market access, healthcare deficits, and educational inequalities (World Bank, 2020).

In response to the limitations of conventional rural development models, the concept of the “Smart Village” has emerged as a forward-looking, technology-driven solution (Garrocho, 2020). Smart Villages leverage digital technologies, sustainable practices, and community-led approaches to improve living conditions, enhance economic opportunities, and build resilient rural communities (Johnson & McGee, 2019). Unlike traditional models, Smart Villages integrate context-specific technological solutions with active community involvement to create self-sustaining rural ecosystems (Alston, 2021).

The objectives of Smart Villages are multifaceted. It seeks to empower communities through improved access to Information and Communication Technologies (ICT), promote digital education through e-learning platforms, enhance healthcare via telemedicine services, and stimulate local economies through e-commerce, smart agriculture, and entrepreneurship and it also promote sustainable resource management through the adoption of renewable energy systems, efficient water use, and climate-resilient agricultural practices (Taylor & Wright, 2022). This model is grounded in the belief that technology, when combined with sustainability and inclusive participation, can foster self-reliant communities capable of adapting to modern economic demands (Alston, 2021).

Furthermore, the Smart Village approach aims to reduce rural-to-urban migration by improving the quality of life and creating diversified economic opportunities within rural regions. This aligns closely with the broader goals of the SDGs, particularly SDG 9 (Industry, Innovation, and Infrastructure) and SDG 11 (Sustainable Cities and Communities), emphasizing the importance of equitable growth and sustainable development (United Nations, 2021).

Globally, several countries have successfully adopted Smart Village initiatives that demonstrate their transformative potential. In India, the Smart Village Program has prioritized the use of digital tools to enhance rural infrastructure, healthcare, and education while integrating renewable energy and e-governance to promote inclusive development (Mishra & Sharma, 2020). In Malaysia, Smart Village projects have successfully combined ICT, clean energy, and community-led planning to improve livelihoods and reduce poverty (Mukherjee, 2021). Across Africa, Smart Village models have been employed to support sustainable agriculture, stimulate local

economies, and improve governance through technology-based solutions (Kigari et al., 2021). These international case studies underscore the model's capacity to drive innovation, entrepreneurship, and sustainability in rural development (Otieno, 2020).

In the context of Myanmar, rural development remains a central component of the country's socio-economic advancement, with approximately 70% of the population residing in rural areas (Ministry of Cooperatives and Rural Development, 2023). Despite concerted efforts by government and development partners, rural communities continue to grapple with poverty, inadequate access to services, and economic vulnerability (Myanmar Digital News, 2023). But the traditional development models have had limited success in overcoming these complex, interrelated challenges (Xinhua, 2023).

The Smart Village Project (SVP) in Myanmar marks a strategic shift towards more integrated and sustainable rural development. This initiative combines physical infrastructure like roads, electricity, and water systems with digital technologies and community-driven planning models (Ministry of Cooperatives and Rural Development, 2023). A core element of the SVP's success hinges on community participation, actively encouraging local residents to be key stakeholders in designing and executing development interventions.

The SVP fosters collaboration among villagers, government authorities, and development organizations to co-create sustainable solutions (Ministry of Cooperatives and Rural Development, 2023). Its comprehensive objectives aim to enhance access to essential services (clean water, sanitation, housing), expand digital literacy and internet access, promote ICT use in education, health, and entrepreneurship, support small-scale enterprises and agricultural innovation, and strengthen community-led governance (Myanmar Digital News, 2023).

The SVP's initiative with a pilot phase in 2021-2022, rapidly expanding into a nationwide rollout during the 2022-2023 fiscal year. During this expansion, Yangon Region was allocated three villages to participate in the project. This study focuses on Painnekone and Kanpyaung villages, both located in Yangon's Southern District. These two communities were carefully chosen to serve as key case studies for understanding the real-world impact of the Smart Village Project (SVP). Painnekone and Kanpyaung stood out as ideal selections for a detailed case study due to several compelling factors. Both villages received their SVP under the same 2022-2023 budget allocation, signifying a parallel commencement of project activities.

Furthermore, these two villages show many similarities in their basic characteristics. This includes their socio-economic backgrounds, main ways of earning a living, and local environments. Their closeness in the Southern District means they share similar regional influences. By studying these two villages, this research aims to fully understand how the Smart Village Project helps socio-economic development in rural areas. It gathers key insights from these similar communities.

1.2 Objectives of the Study

The objectives of the study are:

1. To analyze the economic, social, technological, environmental and infrastructure impacts from the Smart Village Project on economic growth and comparative assessment of conditions before the SVP implementation and during its ongoing progress in Painnekone and Kanpyaung villages.
2. To examine challenges and opportunities faced in implementing smart villages within Painnekone and Kanpyaung villages.

1.3 Method of Study

This study employs a descriptive analysis. Both primary and secondary data are applied to achieve the study objectives. A questionnaire survey was conducted as a requirement for both quantitative and qualitative approaches to provide a comprehensive understanding of the Smart Village Project and its socio-economic impacts in rural Myanmar.

Primary data are collected through a structured questionnaire survey designed to gather both quantitative and qualitative data. Secondary data are collected from various sources to complement the primary data and provide a broader context for the study on rural development. Sources include official reports, statistics, and policy documents from the Ministry of Cooperatives and Rural Development in Myanmar, internet websites with relevant articles and case studies, and academic journals, books, and research papers on rural development and socio-economic transformation.

1.4 Scope and Limitations of the Study

The study focuses on “The Smart Village Project for Socio-Economic Development in Rural Areas”, specifically in Painnekone and Kanpyaung villages within Yangon South District.

The study involved 219 respondents from Painnekone village and 260 respondents from Kanpyaung village, with a total of 479 households in the Yangon South District. The survey was conducted from April to June 2025, focusing on key areas such as demographic information, access to basic services, economic activities, and community participation in the Smart Village Project. Painnekone and Kanpyaung villages were selected due to their representation within the Yangon South District, making them relevant locations for assessing the impact of the Smart Village Project.

The research examines the implementation and progress of the project, starting from its initiation in the 2022–2023 fiscal year to the current phase. The research aims to evaluate the project's impact on socio-economic development, including improvements in livelihoods, social, infrastructure, education, and technology within these communities. It is important to note that the survey will rely on self-reported data, which could introduce biases, as respondents may overestimate or underestimate the effects of the project on their lives.

1.5 Organization of the Study

The study is divided into five chapters. The first chapter contains the study's introduction, which outlines the rationale behind the research, its objectives, methodology, scope, limitations, and the structure of the report. Chapter two presents a literature review, including the theoretical foundation of rural development, the concept of smart villages, their role and impact in rural contexts, and the challenges and opportunities in implementing them. Chapter three provides an overview of rural development in Myanmar, focusing on the rural landscape, government initiatives, and the Smart Villages Project in the country. Chapter four includes a survey analysis, presenting the profile, design, and results of the conducted survey related to smart village initiatives. Chapter five concludes the study with a summary of the findings and suggestions derived from the research.

CHAPTER II

LITERATURE REVIEW

2.1 Rural Development Theory (RDT)

Rural Development Theory (RDT) offers a comprehensive conceptual foundation for understanding and guiding socio-economic progress in rural areas. This theoretical lens consistently emphasizes the critical imperative to uplift living standards, broaden economic prospects, and elevate the overall well-being of rural populations. Fundamentally, RDT confronts systemic challenges like entrenched poverty, inadequate infrastructure, and limited access to vital services that often characterize rural settings. For the Smart Village Project, RDT thus functions as a pivotal framework, enabling a rigorous assessment of how the integration of modern technologies influences the economic, social, technological, and environmental facets of rural development (Jadhav et al., 2025; Poletini, 2019; Renukappa et al., 2022).

At its core, RDT advocates for robust economic growth and social development within rural territories. It champions the strategic development of local economies through enhanced productivity, diversification, and effective utilization of indigenous resources, directly aligning with Smart Villages' goals of fostering new ventures and improving livelihoods. Furthermore, RDT prioritizes social advancement, emphasizing poverty reduction and improved access to essential services like education and healthcare. Smart Village initiatives embody this by deploying e-health, e-education, and digital governance platforms to refine service delivery and advance social inclusion (Jadhav et al., 2025; Renukappa et al., 2022; Somwanshi et al., 2016).

RDT also explicitly acknowledges the paramount importance of incorporating new technologies into rural development processes. It posits that rural areas can overcome traditional limitations through the strategic adoption of innovations like Information and Communication Technology (ICT) infrastructure, smart grids, and renewable energy (Renukappa et al., 2022; Poletini, 2019).

The Smart Village Project embeds technology in rural areas to facilitate widespread digital inclusion and technological empowerment. A core principle of RDT is environmental sustainability, which encourages practices that balance economic growth with firm environmental conservation. Smart Villages exemplify this by promoting renewable energy sources and sustainable resource management, playing a major role in long-term ecological balance (Bishoge et al., 2020).

Recognizing challenges like financial constraints, poor infrastructure, and limited tech access, RDT proposes addressing them with sound policy frameworks, strong community engagement, and full capacity-building initiatives. For Smart Village projects, RDT's analysis shows the key need for local involvement, empowerment, and practical training to get past obstacles (Bishoge et al., 2020; Jadhav et al., 2025). In this way, RDT provides a way to think about and plan for common hurdles in rural development, helping to thoroughly examine the Smart Village Project's potential for major socio-economic improvement.

2.2 Concepts of Smart Villages

The Smart Village paradigm represents a contemporary and integrated approach to rural development, systematically leveraging advanced technology, fostering innovation, and promoting participatory governance. This comprehensive framework aims to fundamentally enhance the quality of life, stimulate robust economic growth, and ensure long-term environmental sustainability within rural communities (Renukappa et al., 2022). Moving beyond earlier initiatives focused primarily on basic infrastructure, the modern concept of a smart village emphasizes creating resilient, self-sufficient ecosystems that strategically address the intricate and multifaceted challenges inherent to rural areas, such as limited essential services, inadequate infrastructure, and economic stagnation (Jadhav et al., 2025; Poletini, 2019).

At its core, the concept identifies rural communities that utilize digital technologies, sustainable practices, and innovative strategies to achieve these transformative goals. For instance, the European Commission (2018) defines Smart Villages as employing modern infrastructure and participatory governance to tackle rural challenges and promote self-sufficiency. Similarly, the International Telecommunication Union (ITU) characterizes a Smart Village as a digitally empowered rural area where technology is seamlessly integrated into essential services, including agriculture, education, healthcare, and local enterprise. This emphasis on

pervasive digital connectivity, smart energy systems, precision agriculture, e-learning platforms, telemedicine, and digital entrepreneurship are all key characteristics (Somwanshi et al., 2016; Renukappa et al., 2022).

This comprehensive approach aligns strongly with the Sustainable Development Goals (SDGs), underscoring its role in fostering equitable and sustainable development globally. The theoretical underpinnings for smart village implementation are often rooted in frameworks such as the Diffusion of Innovation Theory, which explains how new technologies are adopted, the Triple Helix Model, highlighting collaboration between academia, industry, and government, and the Digital Divide Theory, which seeks to bridge technology access gaps (Somwanshi et al., 2016).

Globally, several countries have successfully launched Smart Village initiatives, demonstrating the practical application and transformative potential of this concept (Renukappa et al., 2022; Somwanshi et al., 2016). Notable examples include India's Smart Village Movement, China's Digital Rural Development Program, the European Union's Smart Villages Initiative, and the African Smart Villages Project. These diverse initiatives illustrate how integrating technology, sustainability, and community-driven approaches can effectively bridge the urban-rural divide and contribute meaningfully to comprehensive rural development (Jadhav et al., 2025; Poletini, 2019).

2.3 Role of Smart Villages in Rural Development

Smart Villages assume a pivotal and multifaceted role in modern rural development, systematically embedding technology, innovation, and sustainable practices into the socio-economic fabric of communities. This comprehensive integration facilitates substantial and measurable improvements across key developmental domains, proactively addressing persistent gaps in essential services, infrastructure, and economic opportunities often prevalent in rural regions. Smart Villages represent a strategic evolution in rural policy, moving beyond fragmented initiatives to offer an integrated and cohesive pathway for progress. Crucially, the establishment of robust digital connectivity forms the foundational backbone of a Smart Village, empowering residents to bridge geographical distances and access a vast array of information, services, and networks previously unavailable (Renukappa et al., 2022). This connectivity enables seamless interaction with e-governance platforms, facilitates

remote work opportunities, and provides pathways to global markets for local goods, transforming isolation into integration (Somwanshi et al., 2016).

Regarding economic development, Smart Villages actively foster growth and diversify livelihoods. By promoting digital literacy and entrepreneurship, they empower local populations to create new ventures, access online marketplaces, and enhance existing agricultural and non-agricultural value chains. Precision agriculture, powered by IoT sensors and data analytics, significantly enhances productivity and resource efficiency in farming, contributing directly to food security and farmer incomes (Poletini, 2019). Beyond traditional sectors, these initiatives stimulate local employment by supporting small and medium enterprises (SMEs) that leverage digital tools for wider reach, consequentially helping to curb rural-to-urban migration by establishing viable local economic opportunities (Jadhav et al., 2025).

Smart Villages also significantly enhance social welfare through improved access to essential services and strengthened community frameworks. Telemedicine solutions deliver crucial healthcare consultations and diagnostics to remote areas, overcoming geographical barriers to medical care (Jadhav et al., 2025). Similarly, e-learning platforms provide access to quality education and vocational training, equipping individuals with new skills and knowledge. These technological interventions contribute to greater equity and human capital development, ensuring rural populations are not left behind in the digital age. Furthermore, by integrating digital platforms into local administration, Smart Villages contribute to strengthened local governance and community participation, fostering greater transparency, accountability, and efficiency in public service delivery and empowering communities to actively shape their own development agendas (Poletini, 2019).

Concerning environmental sustainability, Smart Villages serve as exemplary models for eco-conscious development. They prioritize the deployment of renewable energy systems, such as solar, wind, and biogas, thereby reducing reliance on fossil fuels and mitigating carbon footprints (Bishoge et al., 2020). Furthermore, they implement smart water management and waste recycling initiatives, promoting resource efficiency and contributing to ecological balance. This steadfast focus on sustainable practices ensures that development meets current needs without compromising environmental health for future generations (Renukappa et al., 2022). Collectively, these integrated roles underscore the profound and comprehensive impact

of Smart Villages, providing a tangible blueprint for equitable, resilient, and sustainable rural futures.

2.4 The Transformative Potential of Smart Villages

The concept of smart villages offers a compelling framework for addressing the persistent challenges faced by rural communities. These initiatives strategically integrate contemporary technologies and sustainable practices, aiming to enhance inhabitants' quality of life, stimulate economic growth, and ensure environmental stewardship. A growing body of scholarly literature consistently highlights the profound benefits of smart village implementation, underscoring their considerable potential to bridge the urban-rural divide and foster enduring rural development.

(i) Economic Growth and Mitigation of Rural-Urban Migration

Smart villages play a critical role in fostering localized economic growth while simultaneously ameliorating rural-to-urban migration trends. The establishment of robust modern Information and Communication Technology (ICT) infrastructure within these communities facilitates the genesis of local businesses, generating new employment opportunities and cultivating entrepreneurship. This economic revitalization offers a compelling alternative to internal migration, often driven by the pursuit of improved employment and living conditions in urban centers (Jadhav et al., 2025). By creating local jobs and strategically promoting indigenous enterprises, smart villages help maintain balanced demographic distributions and bolster regional economic vitality (Poletini, 2019).

Economically, Smart Villages stimulate local development by creating employment opportunities through digital entrepreneurship, e-commerce, and innovative agricultural practices. The adoption of precision farming, IoT monitoring, and AI analytics enhances agricultural productivity, minimizes resource wastage, and bolsters food security, ultimately improving rural livelihoods. Moreover, by equipping rural areas with modern infrastructure and services, Smart Villages mitigate the rural-urban divide and help deter population migration to urban centers.

(ii) Enhanced Quality of Life and Social Equity

Smart villages significantly improve the overall quality of life for rural populations. By strategically incorporating technology into essential services, such as water supply, sanitation, healthcare, education, and energy access, these villages

substantially elevate living standards. This integration is crucial for mitigating the pronounced disparities historically observed between urban and rural lifestyles (Jadhav et al., 2025; Renukappa et al., 2022). Ultimately, smart technologies empower rural communities, providing the tools needed to enhance both living and working environments, thereby fostering a higher standard of life (Somwanshi et al., 2016) and contributing to greater social equity.

Specifically, in terms of social impact, Smart Villages contribute to improved access to education, healthcare, and participatory governance. The proliferation of high-speed internet and digital learning platforms facilitates educational access for remote communities, bridging literacy gaps and supporting vocational training. Healthcare services are expanded through telemedicine, mobile health units, and AI-powered diagnostics, ensuring comprehensive healthcare delivery in underserved areas.

(iii) Technological Innovation, Resilience, and Investment Attraction

Smart villages serve as pivotal centers for technological dissemination, significantly enhancing rural communities' access to digital tools and resources. The integration of advanced ICT empowers villagers, providing superior communication, broader access to knowledge, and increased participation in local governance (Renukappa et al., 2022). Moreover, the implementation of e-governance systems improves administrative transparency and efficiency, fostering more participatory and responsive governance structures (Poletini, 2019). This empowers local communities to make informed, self-directed decisions about their developmental paths (Poletini, 2019; Somwanshi et al., 2016), which in turn fosters social cohesion and strengthens local administrative frameworks. Digital governance mechanisms specifically enhance transparency, accountability, and citizen participation in local administration.

Smart villages also serve as incubators for technological innovation and enhanced community resilience. The integration of sophisticated technologies, such as the Internet of Things (IoT), sensor networks for resource monitoring, and smart grid systems significantly augments the adaptive capacity of rural communities to fluctuating environmental and economic conditions (Poletini, 2019). These technologies bolster community resilience by enabling efficient and proactive resource management. Furthermore, smart villages function as exemplars for technological advancement, fostering the development of novel solutions specifically tailored to rural

challenges, including optimized agricultural efficiency and comprehensive environmental conservation strategies (Somwanshi et al., 2016).

(iv) Environmental Sustainability and Resource Efficiency

A core principle of smart village development is the proactive promotion of environmental sustainability and optimal resource efficiency. By harnessing renewable energy sources like solar, wind, and hydroelectric power, smart villages markedly reduce their reliance on non-renewable resources, consequently minimizing their ecological footprint (Renukappa et al., 2022). Furthermore, these initiatives implement advanced waste management systems and innovative water conservation techniques, ensuring the judicious and sustainable utilization of natural resources (Bishoge et al., 2020). The widespread integration of green technologies into daily practices allows smart villages to contribute significantly to long-term environmental resilience.

This commitment to environmental sustainability extends to the integration of renewable energy sources such as solar, wind, and biogas, which reduces dependency on non-renewable resources and promotes clean energy use, ensuring long-term ecological balance. Complementary initiatives, such as smart irrigation, waste-to-energy conversion, and reforestation, further reinforce climate resilience.

Crucially, smart villages also cultivate an environment highly conducive to attracting both public and private investments (Bishoge et al., 2020). The establishment of modern digital infrastructure, coupled with renewable energy solutions and efficient resource management systems, positions these communities as prime candidates for capital injection, thereby stimulating further economic expansion (Somwanshi et al., 2016). The availability of advanced infrastructure, combined with demonstrated potential for innovation, appeals to investors seeking to capitalize on emerging market opportunities within these developing rural contexts.

(v) Integrated Infrastructure Development

Integrated infrastructure development serves as a structural pillar in the evolution of smart villages, enabling the delivery of essential services while reinforcing economic resilience and inclusive growth. Unlike conventional rural development strategies, smart village frameworks emphasize coordinated, demand-driven infrastructure investments that interlink sectors such as energy, water, sanitation, transportation, and public services (Chatterjee & Kar, 2018; Renukappa et al., 2022). A critical component is the deployment of decentralized renewable energy systems,

especially solar mini-grids and biogas units, which ensure affordable and reliable electricity access across residential, agricultural, and micro-enterprise applications. Empirical evidence from pilot smart village projects in India and Sub-Saharan Africa shows that access to decentralized energy significantly increases productivity and reduces energy poverty (IRENA, 2019). Water supply and sanitation infrastructure are equally central, with smart villages adopting sensor-based water management, automated pumping, and localized wastewater treatment technologies. These innovations not only improve public health but also address chronic inefficiencies in rural water access (Bisht et al., 2020). Additionally, the modernization of rural transportation networks—through road upgrades, multi-modal transit nodes, and improved logistics infrastructure—has been shown to enhance rural connectivity, facilitate market access, and reduce post-harvest losses (Calderón & Servén, 2010; Jadhav et al., 2025). Investments in public service infrastructure further drive social development. Smart schools equipped with digital learning environments and resilient healthcare centers staffed through mobile and rotating professionals have been associated with improvements in education outcomes and health metrics in rural areas (Heeks, 2009; World Bank, 2022).

Importantly, these infrastructure systems must be interconnected and community-oriented, fostering participation and accountability. Theoretical frameworks such as the Endogenous Development Model (Ray, 2001) emphasize the need for locally driven, resource-based infrastructure planning, ensuring that projects align with community needs and capacities. When effectively implemented, integrated infrastructure initiatives create the enabling environment necessary for economic diversification, enhanced human capital, and long-term sustainability. This interconnected approach is what distinguishes smart villages from traditional rural interventions, laying the foundation for self-sufficiency and innovation in the rural development paradigm (Chatterjee & Kar, 2018; Bishoge et al., 2020).

2.5 Challenges and opportunities in Implementing Smart Village Project

Smart Villages possess immense potential to transform rural areas by integrating technology, improving infrastructure, and enhancing social and economic opportunities. However, their full realization faces several critical challenges. Despite the significant advantages and transformative potential offered by smart villages, the implementation process is often constrained by a number of formidable hurdles. These

challenges must be comprehensively addressed for smart villages to thrive, yet alongside these obstacles lie numerous opportunities that, if leveraged effectively, can help overcome the barriers and drive equitable and sustainable rural development.

2.5.1 Challenges in Implementing Smart Village Project

Successfully establishing and sustaining Smart Villages often confronts several formidable obstacles:

(i) Limited Literacy and Digital Literacy

A major challenge encountered in the implementation of Smart Villages in rural areas is the pervasive low general literacy rate coupled with a pronounced lack of digital literacy. Many rural populations, have limited access to formal education due to geographical isolation, socio-economic barriers, or lack of educational infrastructure. Consequently, even fewer individuals are equipped with the technical skills necessary to engage effectively with digital technologies. This digital illiteracy can significantly impede the effective adoption and utilization of crucial technologies across various domains, including accessing e-governance services, engaging in digital financial transactions, applying smart agricultural techniques, and participating in telemedicine consultations (Somwanshi et al., 2016).

Furthermore, a common resistance to change is often observed, fueled by deeply entrenched traditional practices, existing power structures within communities, a general skepticism towards new digital systems, and fears of job displacement or cultural erosion. Overcoming this multifaceted barrier necessitates not only tailored digital literacy programs and adult education initiatives but also extensive, participatory community engagement to build trust and ensure that the population genuinely understands, values, and embraces the potential benefits of smart technologies. The imperative for sustained capacity building-training local communities and stakeholders to not only use but also to maintain, troubleshoot, and even innovate with smart systems-demands considerable ongoing time, financial resources, and expert facilitation (Naldi et al., 2015). Without this foundational human capacity, even the most advanced technologies remain underutilized or fail.

(ii) Infrastructure Deficiencies

The pervasive lack of reliable foundational infrastructure constitutes a fundamental barrier to implementing Smart Villages. Rural areas frequently suffer from inadequate and intermittent electricity supply, characterized by frequent

blackouts and voltage fluctuations, which can damage sensitive electronic equipment and disrupt continuous operations. Access to reliable broadband connectivity is often limited to non-existent, with rural areas lacking the necessary fiber optic backbone or last-mile wireless solutions.

Furthermore, there is a scarcity of essential digital tools and devices, such as affordable smartphones, computers, and peripheral equipment, among the general populace. These elements—consistent power, robust internet, and accessible devices—are all indispensable prerequisites for the effective deployment and sustained functioning of any smart solution (Renukappa et al., 2022). Without consistent access to electricity and the internet, core technologies like IoT sensors for smart farming, telemedicine platforms for remote healthcare, and e-governance systems for public services simply cannot function reliably, leaving a significant portion of the rural population underserved and exacerbating the existing rural-urban divide (Visvizi & Lytras, 2018). Geographical barriers, such as mountainous terrain or dispersed settlements, further complicate the extension of these vital infrastructure networks.

(iii) High Capital Investment and Financial Constraints

Smart Village initiatives necessitate substantial upfront financial investment in complex digital infrastructure (e.g., fiber optic cables, data centers), sophisticated smart energy systems (e.g., solar farms, smart grids), and advanced agricultural technologies (e.g., precision machinery, drones). These high capital costs pose a significant challenge for rural areas and often the national governments of developing countries, which typically lack the necessary public funds or easy access to private investment (Zavratnik et al., 2018). Many rural communities operate on limited budgets, relying heavily on traditional economic activities that do not generate sufficient surplus for large-scale technological upgrades. Without sufficient financial resources, dedicated government backing in the form of subsidies or grants, or innovative funding mechanisms such as public-private partnerships or impact investment funds, many rural areas are simply unable to invest in the crucial infrastructure required for smart technologies to thrive.

The sheer cost of developing such comprehensive and interconnected infrastructure may delay, scale down, or even entirely prevent the successful implementation of Smart Village projects, particularly in economically disadvantaged regions where return on investment is perceived as lower.

Furthermore, securing long-term operational funding for ongoing maintenance, software updates, cybersecurity subscriptions, and the salaries of skilled personnel necessary to manage these systems often proves to be as challenging, if not more so, than the initial capital outlay (Komorowski & Stanny, 2020).

(iv) Governance and Policy Constraints

Effective governance and strong, coherent regulatory frameworks are crucial for the sustained success of Smart Villages. Unfortunately, many rural administrative contexts are characterized by an absence of unified national and local policies specifically designed to guide digital transformation in rural areas. This often leads to fragmented efforts and conflicting mandates between various government departments (e.g., IT, agriculture, health, energy), resulting in inadequate inter-institutional coordination and limited dedicated policy support for rural digitalization (Guzal-Dec, 2018). Without a harmonized and supportive policy approach to implementing Smart Villages, progress can become disjointed, leading to inefficient resource allocation and diminishing the overall impact.

Additionally, pervasive bureaucratic inefficiencies, potential corruption within local government structures, and suboptimal resource allocation can exacerbate these difficulties, eroding trust and hindering effective project implementation. As digital systems become increasingly integrated into rural life, the reliance on collecting and processing personal data introduces significant concerns about cybersecurity vulnerabilities (e.g., phishing attacks, data breaches) and the protection of data privacy. This necessitates the urgent development and enforcement of robust legal frameworks, ethical guidelines, and technological safeguards to protect sensitive information and prevent the exploitation of vulnerable populations (Renukappa et al., 2022).

(v) Environmental and Social Risks

While Smart Villages inherently promote sustainability through efficient resource management and renewable energy adoption, poor or uninformed implementation can paradoxically lead to significant unintended negative consequences. One critical concern is the rapid accumulation of electronic waste (e-waste) from discarded or obsolete devices, particularly in areas lacking proper recycling infrastructure, potentially leading to toxic soil and water contamination. There's also a risk of unsustainable resource use if technology encourages intensified, rather than optimized, resource extraction (Mohanty et al., 2020), or if

increased demand for energy from data centers and digital services is not met by renewable sources.

Furthermore, rapid technological shifts, if not managed inclusively, can lead to disruption to traditional livelihoods and established social structures. For instance, automation in agriculture might displace manual labor without providing alternative employment, leading to social unrest or increased rural-to-urban migration. There's also a risk of eroding valuable indigenous knowledge and traditional practices if new technologies are simply imposed without cultural sensitivity. The digital divide might also intensify within the village, creating new forms of inequality where benefits are concentrated among early adopters or the technologically skilled, leaving vulnerable segments even further behind. These environmental and social challenges must be meticulously addressed and mitigated through careful planning, thorough environmental and social impact assessments, and truly community-led adaptation strategies to ensure that smart technologies genuinely enhance, rather than harm, local ecosystems and socio-cultural fabric (Bishoge et al., 2020).

2.5.2 Opportunities in Implementing Smart Village Project

Despite significant existing challenges, the Smart Village model presents substantial opportunities to accelerate rural development, which can be strategically leveraged to achieve transformative change.

(i) Integrated Development

Smart Villages promote a unified pathway for progress, moving beyond isolated initiatives by systematically integrating technology, innovation, and sustainable practices across various development sectors. This holistic approach harmonizes diverse domains such as agriculture, education, healthcare, energy, and governance into a cohesive strategy that drives overall rural growth (Renukappa et al., 2022). By leveraging technological advancements, Smart Villages ensure comprehensive and sustainable development, fostering a positive feedback loop where progress in one sector strengthens others. This integrated development also helps manage the effects of urbanization by creating self-sufficient, appealing rural hubs that reduce pressure from mass migration to overburdened urban centers, offering a viable alternative for rural populations to thrive locally.

(ii) Technological Empowerment

Establishing robust digital connectivity profoundly empowers rural residents by providing unprecedented access to vital information, essential services, and broader social and economic networks. This effectively bridges geographical distances, transforming physical isolation into digital integration and fostering genuine digital inclusion (Zavratnik et al., 2018). Digital empowerment enables rural populations to actively participate in the global information economy, making it easier for them to access e-services, diverse educational opportunities, and critical agricultural insights. It also promotes the seamless inclusion of rural communities in broader regional and international markets, opening new avenues for trade and collaboration (Visvizi & Lytras, 2018).

(iii) Economic Diversification, Growth, and Reduced Migration

By fostering digital literacy and entrepreneurship, Smart Villages can stimulate robust local economic growth, facilitate the creation of new ventures (e.g., tech-enabled services, digital marketing for local products), and significantly enhance existing agricultural and non-agricultural value chains (Bishoge et al., 2020). This potential for local job creation and diversified livelihoods can substantially reduce rural-to-urban migration, providing rural communities with compelling opportunities to thrive economically without needing to leave their homes. The introduction of smart agriculture techniques, the development of eco-tourism initiatives, and the proliferation of digital services can collectively diversify income streams, increasing the financial stability and resilience of rural households (Vaishar & Št'astná, 2019). By offering improved economic prospects, higher quality of life, and enhanced services, Smart Villages create strong incentives for residents to remain in their communities, thereby contributing to balanced regional development and alleviating strain on overcrowded cities.

(iv) Enhanced Service Delivery

The implementation of digital solutions, such as telemedicine and e-learning platforms, offers unparalleled potential to deliver crucial healthcare and high-quality education services directly to remote areas, effectively addressing long-standing service deficits and dramatically improving the quality of life for rural inhabitants. Smart Villages can overcome geographical barriers that traditionally limit access to essential services by enabling virtual consultations with healthcare professionals, remote education accessible from home, and efficient online administrative services

(Renukappa et al., 2022). These digital platforms help bridge the critical gap in service delivery, offering equitable access to healthcare and education that has historically been unavailable or severely limited in rural settings (Mohanty et al., 2020). This improved access to essential services acts as a key "pull factor" that makes rural living more attractive, further contributing to reducing the impetus for out-migration to urban centers.

(v) Sustainable Practices and Resilience

Prioritizing renewable energy systems (e.g., community solar mini-grids), smart resource management (e.g., IoT-enabled water management), and climate-resilient agricultural practices (e.g., drought-resistant crops, precision irrigation) contributes significantly to long-term ecological balance and fundamentally enhances community resilience against both environmental degradation and economic fluctuations (Kaur, 2016). By adopting cutting-edge sustainable technologies like solar-powered grids, advanced rainwater harvesting systems, and precision farming methods, Smart Villages can substantially reduce their environmental footprint, enhance energy security, and increase food production efficiency. These integrated systems also equip communities with the vital tools and knowledge to effectively adapt to challenges posed by climate change and other environmental stressors (Visvizi et al., 2019). This focus on local sustainability and resilience provides a crucial framework for developing self-sufficient and attractive rural settlements that can absorb population growth and offer a high quality of life, acting as viable alternatives to large-scale, often unplanned, urban expansion.

(vi) Attracting Investment

The presence of modern digital infrastructure, combined with demonstrated potential for innovation, sustainability, and tangible development outcomes, can cultivate an environment exceptionally conducive to attracting both public and private investments into rural areas (Visvizi & Lytras, 2018). As rural areas proactively develop their digital infrastructure and successfully implement smart technologies, they become inherently more appealing to a diverse range of investors, including impact investors focused on social and environmental returns. This not only enhances local economic opportunities by bringing in external capital but also strategically connects rural areas with broader national and global markets, fostering a powerful cycle of further development and prosperity (Renukappa et al., 2022).

Such investment supports the creation of local economies robust enough to reduce the necessity for outward migration.

(vii) Community Participation and Local Governance

The Smart Village model specifically emphasizes community-led approaches, fostering direct collaboration and active involvement among villagers, local government authorities, and various development organizations. This inclusive model promotes participatory planning and transparent governance, fundamentally empowering local actors to collaboratively co-create, implement, and sustain their own development solutions (Zavratnik et al., 2018). By involving communities directly in the decision-making process from the outset, Smart Villages ensure that solutions are precisely tailored to the unique needs, cultural contexts, and priorities of the population, thereby significantly increasing their acceptance and long-term sustainability. This collaborative approach also considerably strengthens local governance frameworks, enhancing transparency, accountability, and responsiveness within rural communities (Kaur, 2016). Strong local governance, combined with improved livelihoods, plays a crucial role in creating stable and attractive rural environments that counter the pressures of unplanned urbanization by offering a desirable alternative for future generations.

2.6 Review on Previous Studies

A number of empirical studies have examined the rural development across various contexts, offering critical insights into its implementation, outcomes, and challenges. These studies span from localized projects in Myanmar to regional experiences in Southeast Asia and broader international applications, providing a comprehensive understanding of the model's global relevance.

Jadhav et al. (2021) analyzed the planning and development of smart villages in India. The research emphasizes the importance of creating self-sufficient, sustainable villages that are well-connected to global networks. The study identifies key challenges such as rapid urbanization, lack of infrastructure, and poor standards of living in rural areas. It highlights the potential of smart villages to address these challenges by providing better access to essential services, promoting local economic development, and fostering a sense of community.

Renukappa et al. (2022) conducted a study to evaluate smart village strategies and their challenges. The research investigates how rural communities are utilizing

digital transformations and information and communication technologies (ICT) to improve their quality of life. This study, based on a quantitative methodology, analyzes challenges such as limited budgets, lack of clear strategies, and insufficient collaboration between stakeholders. It identifies strategies like smart energy, healthcare, transport, education, and water as vital components for developing smart villages. The findings highlight the role of ICT in supporting sustainable rural development and offer insights into overcoming the barriers faced in implementing smart village initiatives.

Su Mon Mon Phuu (2022) conducted a study that focused on the development of rural road infrastructure in Gyopinkauk Township. The study investigates how rural road development affects the socioeconomic study conditions of households, particularly in terms of access to markets, healthcare, and education. This research examines the impact of road infrastructure improvements on economic development, social services, and household income, using a descriptive analysis approach. The study finds that improved rural roads have a significant positive impact on the livelihoods of residents, contributing to higher income, better accessibility to services, and overall socio-economic progress in the region.

Kasinathan et al. (2022) conducted a study that examined how the realization of Sustainable Development Goals (SDGs) could be achieved by applying disruptive technologies and integrating concepts from Industry 5.0, Society 5.0, and Smart Cities and Villages. Their research analytically explored the outcomes of these disruptive technologies across various fields. Specifically, the study investigated how these technologies influenced areas such as product development, healthcare transformation (including a pandemic case study), nature-inclusive business models, and the growth of smart cities and villages. The findings directly mapped these outcomes to their influence on Sustainable Development Goals 3, 8, 9, and 11. A SWOT analysis was then used to assess the proposed integrated approach for achieving these SDGs. Ultimately, this research aims to assist industrialists, policymakers, and researchers in understanding sustainable development from a technological perspective.

Dobrotă (2022) investigated the concept of smart by using a descriptive method from the perspective of sustainable development, using Chiscani Village in Romania as a case study. The research examines how rural areas can transition towards smart villages by integrating digital transformation and sustainable practices. The study identifies key determinants for successful rural development, including the importance

of local knowledge, connectivity, and entrepreneurial activities. It also highlights the role of smart villages in addressing challenges like migration, low accessibility, and socio-economic disparities in rural regions.

Phyo Htet Aung (2024) conducted a study that examined the effects of rural road infrastructure development on the socioeconomic status of households in Kungyangon Township, Yangon Region using a descriptive analysis approach. The study investigates how the improvement of road infrastructure has influenced various aspects of life, including economic opportunities, access to education, healthcare, and market access. The study found that rural road development reduced travel time, improved access to services, and boosted economic growth, enhancing health, education, and community connectivity and lead to sustainable development.

Overall, the reviewed studies converge on the view that rural development programmes hold considerable potential for catalyzing rural transformation. However, the effectiveness of such initiatives depends on several critical factors: robust digital infrastructure, inclusive governance, sustainable financing, and active community engagement. Future research should prioritize the development of scalable models, explore innovative funding mechanisms, and promote adaptive, context-specific policies to support the long-term viability of Smart Village programs across diverse rural settings.

CHAPTER III

OVERVIEW OF RURAL DEVELOPMENT IN MYANMAR

3.1 Rural Landscape in Myanmar

Myanmar, with a total land area of approximately 676,578 square kilometers, is the second-largest country in Southeast Asia (ADB, 2020). Its diverse geography spans mountainous highlands in the north and east, a central dry zone, and expansive coastal and delta regions in the south and west. These varying physical environments play a crucial role in shaping the living conditions, livelihoods, and development challenges faced by rural communities. According to recent estimates, Myanmar's rural population stands at around 37.1 million people in 2024, with approximately 69% of the total population residing in rural areas (GlobalData, 2024; World Bank, 2022). This demographic distribution highlights the central importance of rural development in national policy priorities.

Furthermore, rural Myanmar is far from homogenous, reflecting the complex interactions between geography, socio-economic conditions, and cultural diversity. In the northern and eastern states, such as Kachin, Shan, and Chin, rural communities are often isolated due to rugged terrain and insufficient transportation infrastructure. In contrast, the central dry zone, which includes regions like Mandalay, Magway, and Sagaing, faces environmental challenges such as water scarcity and poor soil quality, which severely limit agricultural productivity. On the other hand, areas like the Ayeyarwady Delta and coastal regions, including Rakhine, are agriculturally rich yet highly vulnerable to natural disasters like flooding and cyclones, which disrupt both livelihoods and infrastructure (UNDP, 2019).

Myanmar is administratively comprised of 15 State/Regions, including the Nay Pyi Taw Union Territory. Based on the latest available data, the population distribution across these divisions is as follows: Kachin State accounts for approximately 4.3%, Kayah State 0.6%, Kayin State 2.9%, Chin State 0.7%, Sagaing Region 11.7%, Tanintharyi Region 2.7%, Bago Region 8.7%, Magway Region 7.9%, Mandalay

Region 12.2%, Mon State 3.3%, Rakhine State 4.8%, Yangon Region 14.4%, Shan State 12.7%, Ayeyarwaddy Region 10.8%, and Nay Pyi Taw Union Territory 2.2% (Census Data, 2024).

This diverse demographic landscape reflects Myanmar's rich cultural and ethnic makeup. The Bamar (Burman) people constitute the majority, comprising about 68.78% of the population. Other significant ethnic groups include the Kayin (6.69%), Rakhine (4.61%), Shan (4.51%), Mon (2.19%), Chin (2.09%), Kachin (1.5%), and Karenni (0.39%), with various other minorities collectively making up 9.24% (Census Data, 2014). Many of these more than 135 officially recognized ethnic groups inhabit rural and border areas, complicating rural development efforts. These communities often experience systemic disadvantages, including limited access to education, healthcare, electricity, and clean water (IFAD, 2021). In such regions, traditional governance structures, informal networks, and community-based institutions frequently compensate for the lack of state services.

Moreover, agriculture remains the cornerstone of Myanmar's rural economy, contributing 14.87% to the country's GDP as of 2019, and employing 46.2% of workers in 2023 (MMSIS, 2022; Okamoto, 2017). Most rural households rely on subsistence farming, cultivating crops like rice, pulses, maize, and oilseeds, with rice paddy accounting for 45.7% of harvested land in 2019. Despite fertile land and significant water resources, agricultural productivity is low; for instance, the amount of rice harvested in a day is nearly one-third of Cambodia's and over 20 times lower than Thailand's (World Bank Group, 2019). This low productivity is hindered by outdated farming methods, limited irrigation infrastructure, poor market access, and inadequate support services, including agricultural extension and credit facilities (FAO, 2020). Consequently, seasonal migration has become a prevalent coping mechanism, as rural workers seek additional income in urban centers or across borders.

In addition, infrastructural deficiencies remain a significant obstacle to rural development. Approximately 40% of Myanmar's rural population lives in villages with no year-round access to roadways, meaning about 4 million people in 8,200 villages are unconnected by roads. Another 20,000 settlements, with a population of 10 million, are linked by roads impassable during the wet season. Myanmar needs to build or upgrade over 50,000 km of rural roads by 2030 to meet national targets (ADB, 2019). While approximately 76.8% of the population has access to electricity nationwide (Macrotrends), off-grid solar systems have helped bridge some gaps in recent years.

Access to clean drinking water and sanitation services remains inconsistent, with more than 6.9 million people estimated to require urgent WASH assistance in 2025 (UNICEF, 2024). Public services in education and healthcare are often underfunded and unevenly distributed.

In terms of local governance, rural Myanmar is primarily managed through the Village Tract Administrator (VTA) system. The VTA acts as a formal link between the government and rural populations, but decision-making often remains centralized and top-down, with limited participation from local communities. The authority of VTAs has increased following the Ward and Village Tract Administration Law in 2012, sometimes leading to a decline in influence for other village-level leaders and increasing competition between villages for township-level resources (LIFT Fund, 2016). Religious institutions, particularly Buddhist monasteries, also play a key role in providing informal social services, such as education and basic healthcare. Moreover, community-based organizations, including women's groups and farmers' cooperatives, contribute to local governance and social cohesion, though their involvement in official planning processes is often minimal (ADB, 2020).

3.2 Rural Development Policy and Programs in Myanmar

In response to the complex challenges faced by rural communities, the government of Myanmar has introduced a series of strategic policies and programs aimed at improving rural livelihoods and reducing poverty. Historically, rural development was addressed through various government ministries, with one of the earliest institutions being the Ministry of Cooperatives and Commodity Distribution, established in 1951 (Asian Development Bank [ADB], 2020). Over the decades, multiple ministries underwent mergers and structural reforms, reflecting changing governance models and national development priorities.

In 2016, the Ministry of Cooperatives merged with the Ministry of Agriculture, Livestock, and Irrigation to streamline agriculture, fisheries, and rural development efforts. However, after the 2021 political changes, the Ministry of Cooperatives and Rural Development (MoCRD) was re-established. MoCRD now oversees the Department of Rural Development (DRD), which focuses on improving rural socio-economic conditions through sustainable development strategies.

3.2.1 Rural Development Policy by DRD

Myanmar's current rural development policy goals are aligned with the broader objectives of poverty reduction and sustainable development. These policy objectives are formalized in the strategic direction of the DRD and serve as the foundation for its rural programming (MoCRD, 2022). The key components include:

1. **Infrastructure Development:** To construct farm-to-market rural roads that support the development of the agricultural sector, and to implement rural water supply projects and off-grid electrification for socio-economic enhancement in rural areas.
2. **Community-Led Planning:** To ensure rural infrastructure development through a people-centered approach, fostering ownership and sustainability.
3. **Access to Finance:** To provide financial services such as Revolving Funds and Block Grants to support livelihoods, income-generating activities, and sustainable financing mechanisms.
4. **Skills and Capacity Building:** To conduct livelihood-support training programs and technical capacity-building workshops aimed at producing skilled labor in rural communities.
5. **Emergency Response:** To construct rural housing and fly-proof latrines for populations affected by disasters or emergencies.
6. **Institutional Development:** To strengthen the capacity of DRD staff, enhance governance practices, and promote research and evidence-based policymaking.
7. **Stakeholder Engagement:** To create inclusive partnerships with civil society, private sector actors, and international development agencies for coordinated poverty reduction and rural development efforts (MoCRD, 2022; UNDP, 2019).

These policy pillars illustrate a strategic shift from infrastructure-centric approaches to more holistic, community-oriented, and integrated models of rural transformation. By combining infrastructural development with capacity-building, financial inclusion, and participatory governance, Myanmar's rural development agenda aims to empower rural populations and build resilient communities (ADB, 2020).

3.2.2 Project Initiate for rural development

Myanmar's rural development policies have evolved to address the country's significant rural-urban disparities and to improve the living standards of the majority of the population residing in rural areas. Central to this effort is the Myanmar Sustainable Development Plan (MSDP) 2018–2030, which serves as the country's overarching development framework. The MSDP emphasizes inclusive growth, people-centered development, and environmental sustainability. Its third pillar, "People and Planet," directly targets rural development through commitments to improving infrastructure, expanding access to quality health and education services, and promoting sustainable livelihoods (MoPF 2018). This plan is designed to align with global targets, particularly the United Nations Sustainable Development Goals (SDGs), such as ending poverty (SDG 1), ensuring food security (SDG 2), and building resilient infrastructure (SDG 9).

Myanmar's rural development landscape is defined by a diverse range of multi-sectoral programs aimed at enhancing rural community well-being, with specific development projects initiated as outlined in Appendix (A). Myanmar has launched many large projects to help rural areas. The National Community Driven Development Project (NCDDP), from 2013-2025 with \$549 million, built infrastructure and encouraged local involvement in 63 townships. The Evergreen Village Development Project (MSY/EVDP) started in 2014, giving microloans to 15,173 villages with a 370.5 Billion kyat budget. The Village Development Plan Project (VDP), since 2015, helps 17,471 villages plan their own development.

Other programs focus on specific needs. The National Electrification Project (NEP), with a \$400 million World Bank credit, brought off-grid power, with an initial phase ending around 2021. The Cash for Work Project (2016) gave 28.23 million kyats in income support to many households. Vocational training for youth and women started in 2016. The Rural Business Fund Project (to 2025) provides microfinance in 149 villages with 300 million kyats.

Recent efforts include climate resilience. The Resilient Community Development Project (RCDP) (2020) has \$244.95 million for climate-proof infrastructure in 2,942 villages. The Western States Agribusiness Project (WSAP) (2018-2024) focuses on climate-resilient farming in Magway and Chin with \$20.257 million. Agricultural Production Road Projects allocate 28.23 million kyats for rural

roads. The Village Revolving Fund Project (VRFP) (2019-2020) provided 41.5 billion kyats in post-COVID microloans to 1,710 villages.

The Rural Water Supply Projects (2010-2030) aim to bring water to 81,384 villages. The Smart Village Project, a five-year program started in 2022-2023, brings ICT and renewable energy to villages, with each getting around Kyat 60 million to boost connectivity and infrastructure.

The East Asia Poverty Reduction Cooperation, active from 2018 to 2021, was a poverty reduction pilot program with a budget of \$13.34 million, aimed at addressing key poverty issues in select areas. Collectively, these programs demonstrate a strong commitment to addressing a broad range of rural development needs across Myanmar, from basic infrastructure to economic empowerment, contributing to the country's larger goal of improving living conditions and promoting sustainable, community-driven development.

3.3 Smart Villages Project Initiative in Myanmar

Since the 2021–2022 fiscal year, Myanmar's Department of Rural Development (DRD), operating under the Ministry of Cooperatives and Rural Development, has been actively implementing the SMART Village Project as a pilot period. This ambitious five-year initiative, backed by a 60-million-kyat investment for each village, is strategically designed to improve the socio-economic well-being of rural communities across the nation. The project's core philosophy emphasizes inclusive growth and environmentally responsible development, aiming to bridge the existing urban–rural disparity and, in so doing, contribute significantly to Myanmar's overarching sustainable development agenda.

A fundamental aspect of the SMART Village Project is its close alignment with several of the United Nations' Sustainable Development Goals (SDGs). Specifically, the project directly contributes to several United Nations Sustainable Development Goals (SDGs): SDG 1: No Poverty, by promoting poverty reduction and enhancing economic opportunities in rural areas; SDG 7: Affordable and Clean Energy, through initiatives aimed at improving access to clean and efficient energy in villages; SDG 9: Industry, Innovation, and Infrastructure, by fostering innovation and building resilient infrastructure in rural areas; SDG 11: Sustainable Cities and Communities, by creating sustainable rural communities that participate in governance and are socially included; and SDG 13: Climate Action, by integrating climate-smart practices and the use of

renewable energy in agriculture to address climate change challenges (United Nations, 2015).

To ensure focused and sustainable progress, the DRD (2021) has outlined a phased expansion strategy: three villages will be selected annually for development within states and regions that demonstrate stability in governance and infrastructure. This targeted approach aims to maximize the project's impact in areas conducive to long-term success.

3.3.1 Key Objectives & Implementation Component of the SMART Village Project

The SMART Village project is built upon four mutually reinforcing objectives that collectively define its integrated development approach. These objectives align with Myanmar's national development priorities and international sustainability standards, fostering a comprehensive, community-driven rural transformation.

1. **Improving Rural Living Standards through Infrastructure Development:** This objective focuses on enhancing daily life and economic opportunities by developing essential services like transportation, water, sanitation, energy, and telecommunications (UNDP, 2016; World Bank, 2018).
2. **Fostering Rural Economic Growth:** This objective aims to unlock entrepreneurship, strengthen local value chains, and boost household incomes by enabling access to productive resources, financial support, and technical guidance (ADB, 2019; IFAD, 2020).
3. **Building Environmentally Sustainable SMART Villages:** This objective establishes inclusive, resilient communities that thrive socially and ecologically by integrating digital innovation, green energy, and eco-friendly practices into rural development (AIT, 2020; GIZ, 2021).
4. **Developing Local Capacity for Sustainable Governance:** This objective empowers rural actors to manage and sustain long-term development efforts through investment in human capital and institutional development, including targeted education, vocational training, and community leadership support (MoCRD, 2019; UNESCAP, 2021).

These objectives are implemented through six main components, as detailed in the Smart Village Manual (DRD, 2022):

1. **Village Infrastructure Development:** Focuses on upgrading fundamental physical assets, including agricultural land management, road networks, water supply, electricity (potentially renewable), and the construction/modernization of essential community buildings and multi-purpose centers (DRD, 2022).
2. **Inputs Supply and Provision of Financial Services:** Addresses access to vital resources and financial mechanisms by systematically allocating funding (e.g., Myaseinyaung), establishing micro-finance programs, promoting mobile/digital payments, and ensuring affordable supply of agricultural and livestock inputs (DRD, 2022).
3. **Livelihood and Rural Business Development:** Aims to diversify economic opportunities and cultivate a resilient local economy. This includes guiding home-based farming, identifying new entrepreneurial ventures, providing skills training, promoting "One Village One Product" (OVOP) initiatives, facilitating Rural Basic Funding (RBF), encouraging contract farming, supporting value-added products, and assisting Small and Medium Enterprises (SMEs) (DRD, 2022).
4. **Institutional Strengthening and Technical Enhancement:** Builds the capacity of individuals and community organizations to manage development initiatives effectively. This is achieved through community-based training, specialized skill development (e.g., financial management, market analysis), and fostering robust knowledge-sharing platforms (DRD, 2022).
5. **Social Protection:** Establishes a comprehensive safety net for vulnerable segments of the community, ensuring equitable development. Key initiatives include cash-for-work programs, financial assistance for elderly and pregnant individuals, establishing daycare centers for children and the aged, nutrient supply programs, and championing gender equality (DRD, 2022).
6. **Environmental Conservation:** Underscores the commitment to sustainable natural resource management and ecological protection. This involves implementing waste management plans, raising awareness about pollution, organizing tree planting initiatives, providing training on natural disaster preparedness, and promoting green development practices (DRD, 2022).

3.3.2 Criteria of Smart village Project Implementation

The project follows a community-centered implementation model, emphasizing a participatory approach to identifying local development needs. This bottom-up strategy ensures that village-level planning is driven by the community itself. In line with this, rural economic development interventions are carried out through group-based methodologies and cooperative systems, which promote collective ownership and enhance the sustainability of livelihood initiatives.

To ensure transparency and effectiveness, the selection of villages for inclusion in the SMART Village Project adheres to clearly defined criteria. Selected villages should:

1. Have basic infrastructure in place (e.g., schools, clinics, roads, electricity, water)
2. Demonstrate experience and potential in agriculture, livestock, or small-scale enterprises.
3. Be accessible via safe and reliable transport routes to nearby markets.
4. Show capacity for collective action through group or cooperative systems.
5. Maintain stable phone and internet connectivity.
6. Be willing to co-invest in development activities and collaborate with government agencies.
7. Be located in secure, peaceful areas with good local governance.
8. Exhibit strong community engagement and willingness to participate actively.
9. Have at least 70 households eligible to benefit.
10. Preferably possess potential for tourism-based economic development.

Additionally, priority is specifically accorded to villages with potential for tourism development, recognizing its intrinsic capacity to stimulate local economies and provide direct socio-economic benefits to rural communities through job creation and enhanced market access for local products and services.

3.3.3 Project Implement Area

The Smart Village Project is a good step forward, actively working to close the gap in development between cities and rural areas. This important effort aims to make life better for people in villages and help local economies grow. The project started as a five-year plan, beginning with a pilot in the 2021-2022 fiscal year, and it has already achieved s achieved remarkable milestones.

Its inaugural year (2022-2023 FY) saw the successful integration of 43 villages, laying a robust foundation for future expansion. The momentum continued into the 2023-2024 financial year, with the project thoughtfully extending its reach to encompass an additional 45 villages. Looking ahead, the current 2024-2025 financial year is set to welcome another 40 villages into this transformative initiative, bringing the total to 128 smart villages implemented or planned by the end of 2025. The sustained impact and operational excellence of the Smart Village Project are deeply rooted in the diligent, ongoing monitoring efforts of both the dedicated oversight committee and the engaged local communities.

Table (3.1) Smart Village Project Rollout Across the Nation, FY 2022-2025

Sr No	Implementation Area	Number of Smart Village Project			
		2022-2023	2023-2024	2024-2025	Total Villages
1	Kachin State	3	3	2	8
2	Kayah State	-	-	-	-
3	Kayin State	3	3	2	8
4	Chin State	-	-	-	-
5	Mon State	3	3	3	9
6	Rakhine State	3	3	-	6
7	Shan State (North)	3	3	0	6
8	Shan State (East)	3	3	3	9
9	Shan State (South)	3	4	4	11
10	Sagaing Division	1	-	-	1
11	Bago Division	3	4	3	10
12	Magway Division	3	3	3	9
13	Thanintharyi Division	3	3	3	9
14	Ayeyarwaddy Division	3	4	4	10
15	Mandalay Division	3	3	4	10
16	Yangon Division	3	3	4	10
17	Naypyitaw Council	3	3	5	11
Total Villages		43	45	40	128

Source: Ministry of Cooperatives and Rural Development

Table (3.1) delineates the overall project implementation areas, highlighting the regional disparities in Smart Village Project rollout. The limited or absent implementation in regions such as Kayah, Chin, Sagaing, Rakhine, and Shan (North) is primarily attributable to a confluence of interconnected challenges, including pervasive conflict and insecurity, profound deficiencies in basic infrastructure, inadequate digital connectivity, fragilities in local governance, and elevated economic risk. Regions

including Shan State (South), Naypyitaw Council, Bago, Ayeyarwaddy, Mandalay, and Yangon Divisions show a high concentration (10-11 villages each), indicating strong alignment with project selection criteria such as development potential and robust infrastructure.

This project's success is a testament to powerful collaboration. Various government departments, including the Department of Cooperative, the Department of Rural Development, and the Department of Small-Scale Industries, work seamlessly together. This inter-departmental synergy is absolutely critical for supervising fieldwork, deploying essential technologies, and adeptly navigating and resolving any challenges that emerge.

Given the project's expanding influence and its unwavering commitment to uniting rural and urban landscapes, Yangon has been identified as a pivotal study area for the Smart Village initiative. The city's Southern District, in particular, offers a compelling backdrop for applying the principles of the Smart Village Project. This region's unique blend of urban and peri-urban communities faces a complex array of infrastructure and development challenges, making it an ideal environment for assessing the project's transformative potential.

To further elucidate the initiative's impact within this context, Kanpyaung Village from Kyauktan Township and Painnekone Village from Kaukmu Township have been meticulously selected as the primary study areas. Kanpyaung Village, an agriculture-based community within Kyauktan Township, has a total population of 2,685 residing in 708 households. Painnekone Village, located in Kaukmu Township, has a population of 1,910 across 466 households. Both of these villages commenced their participation in the Smart Village initiative during the 2022-2023 financial year, thereby providing valuable empirical data for this investigation into the project's long-term effects.

3.4 Smart Village Transformation in Painnekone and Kanpyaung Village

The Smart Village Project, led by Myanmar's Department of Rural Development, is a transformative initiative aimed at modernizing rural communities such as Kanpyaung and Painnekone. Its core objective is to improve living standards, create economic opportunities, and promote sustainable development by integrating technology, infrastructure, and inclusive governance into everyday rural life.

Though digital infrastructure is still developing, the project is actively working to bring new technologies and better connectivity to these areas. By empowering local communities to adopt innovative tools and approaches, the initiative enables residents to participate more effectively in the digital economy while also enhancing traditional livelihoods.

The project employs a holistic development framework, encompassing key areas such as economic development, social protection, digital infrastructure, education, healthcare, renewable energy, and public services. Through targeted investments and community-driven programs ranging from livelihood training and digital entrepreneurship to infrastructure upgrades and renewable energy installations the project demonstrates how innovation rooted in local needs can drive inclusive and resilient growth.

Supporting this integrated effort, Table (3.2) and Table (3.3) in detail document the progress made in Painnekone and Kanpyaung villages, respectively. These records highlight the wide-ranging initiatives implemented since the project's initiate in the 2022–2023 fiscal year and track ongoing activities through 2024–2025. They serve as a transparent progress report, showcasing tangible advancements in economics, social, infrastructure, community well-being, and economic empowerment.

The comprehensive dimensions shaping this transformation in both villages include:

(i) Economic Impact: Economic Development and Entrepreneurship

As the Smart Village Project advances, a heightened emphasis is being placed on fostering economic growth through the cultivation of digital entrepreneurship. With the progressive expansion of mobile networks and digital platforms, residents of Kanpyaung and Painnekone are gaining access to indispensable tools that facilitate the initiation and expansion of local businesses. Even with internet problems, some new business owners are using phones and offline tools to sell their products and services well. The project remains committed to providing sustained support to local businesses through broadened access to e-commerce platforms, advanced digital marketing strategies, and comprehensive financial services, thereby integrating these villages into wider economic networks.

Furthermore, in addition to the agricultural inputs of a bulldozer and a tractor provided to Painnekone Village in 2022–2023, the 2023–2024 fiscal year saw the

village offering valuable livelihood trainings in confectionary, basic tailor making, and advance tailor making, further empowering local residents particularly women and youth with marketable competencies. These initiatives are not only promoting local entrepreneurship but also helping to diversify income sources, enhance community resilience, and reduce dependency on traditional subsistence farming.

(ii) Social Protection and Education Development

Beyond direct economic and infrastructure development, strong social protection initiatives are an integral component. Painnekone, in 2022-2023, provided financial support to elders over 85, school uniforms, and protective fencing for the local school. Kanpyaung's social safeguards in 2022-2023 encompassed NRC Card Registration, gender equality talks, child care awareness, and financial training. These social support measures continued into 2023-2024 and are also planned for 2024-2025.

In the educational sphere, both Kanpyaung and Painnekone villages are incrementally integrating digital learning platforms. Though reliable internet is still a challenge, offline educational resources and mobile-based learning applications are being utilized to enhance educational opportunities. These tools provide students with access to learning materials and virtual lessons, bridging the educational divide between rural and urban areas. Additionally, skill development programs are being introduced to improve digital literacy, entrepreneurship, and vocational skills, enabling adults to participate more effectively in the digital economy. Specifically, in the 2022-2023 fiscal year, Painnekone Village conducted trainings in soap, shampoo production, engine repair, and accounting and book-keeping. Furthermore, Kanpyaung Village initiated a dedicated fundraising program aimed at fostering rural economic development.

(iii) Technologies and Digital Infrastructure Development

The comprehensive deployment of digital infrastructure remains an ongoing challenge in Kanpyaung and Painnekone. Nevertheless, both villages are actively progressing towards improved connectivity, which is foundational for enabling future access to a spectrum of digital services. Although widespread and highly reliable internet access is not yet ubiquitous, ongoing initiatives are strategically enhancing connectivity. This progression is anticipated to significantly facilitate the adoption of e-governance solutions, enhance access to online educational platforms, and enable remote telemedicine services. The expansion of digital infrastructure in these villages

is paramount for unlocking critical opportunities across education, healthcare, and economic development, ultimately integrating rural communities into broader national and global networks. Currently, foundational digital systems are being meticulously established to support these prospective advancements.

Development in technology is also strongly impacting healthcare. The Smart Village Project uses technology to improve health services. While advanced digital healthcare like telemedicine faces internet limits, mobile networks help people get health information and talk to doctors remotely. Health monitoring systems and mobile health apps are used to track important health data. This allows people to get medical advice from far away. As digital internet systems grow, these services will get bigger, giving rural areas better healthcare and making it easier to get medical help.

(iv) Environmental development

In consonance with the sustainability objectives underpinning the Smart Village Project, renewable energy sources are playing an indispensable role in the developmental trajectories of Kanpyaung and Painnekone villages. Solar power, in particular, is witnessing increasing adoption, providing clean, economically viable, and consistent energy provisions to households. This strategic pivot towards renewable energy not only qualitatively enhances the daily lives of residents but also mitigates reliance on conventional, often unreliable, non-renewable energy sources historically prevalent in rural area. Solar energy systems are progressively energizing homes, schools, and community centers, ensuring the uninterrupted provision of essential services, even in the absence of a fully integrated digital infrastructure.

(v) Infrastructure and Public Services Development

The continuous enhancement of physical infrastructure remains a paramount priority for both Kanpyaung and Painnekone villages. Upgrades to roads, water supply, sanitation, and waste management are critical to improving the quality of life in these communities. Enhanced infrastructure is essential for ensuring that the benefits of digital technologies, once fully implemented, can be fully realized. Improvements in public services such as better transportation networks and effective waste management systems contribute to the overall livability and functionality of these areas and complement ongoing digital initiatives in the long term. To concretize these

developmental endeavors, specific infrastructure projects have been systematically undertaken since the villages' integration into the Smart Village Initiative.

Kanpyaung Village: Significant infrastructure development includes the initiation and enhancement of water supply systems through a Water Piping Project, the establishment of a Water Treatment System, the installation of an Overhead Tank Piping System, implementation of a Lake Fencing Project, and comprehensive Home Water Distribution. Additionally, concrete lanes have been constructed or are planned for critical public zones such as Clinic and Pre-school areas, as well as a concrete canal and roadway for the village's western area. These efforts have significantly improved access to clean water, enhanced public hygiene, and increased the safety and accessibility of key health and education facilities key steps in elevating daily living standards and supporting long-term community well-being.

Painnekone Village: Road infrastructure has been a primary development focus, with the establishment and continued upgrading of key routes including laterite road, trade road, box culvert and concrete paving (concrete road shoulders). These improvements have not only reduced seasonal disruptions caused by heavy rains and poor road conditions but also facilitated better internal mobility, logistics, and access to essential markets and services. As a result, both villages are now better positioned to support future digital infrastructure rollouts, service delivery, and socioeconomic engagement.

The Smart Village Project in Kanpyaung and Painnekone is more than a technological upgrade it is a holistic transformation of rural life. Through integrated improvements in economy, education, health, environment, and infrastructure, the project is building empowered, connected, and future-ready communities. These efforts are enabling villagers to access better livelihoods, smarter lifestyles, and stronger social systems. As digital and physical systems continue to evolve in parallel, the Smart Village framework offers a model of sustainable rural development that can be replicated and scaled nationwide bridging the rural–urban divide and ensuring that no one is left behind.

Table (3.2) Smart Village Project Progress by Painnekone Village (FY 2022-2025)

Sr.	Key Area	2022-2023 FY	2023-2024-FY	2024-2025 FY
1	Infrastructure Development	1. Mahawgani Laterite Road (400'x12'x9")	1. Painnechan Laterite Road (400'x12'x9") 2. Painnekone Lane Laterite Road (300'x12'x9") 3. Box culvert (20'x6'x6') 4. Trade Road(4600'x18'x2') 5. 20 Poles for solar electrification 6. Laterite road for Mahawgani (520'x12'x7")	1. Concreting the sablemyaint road (330'x9'x7") 2. Concreting the Padaukmyaing lane 3. Mahawgani lane Concteting work
2	Inputs Supply and Provision of Financial Services	1. Tractor 2. Grider	-	-
3	Livelihood	1. Multi-Purpose Soup making course 2. Single-stroke diesel engine maintenance course(basic) 3. Data Entry & Book-keeping course	1. Cake baking Training 2. Tailoring Training (Basic) 3. Tailoring Training (Advance)	-
4	Technical Assistant	1. Vegetable & GAP Training 2. Livestock farming/breeding education	1. Chicken&Pig breeding training 2. Pesticide Use and Organic Fertilizer Production Training	-
5	Social safeguard	1. financial Aid for over 85 yrs2. Uniform & Stationary provide for primary3. School fencing plan	1. financial Aid for over 85 yrs2. Field Treatment for TB	-
6	Environmental Conservation	1. Waste management Commeetee 2. Knowledge sharing for Environmental Awareness	1. Green Frowth Awaness Training 2. Waste Management Training 3. Shade Tree planting	-
7	RBF	All infrastructure development works in this FY	All infrastructure development works in this FY	All infrastructure development works in this FY

Source: Ministry of Cooperatives and Rural Development

Table (3.3) Smart Village Project Progress by Kanpyaung Village (FY 2022-2025)

Sr.	Key Area	2022-2023 FY	2023-2024-FY	2024-2025 FY
1	Infrastructure Development	1. Water Distribution Piping System (4050' , 30 nodes) 2. Water treatment system 3. Conctate street (Lake sub-way) (350'x4'x6") 4. School fencing work 5. Home Piping Work (3520', 30nodes)	1. Concreting the clinic and preschool road (400'x12'9") 2. Concreting the village hall road (300'x12'x9") 3. Concreting Kanpyaung - Pyinmakan Rural road - 20'x6'6'	1. Concreting the clinic and preschool road, final part (330'x9'x7") 2. Overhead Tank, Home-piping
2	Inputs Supply & Provision of Financial Services	Mya Sein Yaung Aid	Mya Sein Yaung Aid	Mya Sein Yaung Aid
3	Livelihood	1. Rural Business Development Fund Establishment (RBF) - 20 Members	1. Multi-Purpose Soup making course, 2. Cake Baking Training 3. Rural Business Development Fund Establishment (RBF)	1. Rural Business Development Fund Establishment (RBF)
4	Technical Assistant	1. Green Rural Development and Village Leadership Training 2. Livestock farming/breeding education 3. Knowledge sharing for water metering	1. Equipment upgrade for Knowledge Center (IT) 2. Fertilizer Usage Awareness 3. GAP Talk 4. Practices for Livestock Breeding 5. Seed Technology Training	Farmer Knowledge Sharing
5	Social safeguard	1. NRC Card Registration plan 2. Gender Equity Talk 3. Child Care Awareness Talk 4. Proposal writing Training 5. RBF Financial Training	1. Financial Aid for over 85 yrs 2. Fair Awareness Plan	1. financial Aid for over 85 yrs 2. Gender Equity 3. Road safety Awareness Training
6	Environmental Conservation	1. Knowledge sharing for Environmental Awareness	1. Knowledge sharing for Environmental Awareness	1. Knowledge sharing for environmental awareness and natural disaster 2. Waste Management Training
7	RBF	1. Rural Business Development Fund Establishment (RBF) - 20 Members	1. Rural Business Development Fund Establishment (RBF)	1. Rural Business Development Fund Establishment (RBF)

Source: Ministry of Cooperatives and Rural Development

3.5 Challenges & Opportunities of Implementation Smart Villages Project

The Smart Village initiative in Myanmar, while holding immense promise, faces notable challenges in its rural implementation, particularly in villages like Kanpyaung and Painnekone. These hurdles largely stem from foundational infrastructural gaps, including the widespread issue of unreliable electricity, coupled with inconsistent funding, complex collaboration dynamics, unstable communication networks, insufficient oversight, and the inherent difficulties of adapting modern technologies to diverse rural contexts. Despite these obstacles, the Smart Village model simultaneously unlocks significant opportunities for transformative development.

3.5.1 Challenges of Implementation Smart Villages Project

The Smart Village initiative faces significant hurdles in its implementation within rural areas, particularly in Kanpyaung and Painnekone villages. These challenges are mainly due to insufficient basic infrastructure, including unreliable electricity and poor internet, along with limited and inconsistent funding. Further complicating matters are difficulties in government and private sector collaboration, unstable communication networks, insufficient monitoring and support for projects, and the inherent challenges of adapting modern technologies to specific rural contexts.

(i) Insufficient Basic Infrastructure

The development of essential infrastructure, including reliable electricity, internet, and transportation networks, remains a primary impediment to the full realization of the Smart Village initiative. In many households, reliance on traditional and inconsistent energy sources persists, despite efforts to introduce solar energy solutions. Furthermore, ongoing road construction projects face limitations, restricting mobility and consequently impacting economic activities, the delivery of essential services, and overall community development. This infrastructural deficit significantly hampers the adoption of digital tools and limits access to core Smart Village components such as e-governance services, online education, and telemedicine.

The situation in Kanpyaung village presents an even greater challenge. While funding has been allocated for an IT center to bridge the digital gap, the village is contending with a critical regulatory hurdle: the lack of land usage authorization. The village's land is primarily designated for farming, making it difficult to obtain permission for alternative uses, such as establishing an IT center. This regulatory impediment directly delays the implementation of crucial digital infrastructure,

preventing the community from accessing the technological advancements the project aims to deliver.

In contrast, Painnekone village possesses the necessary infrastructure, including existing buildings and space suitable for an IT center. However, despite having the required facilities, the village has not received the necessary funding to establish the center. This financial shortfall consequently delays the implementation of essential digital initiatives, limiting potential benefits for the community.

(ii) Limited Funding Sources Causing Delays

The progress of the Smart Village Project is significantly constrained by financial limitations. Inconsistent and inadequate financial support directly causes delays in crucial projects, including internet infrastructure expansion and the development of digital education platforms, thus preventing the project from reaching its full potential. Although some funding has been allocated for renewable energy projects, smart agriculture tools, and skill development programs, the pace of implementation remains slow. The lack of timely and sufficient funding often leaves key initiatives, especially in rural areas, unfinished or significantly delayed, thereby hindering the delivery of services that could substantially improve the lives of rural residents.

In both Kanpyaung and Painnekone villages, the issue of inconsistent funding exacerbates delays in infrastructure development. Due to the phased allocation of project funding, infrastructure projects are frequently left incomplete or subject to delays as funds are disbursed gradually. For example, while road and water supply projects have progressed, certain aspects require further development due to budget limitations in specific phases. These delays contribute to community frustration and negatively affect the long-term success of the initiatives.

(iii) Challenges in Government and Private Sector Collaboration

Effective collaboration between the government and private sector is crucial for the Smart Village initiative's success in rural Myanmar; however, achieving this has proven difficult. While the government is responsible for funding and facilitating infrastructure projects, there is a notable lack of involvement from private companies in sustainable development efforts. The private sector could play a pivotal role by contributing to digital service development, supporting local businesses, and improving technological infrastructure. However, disincentives for private investment and unclear policy frameworks have hindered the establishment of effective and lasting

partnerships. The absence of such collaborations compromises the project's long-term sustainability and limits the ability to scale the Smart Village model nationwide.

Additionally, a lack of active community participation further complicates the project's success. When community members are not fully engaged in the planning and execution of these initiatives, there is a diminished sense of ownership and a lack of collective effort to ensure the full realization of project benefits. This further exacerbates project timeline delays, as robust community commitment is essential for smooth implementation.

(iv) Unstable Communication Infrastructure

Reliable communication infrastructure is paramount for the success of the Smart Village initiative, yet unstable internet and phone lines present significant obstacles. The lack of a consistent internet connection in rural areas restricts villagers' access to essential digital services, including online education, telemedicine, and e-governance tools. While mobile-based solutions like health applications and educational platforms are being introduced, their effectiveness is heavily dependent on internet stability. The absence of reliable communication infrastructure makes it challenging to disseminate vital information to villagers regarding government initiatives, educational opportunities, and healthcare services. Moreover, the communication gap between local governments, project coordinators, and the communities they serve leads to delays in response times and impedes effective project management and support.

(v) Insufficient Monitoring and Support

Despite significant progress in implementing infrastructure and digital technologies, there is insufficient monitoring and support for ongoing projects in rural villages. Effective monitoring is essential to assess the impact of initiatives such as smart agriculture, mobile health services, and digital learning platforms. Without continuous oversight, it is challenging to determine whether these programs are achieving their intended outcomes or if adjustments are necessary. Furthermore, a lack of support structures exists for local residents who may encounter difficulties in adopting new technologies. For instance, while mobile-based smart agriculture solutions are available, farmers often require training and technical assistance to maximize their benefits. Similarly, without proper follow-up, the full potential of implemented mobile learning tools and e-governance services may not be realized within the community.

(vi) Difficulty Adapting Modern Technologies to Rural Context

A core challenge of the Smart Village initiative involves integrating modern technologies effectively within the rural context. While tools such as smart agriculture, mobile health applications, and digital education are designed to benefit rural residents, they often do not align seamlessly with local needs and circumstances. For example, precision farming tools necessitate reliable internet access and technical literacy, both of which are scarce in rural villages. Additionally, local farmers may possess limited knowledge regarding the utilization of digital platforms for optimizing crop management or accessing real-time weather data. The challenge lies in adapting these technologies to the specific challenges and resource limitations of rural areas, which requires tailored solutions that account for low connectivity, limited technical knowledge, and local cultural practices.

Furthermore, the adoption of modern technologies is hindered by inadequate infrastructure, delayed funding, and insufficient support systems for local users. Even when technologies are introduced, many villagers experience difficulty in adapting due to the absence of comprehensive training and technical assistance. This slow adoption process prevents communities from fully realizing the benefits of the advancements brought by the Smart Village project.

In addition to these ongoing challenges, a devastating earthquake struck Myanmar on March 28, 2025, further impacting rural development efforts. The 7.7 magnitude earthquake, which primarily affected the Mandalay, NayPyiTaw, and Sagaing regions, caused severe damage to critical infrastructure, including roads, electricity, and communication networks. This destruction has significantly hindered the Smart Village Project's progress, particularly in regions where planned improvements, such as roads and water systems, were set to be implemented. In response to the crisis, the 2025-2026 budget for the project has been redirected toward earthquake recovery efforts, delaying infrastructure upgrades and the introduction of new technologies in rural areas

3.5.2 Opportunities for Transformation

The Smart Village model presents a compelling framework for transformative development in both Kanpyaung and Painnekone villages, even as they currently navigate distinct challenges. By strategically leveraging the model's integrated

approach, these communities can overcome existing hurdles and unlock their full potential for sustainable growth and improved well-being.

(i) Sustainable Infrastructure & Digital Transformation

The Smart Village model creates a critical opportunity to establish and leverage modern infrastructure for both villages, significantly addressing the nation's common challenge of unreliable electricity. For Kanpyaung, despite land authorization hurdles, the emphasis is on Renewable Energy Integration, allowing it to potentially leapfrog traditional grids with solar power for households and agricultural use, ensuring a more stable and environmentally friendly energy supply. Its focus on Community-Led Infrastructure Development means creative, decentralized digital access points can be explored within existing community buildings or through mobile solutions until a dedicated IT center is feasible. For Painnekone, the existing physical infrastructure offers an immediate advantage for Rapid Digital Infrastructure Rollout. Once funding is secured, the village can quickly establish its IT center and implement widespread digital connectivity, providing immediate access to information and online services. For both villages, ensuring the long-term Operation & Maintenance (O&M) of this new infrastructure is paramount, which is intrinsically linked to local skill building.

(ii) Economic Development & Livelihoods

The Smart Village initiative holds immense potential for stimulating and diversifying local economies in both communities. Kanpyaung, with its agricultural focus, has a prime opportunity for Integrated Sustainable Agriculture, becoming a model for climate-resilient and organic farming practices. These not only improve food security and soil health but also lead to higher-value produce and new market opportunities for farmers. For Painnekone, the rapid digital rollout can lead to Accelerated Economic Diversification (Digital-Led), transforming the IT center into a hub for digital literacy and entrepreneurship, enabling residents to explore new digital-based livelihoods and e-commerce. For both villages, the model fosters the Creation of Diverse Job Opportunities, ranging from sustainable agriculture and renewable energy jobs in Kanpyaung to digital services and IT support roles in Painnekone. This diversification helps build more resilient local economies and provides sustainable livelihoods, aligning with global green economic trends. Additionally, Vocational Training in Green Skills specifically benefits Kanpyaung by equipping residents with skills relevant to its agricultural and environmental goals. Ultimately, these economic advancements are key to achieving Reduced Rural-to-Urban Migration, which is

highlighted as particularly effective for Painnekone, as tangible improvements provide a clear incentive for residents, especially youth, to stay and contribute to their home village.

(iii) Community Empowerment & Social Resilience

The Smart Village model emphasizes fundamental social transformations crucial for long-term success. For both villages, Strengthened Community Participation and Local Governance are key, involving local leaders and residents in decision-making processes to tailor solutions to specific needs and foster a strong sense of ownership over initiatives. Gender Equality and Women's Empowerment are critical shared opportunities, ensuring that women have equal access to training, employment, and leadership roles, which leads to more diverse decision-making and stronger community development. Importantly, the combined benefits of job creation, improved services, and better living conditions contribute significantly to Reduced Rural-to-Urban Migration in both communities. This is highlighted as particularly effective for Painnekone, as the tangible improvements provide a clear incentive for residents, especially youth, to stay and build their lives within the village, thereby retaining crucial human capital and promoting balanced regional development.

(iv) Attracting Investment

Both Kanpyaung and Painnekone stand to benefit from the Smart Village model's ability to Attract Investment. The integration of modern digital infrastructure with a strong focus on sustainability and eco-friendly development creates an appealing environment for both public and private investors. Painnekone's "ready-to-implement" status for its IT center, in particular, signals lower risk and can potentially draw in funding more efficiently. As global concern over environmental issues grows, both rural areas that embrace these technologies are better positioned to access national and international funding opportunities for sustainable development projects.

The Smart Village model offers Kanpyaung and Painnekone transformative opportunities to strengthen infrastructure, diversify livelihoods, and empower communities. By aligning digital integration with local participation and sustainable practices, both villages are well-positioned for resilient, inclusive development. This holistic approach not only curbs rural-to-urban migration but also enhances their potential to attract long-term investment and growth.

CHAPTER IV

SURVEY ANALYSIS

4.1 Survey Profile

This study focuses on assessing the socio-economic impact of the Smart Village Project (SVP) in rural areas, specifically in Painnekone and Kanpyaung villages, located in the Yangon South District. A total of 479 individuals were interviewed across these two villages (219 from Painnekone and 260 from Kanpyaung). Both villages were chosen for the Smart Village Project under the Department of Rural Development, Ministry of Cooperatives and Rural Development (MoCRD), during the 2022-2023 fiscal year. The goal of the Smart Village Project is to reduce the gap between urban and rural areas by creating Smart Villages that enhance the quality of life, foster economic growth, and support environmentally sustainable practices. The selection of Painnekone and Kanpyaung for this study was driven by several important reasons. Firstly, both villages have been actively involved in the early phases of the Smart Village Project, which aims to improve local infrastructure, promote sustainable practices, and raise living standards. This makes them ideal candidates to assess the project's effectiveness in real-world settings. Additionally, the SVP encompasses a wide range of initiatives, including rural infrastructure development, financial services support, livelihood improvement, strengthening community organizations, promoting technology, and environmental protection. These efforts provide a well-rounded model of rural development.

Another key factor in choosing these villages is their strong community engagement and the leadership provided by the Village Administration Teams. This active involvement ensures that the project's initiatives are well-received and implemented effectively. Finally, the accessibility of these villages for survey purposes made them convenient for data collection, further reinforcing their suitability for this study.

(a) Painnekone Village

Painnekone Village is located in Kawhmu Township, Yangon Region. According to the Department of Rural Development Smart Village Project (2022), the population of Painnekone Village is 1,910 people, distributed across 466 households. The main livelihood for most villagers is agriculture, with rice and vegetables being the primary crops grown. Many residents also engage in small-scale trading to support their income. Painnekone's close community ties are evident, as neighbors frequently help one another, creating a strong support system within the village.

Although Painnekone is close to larger towns like Kawhmu and the city of Yangon, it still faces challenges with infrastructure. Basic amenities such as reliable roads, healthcare, and education services are not as developed as in nearby urban areas. This limits the growth potential of the village, but the Smart Village Project aims to address these gaps by improving infrastructure and bringing new technologies to rural life.

Painnekone is participating in the Smart Village Project, which started in the 2022-2023 fiscal year. This initiative is designed to improve living conditions by enhancing agricultural practices, supporting sustainable development, and providing access to modern technologies. The project aims to make the village more self-sufficient, economically stable, and connected to the larger region without compromising its traditional agricultural lifestyle.

(b) Kanpyaung Village

Kanpyaung Village is situated in Kyauktan Township, Yangon Region, and based on data from the Department of Rural Development Smart Village Project (2022), the population of Kanpyaung Village stands at 2,685 people, living in 708 households. Like Painnekone, Kanpyaung is mainly agricultural, with rice and vegetables being the primary crops cultivated. Many families depend on farming for their livelihoods, while some engage in small trade. The village community is closely connected, with strong traditions and a sense of unity among its residents.

Kanpyaung is in close proximity to urban centers such as Kyauktan and Yangon, which are more developed, but the village still struggles with limited infrastructure. Basic services like healthcare and education are not as readily available as in nearby cities. This gap in development affects the village's potential to progress and modernize, making it an ideal candidate for the Smart Village Project, which aims to address these challenges.

Through the Smart Village Project, Kanpyaung is benefiting from improvements in infrastructure, access to technology, and support for sustainable farming. This initiative is helping the village to grow economically while preserving its agricultural traditions. The project is providing Kanpyaung with tools and resources that will enable it to improve living standards, support local businesses, and promote long-term development in the rural community.

4.2 Survey Design

The survey design for this study incorporated both primary and secondary data to meet the research objectives. A questionnaire survey was employed, incorporating both quantitative and qualitative methods. Primary data collection involved information gathered from Village Administrators, staff from the Project Implementation Team, heads of households, and community elders, using a simple random sampling technique.

The study used Taro Yamane's (1973) formula, with a 5% margin of error and a 95% confidence level. In total, 479 people completed the survey, which slightly exceeded the calculated sample size. This small increase was due to practical challenges during data collection, such as non-responses or incomplete answers. Even though the final sample size was slightly larger, it is still statistically valid and sufficient to achieve the accuracy needed for the analysis. The increase in the sample size does not affect the reliability of the results, as it remains within an acceptable range for statistical validity. The survey was conducted between April and June 2025 and included respondents from both villages, based on a total population of about 1,174 households.

The sample size was calculated using the following formula:

$$n = \frac{N}{1 + N(e^2)}$$

Where:

- n = the sample size,
- N = the population size,
- e = the margin of error (5% at a 95% confidence level).

For Painnekone, applying the formula:

$$n = \frac{466}{1 + 466(0.05^2)} = 215.24 \approx 215$$

For Kanpyaung:

$$n = \frac{708}{1 + 708(0.05^2)} = 255.59 \approx 256$$

Table(4.1) Sample Size Collection of Painnekone and Kanpyaung Village

Village Name	Total Households (N)	Sample Households (n)	Percentage	Sampling Method
Painnekone	466	219	47%	Simple Random Sampling
Kanpyaung	708	260	37%	Simple Random Sampling
Total	1174	479		

Source: Survey Data, (2025)

A total of 479 respondents were selected as the sample, with 219 from Painnekone Village and 260 from Kanpyaung Village. In the first stage, two villages, Painnekone and Kanpyaung, were selected due to their active involvement in the SVP. In the second stage, a sample of community members was selected based on specific criteria such as age, occupation, and involvement in the project. This ensured a diverse representation of the population, including farmers, small business owners, community leaders, and local government officials.

The survey questionnaire for this study was organized into several sections. **Section I** gathered general socio-demographic information of the respondents, including characteristics such as gender, age, marital status, household size, education level, occupation, and income. **Section II** focused on the economic, social, technological, environmental, and infrastructure impacts of SVP, comparing conditions before and during the project. It covered areas like income, employment, education, digital access, environmental awareness, and infrastructure improvements. This section also included questions related to the project's transparency, leadership involvement, and overall progress. **Section III** captured the general perceptions on the SVP from village administrators and project staff regarding the project's impact and community participation. **Section IV** addressed key challenges and opportunities in project

implementation. Challenges included poor infrastructure, limited funding, and difficulty in adapting modern technologies. Opportunities included better connectivity, internet access, energy supply, education, and employment.

This approach helped gather both detailed feedback and numerical data, giving a clear picture of how the Smart Village Project has impacted the lives of people in Painnekone and Kanpyaung villages. By combining personal experiences with measurable outcomes, the survey provides a thorough understanding of the project's effectiveness and its influence on the communities' socio-economic development. The secondary data was collected from the Department of Rural Development (DRD) Yangon Region Office, association records, books, articles, research papers, and trusted websites to provide additional context and support the survey findings.

4.3 Analysis of Survey Results

This analysis was conducted to thoroughly assess the effectiveness of the Smart Village Project in fostering socio-economic development within the rural areas of Painnekone and Kanpyaung Villages, located in the Yangon South District. By examining various dimensions of the project's implementation and its perceived impacts, this study aims to provide a comprehensive understanding of how such initiatives contribute to improving the livelihoods and overall well-being of rural communities.

4.3.1 Socio-Demographic Characteristics of Respondents

The socio-demographic profile of the respondents is crucial in understanding the sample population and contextualizing the study's findings. The tables below summarize ten key demographic aspects: gender, age, marital status, educational level, occupation, monthly income (kyats), number of people in household, number of children in household, attending training course and vocational skills or technical expertise.

According to Table (4.2), the socio-demographic characteristics of respondents from two locations: Painnekone and Kanpyaung. Based on survey data for 2025, the total number of respondents 219 from Painnekone and 260 respondents from Kanpyaung. The gender distribution indicates a strong male bias in both Painnekone and Kanpyaung, with a majority of respondents being male (180, 82%) for Painnekone,

(229, 88%) for Kanpyaung and a smaller proportion of females (39, 18%) for Painnekone and (31, 12%).

The largest age group in both locations is 50-59 years (59, 27%) for Painnekone and (83, 32%) for Kanpyaung, followed by 40-49 years and 60 and above for both village.

Table (4.2) Socio-Demographic Characteristics of Respondents

No	Items	Description	Number of Respondents		Percentage (%)	
			Painnekone	Kanpyaung	Painnekone	Kanpyaung
1	Gender	Male	180	229	82	88
		Female	39	31	18	12
2	Age	Under 30	7	10	3	4
		31-39	44	49	20	19
		40-49	55	65	25	25
		50-59	59	83	27	32
		60 and above	55	52	25	20
3	Marital Status	Single	20	23	9	9
		Married	199	237	91	91
4	Education Level	Primary School	107	135	49	52
		Middle School	79	94	36	36
		High School	24	21	11	8
		Graduate	4	7	2	2.5
		Vocational School	2	3	1	1
		Not attend	2	1	1	0.5
5	Employment Status	Farmer	115	109	52.6	42
		Business Owner	33	49	15.0	19
		Gov- Staff	6	3	2.8	1
		Private Staff	3	18	1.4	7
		Casual labor	43	57	19.7	22
		Unemployed	15	10	7.0	4
		Other	3	13	1.4	5

Table (4.2) Continued

No	Items	Description	Number of Respondents		Percentage (%)	
			Painnekone	Kanpyaung	Painnekone	Kanpyaung
6	Monthly Income (Kyats)	<100,000	8	5	3.8	2
		100,000-199,999	15	10	7.0	4
		200,000-299,999	33	39	15.0	15
		300,000-499,999	100	135	45.5	52
		500,000 or more	63	70	28.6	27
7	Number of people in household	1 to 2	39	55	18	21
		3 to 4	120	153	55	59
		5 to 6	50	47	23	18
		Over 6	9	5	4	2
8	Number of Children in Household	0	68	44	31	17
		1	66	109	30	42
		2	53	83	24	32
		3	18	18	8	7
		4	7	3	3	1
		5	4	2	2	0.6
		Over 5	4	1	2	0.4
9	Attending training course	Yes	209	237	95.3	91
		No	10	23	4.7	9
10	Vocational Skills or Technical Expertise	Yes	157	226	71.8	87
		No	62	34	28.2	13

Source: Survey data (2025)

Marital status is consistent across both locations, with married individuals forming the vast majority of respondents (199, 91%) for Painnekone and (237, 91%) for Kanpyaung.

Primary education is the most common in Painnekone (107, 49%), followed by middle school (79, 36%). High school graduates are fewer (24, 11%), and those with graduate (4, 2%) and vocational school (2, 1%) education are rare. A small percentage (2, 1%) did not attend school. In Kanpyaung, primary education is also the most common (135, 52%), followed by middle school (94, 36%). High school graduates are fewer (21, 8%), and those with graduate (7, 2.5%) and vocational school (3, 1%) education are rare. A small percentage (1, 0.5%) did not attend school. Kanpyaung has a slightly higher percentage of graduates, but the overall trend of predominant educational attainment up to primary and middle school levels remains consistent across both locations, indicating a generally lower formal education background among the respondents.

The employment status of the two communities is compared, with farmers being the largest group in Painnekone (115, 52.6%), followed by casual laborers (43, 19.7%) and business owners (33, 15.0%). In Kanpyaung, farmers are also the largest group (109, 42%), followed by casual laborers (57, 22%) and business owners (49, 19%)

The largest income bracket for Painnekone is 300,000-499,999 Kyats (100, 45.5%), followed by 500,000 or more (63, 28.6%). For Kanpyaung, the largest income bracket is 300,000-499,999 Kyats (135, 52%), followed by 500,000 or more (70, 27%).

The most common household size in Painnekone is 3 to 4 people (120, 55%), followed by 5 to 6 (50, 23%) and 1 to 2 (39, 18%). For Kanpyaung, the most common household size is 3 to 4 people (153, 59%), followed by 1 to 2 (55, 21%) and 5 to 6 (47, 18%). Both locations predominantly feature households with 3 to 4 members, suggesting typical family structures. Kanpyaung has a slightly higher proportion of smaller households (1-2 people). The highest percentage of households in Painnekone have no children (68, 31%), followed by one child (66, 30%) and two children (53, 24%). In Kanpyaung, the highest percentage of households have one child (109, 42%), followed by two children (83, 32%) and no children (44, 17%). Both locations show a strong engagement in training courses, with 209 respondents (95.3%) in Painnekone and 237 respondents (91%) in Kanpyaung having attended, indicating a proactive approach towards skill development or capacity building.

Vocational skills or technical expertise are a significant majority (157, 71.8%) in Painnekone and an even higher percentage (226, 87%) in Kanpyaung. Both communities demonstrate a high level of vocational or technical expertise, which aligns with high participation in training courses.

4.3.2 The Impacts of Smart Village Project through Study Areas

This part states the comparison of economic, social, technological, environmental, and infrastructure situation before and during smart village implementation of a project in two locations: Painnekone and Kanpyaung.

(i) Economic impacts of Smart Village Project

The table (4.3) is represented by mean values and overall mean value for each of seven economic related questions, which is focused on stable and improve household income, new job opportunities, sharing of training program and business knowledge and reduced rural-to-urban migration. The purpose of the table is to quantitatively assess and compare the changes in key economic indicators in two different locations, Painnekone and Kanpyaung, before and after the implementation of smart village project.

Table (4.3) Economic Impact of Smart Village Project

No	Characteristics	Mean (Before SVP)		Mean (During SVP)	
		Painnekone	Kanpyaung	Painnekone	Kanpyaung
1	The project has created stable and sufficient household income for us.	2.69	2.7	4.17	4.11
2	The project has improved household incomes.	2.46	2.63	4.51	3.9
3	This project has created new job opportunities.	2.64	2.72	4.31	4.12
4	The project has improved the market access for our products.	2.67	2.66	4.11	4.02
5	"Cash for Work" development programs have provided income opportunities for the villagers.	2.71	2.7	4.28	4.08
6	Training programs and business knowledge sharing from the project have been beneficial.	2.65	2.7	3.75	3.97
7	The project has reduced rural-to-urban migration.	2.48	2.63	4.28	4.13
Overall Mean Value		2.61	2.68	4.20	4.05

Source: Survey Data (2025)

According to Table (4.3), there is a significant positive economic impact of the Smart Village Project in both Painnekone and Kanpyaung. The mean values of all economic indicators show a substantial increase from the “Before SVP and the During SVP. The overall mean values before the SVP, the economic situation in both villages was perceived as neutral to slightly underdeveloped or challenging. There was no strong positive sentiment regarding stable income, job opportunities, or market access, suggesting a need for intervention. During the SVP, the overall mean values increased significantly, indicating a strong positive impact on the economic well-being of both communities. Painnekone showed a slightly higher overall perceived positive impact compared to Kanpyaung.

The mean value before the SVP, the most significant economic issues in Painnekone were income improvement and reduced rural-to-urban migration. This indicate that residents felt their incomes were not growing, and many might have been considering moving for better opportunities. In Kanpyaung, similar concerns were found in items 2 and 4. This lack of income improvement and outward migration pressure indicate limited economic vitality and potential decline. The highest mean before the SVP was "Cash for Work" programs providing income opportunities in Painnekone and creating new job opportunities in Kanpyaung. The SVP Analysis shows that Painnekone had the highest mean for improved household incomes, proving the success of its income-generating strategies. To replicate this, it is important to identify the specific interventions that led to this result. Painnekone had the lowest mean for training programs and knowledge sharing, suggesting their impact was less immediate than income generation. In Kanpyaung, the lowest mean for "Improved Household Incomes" shows that while income improved, the increase was smaller than in Painnekone. These lower scores highlight areas where the project’s impact was positive but not as strong, with the smaller income growth in Kanpyaung being a potential concern if income uplift was the main goal.

(ii) Social Impact of Smart Village Project

The table (4.4) presents a quantitative analysis of the social impact of a project, comparing key indicators "Before" and "During" its implementation across two distinct locations: Painnekone and Kanpyaung. This data, represented by mean values for various social aspects, aims to illustrate the project's effectiveness in contributing to better access to education, health, and public services, providing school uniforms and

writing materials to primary students, offering financial support for elderly people aged 85 and above, increasing community participation in gender equality awareness, fostering cooperation and unity among villagers, improving travel ease through concrete roads, and ensuring access to clean drinking water and proper sanitation. By examining these mean scores, this section will provide a clear insight into the observed changes and the overall social well-being of the communities involved.

Table (4.4) Social Impact of Smart Village Project

No	Characteristics	Mean (Before SVP)		Mean (During SVP)	
		Painnekone	Kanpyaung	Painnekone	Kanpyaung
1	The project has encouraged more youth participation in community activities.	2.53	2.54	3.36	3.77
2	Primary school students have access to school uniforms and writing materials.	2.86	2.7	3.97	4.08
3	Financial support is available for elderly people aged 85 and above.	2.47	2.55	4.4	4.15
4	Community participation in awareness programs related to gender equality has increased.	2.54	2.56	4.07	4.02
5	There is an increase in cooperation and unity among the villagers.	2.61	2.56	4.24	4.07
6	The community has become more engaged in local decision-making processes.	2.71	2.68	4.55	4.31
7	Access to clean drinking water and a proper sanitation system (toilets) is available.	2.65	2.62	4.4	4.19
Overall Mean Value		2.62	2.60	4.14	4.08

Source: Survey Data,(2025)

According to table (4.4), indicate that the project's implementation in Painnakone and Kanpyaung has resulted in a significant and positive social impact. The "After Mean" values (4.14 and 4.08) are significantly higher than the "Before Mean" values (2.62 and 2.60), indicating a widespread improvement in various aspects of social well-being. The pre-project social environment was moderate to neutral, with

room for significant improvement across various dimensions. The (after) mean values are significantly higher, with both communities experiencing improvements in social services, community cohesion, and essential infrastructure. Painnakone (4.14) shows a slightly higher overall perceived social impact than Kanpyaung (4.08), but both are indicative of strong success. The overall mean values suggest a moderate to neutral pre-project social environment, with room for significant improvement across various dimensions.

The mean value is significant social needs before the project, with low mean values (2.47) for financial support for elderly people aged 85 and above and infrastructure improvements contributing to better access to education, health, and public services. These low scores indicate potential social welfare deficiencies and barriers to basic services, contributing to inequality and reduced quality of life. Future needs assessments should target vulnerable populations like the elderly and evaluate the accessibility and quality of basic public services to identify critical gaps. The highest mean score for the project was for the construction of concrete roads, suggesting existing awareness of the need for improved transportation or very basic pathways. This indicates that improvements in connectivity might have been a long-standing desire or recognized area of potential betterment. By understanding existing infrastructure and community priorities around connectivity can inform effective interventions in future projects.

The Druing Project Analysis revealed that the construction of concrete roads in Painnakone and Kanpyaung significantly improved travel and connectivity, leading to a significant improvement in daily life. This success validates investment in physical infrastructure and suggests that continuous maintenance of roads should be prioritized. However, the lowest mean for Painnakone suggests that infrastructure improvements have not significantly contributed to better access to education, health, and public services. This could be due to the quantity/quality of services not keeping pace with infrastructure improvements, awareness of improved access still developing, or other barriers to accessing these services, such as cost and personnel shortages. This suggests a potential gap between infrastructure provision and actual service delivery, indicating that the project's social benefits were not as universally strong as desired. Therefore, continuous maintenance of roads should be prioritized for future projects in similar contexts.

(iii) Technological Impact of Smart Village Project

The table (4.5) below presents a quantitative analysis of the technological impact of a project, comparing key indicators "Before" and "After" its implementation across two distinct locations: Painnakone and Kanpyaung. This data, represented by mean values for various technological aspects, aims to illustrate the project's effectiveness in improving communication and digital service use through fast internet access, supporting education, innovation, and community collaboration via digital technology, making health and banking services more easily accessible online, utilizing modern technology for employment and educational purposes, enhancing waste management and sanitation services, providing opportunities for training and Wi-Fi access through IT Knowledge Centers, and visibly improving the efficiency of agricultural practices. By examining these mean scores, this section will provide clear insight into the observed changes and the overall technological advancement within the communities involved.

The "Technology Impact" table reveals a significant positive technological transformation in Painnekone and Kanpyaung due to the project. "Mean (During the SVP)" values are notably higher than "Before Mean" scores, indicating a strong perceived improvement in technology adoption and its benefits. The "Before" scores suggest a largely underdeveloped technological environment, while "During" scores reflect a substantial leap forward, with values approaching 4.0. This indicates respondents overwhelmingly perceive the project successfully introduced and integrated technology, leading to tangible benefits. Kanpyaung shows a slightly higher overall perceived technological impact, suggesting a greater relative leap from its lower starting point.

Table (4.5) Technological Impact of Smart Village Project

No	Characteristics	Mean (Before SVP)		Mean (During SVP)	
		Painnekone	Kanpyaung	Painnekone	Kanpyaung
1	The fast internet access has improved communication and allowed better use of digital services.	2.61	2.48	4.1	4.06
2	The introduction of digital technology has supported education, innovation, and community collaboration in the village.	2.66	2.48	3.73	3.9
3	Health and banking services are now easily accessible online.	2.65	2.45	3.89	3.93
4	Modern technology is now being used for employment and educational purposes.	2.73	2.49	4.1	4.06
5	Waste management, systematic disposal, and sanitation services have improved due to the use of technology in the village.	2.87	2.52	4.09	4.02
6	After the establishment of the IT Knowledge Center (Information Technology Knowledge Center) in the village, there have been more opportunities for training, Wi-Fi access, and computer lessons.	2.5	2.44	3.43	3.76
7	Technology is visibly improving the efficiency of agricultural practices (e.g., weather forecasting, smart irrigation) in our village.	2.63	2.51	4.12	4.01
	Overall Mean Value	2.66	2.48	3.92	3.96

Source: Survey Data,(2025)

The study reveals a significant gap in technology access and digital literacy in two villages before the project. The villages of Painnekone and Kanpyaung had low scores for opportunities for training, Wi-Fi access, and computer lessons, indicating a lack of formal technology training and access. This hinders technological advancement and limits villagers' ability to leverage technology for personal or economic growth. The highest scores for modern technology used for employment and education were in

Painnekone (2.73) and Kanpyaung (2.87), suggesting a basic or nascent form of technology use. The highest scores for waste management and systematic disposal in Kanpyaung (2.52) suggest a slight edge in these areas. These areas may represent less dire starting points, indicating a subtle foundation or recognized need that the project could easily build upon.

The project analysis revealed that the highest perceived impacts in Painnekone were related to the practical application of technology in agriculture and the fundamental improvement in communication through internet access. This suggests that the project successfully delivered highly tangible and relevant technological solutions for the villagers' daily lives and economic activities. For Kanpyaung, the highest mean was 4.06 for Items 1 and 4, also highlighting the success of internet access and general technology use for practical purposes. The lowest mean was for opportunities for training, Wi-Fi access, and computer lessons after the establishment of an IT Knowledge Center in Painnekone. This suggests that while the project's impact is positive, there is room for further enhancement to fully capitalize on the potential of IT knowledge centers. The project's strategic choices to introduce practical technologies directly address critical needs in agriculture and connectivity, empowering residents.

(iv) **Environmental Impact of Smart Village Project**

The table (4.6) presents a quantitative analysis of the environmental impact of a project, comparing key indicators "Before" and "During" its implementation across two distinct locations: Painnekone and Kanpyaung. This data, represented by mean values for various environmental aspects, aims to illustrate the project's effectiveness in promoting environmentally friendly practices such as rainwater harvesting and systematic waste disposal, introducing sustainable farming systems, enabling systematic waste management, increasing community awareness and understanding of environmental conservation, leading to a cleaner environment and improved living standards, fostering more active community participation in environmental conservation efforts, and providing better awareness and training on environmental protection. By examining these mean scores, this section will provide clear insight into the observed changes and the overall environmental sustainability within the communities involved.

Table (4.6) Environmental Impact of Smart Village Project

No	Characteristics	Mean (Before SVP)		Mean (During SVP)	
		Painnekone	Kanpyaung	Painnekone	Kanpyaung
1	The project has promoted environmentally friendly practices such as rainwater harvesting and systematic waste disposal.	2.76	2.56	4.36	4.23
2	The introduction of sustainable farming systems through the project has improved the village environment.	2.7	2.51	3.91	4.09
3	The project has enabled the systematic management of waste within the village.	2.69	2.48	4.18	4.1
4	The village community has gained more awareness and understanding of environmental conservation and long-term sustainability.	2.7	2.51	4.1	4.11
5	The project has led to a cleaner environment and an improved standard of living.	3.32	2.51	4.12	4.12
6	The community is now more active in participating in environmental conservation efforts.	2.91	2.4	4.02	4.13
7	The project has provided better awareness and training on environmental protection.	2.67	2.38	3.99	4.21
	Overall Mean Value	2.82	2.48	4.10	4.14

Source: Survey Data,(2025)

Kanpyaung and Painnekone had low levels of environmental awareness and participation in conservation efforts before the project. This indicates a lack of understanding and engagement with environmental issues. The highest mean value was 3.32 for Painnekone, that indicating a higher starting point for cleanliness or stronger aspirations. This indicates a community already attuned to the importance of a clean environment, potentially making it more receptive to project interventions.

The project aimed to promote environmentally friendly practices in Painnekone and Kanpyaung, resulting in high scores in both areas. Painnekone successfully

implemented rainwater harvesting and systematic waste disposal, while Kanpyaung significantly improved environmental awareness and training. These high scores demonstrate the project's success in delivering tangible environmental improvements and building foundational knowledge and capacity for long-term sustainability. The project should sustain the momentum of eco-friendly practices through continuous support and potentially scale up successful models. Kanpyaung should capitalize on increased awareness by supporting community-led environmental initiatives and providing practical application opportunities. The lowest mean score for Painnekone was for the introduction of sustainable farming systems, suggesting that the perceived improvement was not as overwhelming as other environmental aspects. Future project phases should focus on long-term support for sustainable farming, providing ongoing technical assistance, monitoring environmental benefits more closely, and facilitating peer learning among farmers to enhance adoption and perceived impact.

(v) Infrastructure Impact of Smart Village Project

The table (4.7) presents a quantitative analysis of the **Infrastructure Impact** of the Smart Village Project, comparing key indicators "Before" and "During" its implementation across two distinct locations: Painnekone and Kanpyaung. This data, represented by mean values and standard deviations for seven key characteristics, aims to illustrate how the project has influenced foundational elements critical for rural development. By analyzing these mean scores, this table will provide clear insight into the project's direct influence on the infrastructural backbone and operational environment within the involved communities.

According to table (4.7), show that the new infrastructure has significantly improved access to essential services like education, health, and public services, with the highest mean value of 4.42 in Painnekone and 4.50 in Kanpyaung. This is a significant benefit, as physical improvements directly translate into better service utilization, which is crucial for quality of life. However, the lowest mean value suggests that job creation may be less impactful or widely perceived than direct improvements in access to services or travel ease. The infrastructure may facilitate economic activity, but direct job creation may be a lesser perceived benefit. The infrastructure improvements in Painnekone and Kanpyaung have significantly improved access to education, health, and public services. Access to electricity and energy has become more reliable, enhancing daily life, education, and economic activities. The

construction of concrete roads has made travel easier within the village and nearby areas, facilitating social, economic, and service access. The project has also provided adequate training to use new technology and infrastructure, demonstrating the effectiveness of capacity building. Maintenance and technical support for the new infrastructure are available when needed, ensuring long-term sustainability and functionality. These positive benefits demonstrate the importance of infrastructure in improving access to vital services and promoting self-sufficiency within the community.

Table (4.7) Infrastructure Impact of Smart Village Project

No	Characteristics	Mean (Before SVP)		Mean (During SVP)	
		Painnekone	Kanpyaung	Painnekone	Kanpyaung
1	The new infrastructure has contributed to the creation of new job opportunities in the village.	2.17	2.09	4.04	4.11
2	The infrastructure improvements have contributed to better access to education, health access to education, health, and public services.	2.34	2.22	4.21	4.33
3	Access to electricity and energy has become more reliable.	2.56	2.36	4.01	4.12
4	The construction of concrete roads through the project has made it easier to travel within the village and nearby areas.	2.91	2.83	4.32	4.45
5	Adequate training was provided to use the new technology and infrastructure.	2.63	2.58	4.21	4.22
6	Maintenance and technical support for the new infrastructure are available when needed.	2.67	2.51	4.19	4.13
7	The infrastructure has contributed to improved access to education, health, or public services.	2.5	2.31	4.42	4.5
	Overall Mean Value	2.54	2.41	4.20	4.27

Source: Survey Data (2025)

(vi) Overall Mean Value of the Impacts of Smart Village Project

The summary of overall mean value of economic, social, technology, environmental and infrastructure before and during for Painnekone and Kanpyaung are show in the following table (4.8).

Table (4.8) Overall Mean Values of Smart Village Project

No.	Characteristic	Before Mean Values		During Mean Vaules	
		Painnekone	Kanpyaung	Painnekone	Kanpyaung
1	Economic Impacts	2.61	2.68	4.20	4.05
2	Social Impacts	2.62	2.60	4.14	4.08
3	Technology Impacts	2.66	2.48	3.92	3.96
4	Environmental Impacts	2.82	2.48	4.10	4.14
5	Infrastructure Impacts	2.54	2.41	4.20	4.27

Source: Survey Data, (2025)

The above table represents that "During Mean" values are consistently high, ranging from 3.92 to 4.20 for all domains and both villages. This mean value consistency indicates a widespread and strong positive perception of the changes brought about by the Smart Village Project across all assessed areas. Many of the villages from two villages are agree that the project has had a beneficial impact on their communities.

The table presents a quantitative assessment of the perceived benefits and potential gains emerging from the Smart Village Project in two distinct locations: Painnakone and Kanpyaung. This data, represented by mean values and standard deviations for seven key characteristics, aims to illustrate how the project has fostered new avenues for improved connectivity, sustainable energy, enhanced education and business opportunities, better health through clean water, increased employment, skill development, and empowered local leadership. By investigating these mean values will provide insight into the positive prospects and potentials that respondents believe the project has created within their communities.

(vii) Comparative analysis of Before and During SVP Implementation

The quantitative statistical analysis to formally assess the perceived effectiveness of the Smart Village Project (SVP) implementation in two distinct

locations: Painnekone and Kanpyaung. Utilizing a paired samples t-test, the analysis compares the "Before" and "During" implementation mean values across five key impact domains: Economic, Social, Technology, Environmental, and Infrastructure, as summarized in the overall mean value table. The primary objective is to determine, at a 5% level of significance, if the SVP's interventions directly led to a measurable improvement in the villagers' perception on these key aspects in each village. This statistical rigor aims to validate the observed positive shifts and provide robust evidence of the project's overall impact.

The following are calculation of “pair comparison t test” for Painnekone and Kanpyaung.

(i) Pair comparison t test for Painnekone Village

Let X = During mean values, Let Y = Before mean values

Table (4.9) Comparative Result of Before and During SVP Implementation in Painnekone Village

Sr.	Particular	X	Y	d	d ²
1	Economic Impact	4.20	2.61	1.59	2.53
2	Social Impact	4.14	2.62	1.52	2.31
3	Technology Impact	3.92	2.66	1.26	1.59
4	Environmental Impact	4.10	2.82	1.28	1.64
5	Infrastructure Impact	4.2	2.54	1.66	2.76
Total				7.31	10.83

Source: Survey Data, (2025)

$$\bar{d} = \frac{\sum d}{n} = \frac{7.31}{5} = 1.46$$

$$S = \sqrt{\frac{\sum d^2 - \frac{(\sum d)^2}{n}}{n-1}} = \sqrt{\frac{10.83 - \frac{7.31^2}{5}}{5-1}} = 0.187$$

Null Hypothesis (H0) : There is no significant improvement in before and during mean for SVP implementation

Alternative Hypothesis (H1): There is significant improvement in before and during mean for SVP implementation.

Calculate the t-statistics

$$t = \frac{\bar{d}-0}{s/\sqrt{n}} = \frac{1.46-0}{\frac{0.187}{\sqrt{5}}} = 17.45$$

Determine Degrees of freedom (df) = n-1=5-1=4

At a 5% significant level and depending on the degree of freedom, critical value at 5% = 2.13

From the above calculation, the value of $t = 17.45$ is greater than the critical value is 2.13 at 5%. therefore, Reject Null Hypothesis. There is evidence of a significant improvement in before and during means across the five key domains for SVP implementation for Painnekone village. This implies that the project has led to a statistically positive change in Painnekone village.

(ii) Pair comparison t test for Kanpyaung Village

Let X = During mean values, Let Y = Before mean

Table (4.10) Comparative Result of Before and During SVP Implementation in Kanpyaung Village

Sr.	Particular	X	Y	d	d ²
1	Economic Impact	4.05	2.68	1.37	1.88
2	Social Impact	4.08	2.60	1.48	2.19
3	Technology Impact	3.96	2.48	1.48	2.19
4	Environmental Impact	4.14	2.48	1.66	2.76
5	Infrastructure Impact	4.20	2.41	1.79	3.20
Total				7.78	12.22

Source: Survey Data, (2025)

$$\bar{d} = \frac{\sum d}{n} = \frac{7.78}{5} = 1.56$$

$$S = \sqrt{\frac{\sum d^2 - \frac{(\sum d)^2}{n}}{n-1}} = \sqrt{\frac{12.22 - \frac{7.78^2}{5}}{5-1}} = 0.169$$

Null Hypothesis (H0) : There is no significant improvement in before and during mean for SVP implementation.

Alternative Hypothesis (H1): There is significant improvement in before and during mean for SVP implementation.

Calculate the t-statistics

$$t = \frac{\bar{d}-0}{s/\sqrt{n}} = \frac{1.56-0}{\frac{0.169}{\sqrt{5}}} = 20.63$$

Determine Degrees of freedom (df) = n-1=5-1=4

At a 5% significant level and depending on the degree of freedom, critical value at 5% = 2.13

From the above calculation, the value of $t = 20.63$ is greater than the critical value is 2.13 at 5%. therefore, Reject Null Hypothesis. There is evidence of a significant improvement in before and during means across the five key domains for SVP implementation for Kanpyaung. This implies that the project has led to a statistically positive change in Painnekone.

4.3.3 Perception on Smart Village Project

In Section III, general perceptions of the Smart Village Project (SVP) were gathered from 18 individuals, comprising village administrators and project staff, focusing on the project's impact and community participation. The following table presents respondents' perceptions of the Smart Village Project (SVP), evaluating its impact across key areas such as living conditions, community participation, and the effectiveness of project implementation by **community leaders, project managers, and local facilitators.**

Table (4.11) Perception on Smart Village Project

No	Characteristics	Mean	Standard Deviation
1	The Smart Village Project has improved the overall living conditions of the village.	4.29	0.63
2	The project addresses the real needs of the community.	4.25	0.63
3	The community members understand the goals of the project.	4.3	0.7
4	The village leaders are actively involved from the beginning of the project.	4.36	0.64
5	The project has been implemented in a fair and transparent manner.	4.36	0.63
6	I am satisfied with the progress of the project so far.	4.2	0.66
7	The project has positively impacted the community's participation.	4.22	0.64
	Overall Mean Value	4.28	

Source: Survey Data, (2025)

According to Table (4.11), represented by offering insights into the perceptions of the Smart Village Project. The overall mean value of 4.28 indicates a generally positive across all measured characteristics. The project is seen as effective, well-

understood, transparent, and participatory. The Smart Village Project has significantly improved the living conditions of the village, addressed the community's real needs and ensured effective needs assessment and design. Community members have a clear understanding of the project's objectives, with a high mean value of 4.30. Village leaders have been actively involved from the beginning, demonstrating their commitment to legitimacy and effective implementation. The project has been implemented in a fair and transparent manner, with a low standard deviation indicating widespread positive perception. The project has also positively impacted community participation, with a high mean value of 4.22, indicating that the project has successfully fostered increased community participation, which is crucial for sustainable development. However, some respondents may have less enthusiastic views on the pace or extent of progress compared to the direct impact or transparency. The project has also positively impacted community participation, demonstrating empowered communities taking ownership. Overall, the Smart Village Project has shown strong agreement among respondents on its positive impact on the village's living conditions, community needs, and participation.

4.3.4 Challenges and Opportunities of Smart Village Project

This **part** of the respondent's profile states the information of challenges and opportunities for Smart Village Project in two distinct locations: Painnekone and Kanpyaung. The survey was conducted with 215 respondents from Painnekone and 255 respondents from Kanpyaung, and represented by mean values and standard deviations for seven key characteristics, aims to quantitatively assess the perceived difficulties faced by the project, including issues related to basic infrastructure, funding, inter-sectoral collaboration, communication, project monitoring, technology adaptation, and unique village-specific hurdles. By examining these mean scores, this section will provide crucial insight into the obstacles that affected the project's progress and sustainability in both communities.

(i) Challenges in Implementation of Smart Village Project

Table (4.12) indicated that both Painnekone and Kanpyaung faced challenges during project implementation, with Painnekone experiencing higher mean values of 2.2 to 2.8 and Kanpyaung experiencing higher mean values of 2.0 to 3.8. The overall mean values for both cities suggest that challenges were present but not

overwhelmingly severe, with Kanpyaung experiencing slightly more pronounced challenges.

Table (4.12) Challenges of Implementation Smart Village Project

No	Characteristics	Painnekone		Kanpyaung	
		Mean	Standard Deviation	Mean	Standard Deviation
1	Basic infrastructure is insufficient (electricity, internet, roads, bridges, buildings, etc.).	2.63	0.96	3.8	0.69
2	Limited funding sources have caused delays in the implementation of the project in the village.	2.34	0.64	3.88	0.58
3	Collaboration between the government and private sector in rural areas has been challenging for long-term sustainability.	2.87	0.93	3.67	0.79
4	Unstable internet and phone lines have caused communication difficulties.	2.26	0.73	2.03	0.55
5	There has been insufficient action taken to monitor and provide the necessary support for the project.	2.24	0.7	2.12	0.67
6	Cultural or social norms in the village have created resistance to using new technology.	2.86	1.02	2.25	0.72
7	Rural communities lack sufficient access to loans, grants, or other financial assistance for development.	3.74	1.23	2.91	1.1
Overall Mean Value		2.71		2.95	

Source: Survey Data, (2025)

The basic infrastructure in Kanpyaung is insufficient, with a mean of 3.80, indicating strong agreement that this is a major perceived challenge. Limited funding sources have caused delays in project implementation, with a mean of 3.88, indicating strong agreement. This could lead to slower progress or incomplete project components. Collaboration between the government and private sector in rural areas has been challenging for long-term sustainability, with a mean of 3.67, indicating difficulties in cross-sector collaboration. The potential weaknesses in governance, partnership models, or coordination mechanisms. Communication difficulties due to

unstable internet and phone lines are perceived as a minor challenge, with Kanpyaung having the lowest mean (2.03) across all items in its column. While not a major obstacle, occasional communication issues could still hinder coordination or information dissemination. These challenges highlight the need for improved infrastructure, funding, and collaboration between the government and private sector in rural areas for sustainable project outcomes.

Both Painnekone and Kanpyaung villages perceive insufficient action taken to monitor and provide necessary support for the project as a minor challenge. They view this as a relatively minor obstacle, suggesting that project management has handled monitoring and support reasonably well. Cultural or social norms in the villages have created resistance to using new technology, with Painnekone (2.86) and Kanpyaung (2.25) identifying this as a moderate challenge. Painnekone faces more significant challenges regarding financial assistance; its respondents (3.74) strongly feel that rural communities lack sufficient access to loans, grants, or other financial aid for development. Kanpyaung (2.91), however, views this as a moderate challenge, less pronounced than their issues with infrastructure and funding. This perception may affect morale and perceived fairness, which is important for community engagement.

(ii) Opportunities of Implementing Smart Village Project

The table (4.13) presents a quantitative assessment of the perceived benefits and potential gains emerging from the Smart Village Project in two distinct locations: Painnekone and Kanpyaung. This data, represented by mean values and standard deviations for seven key characteristics, aims to illustrate how the project has fostered new avenues for improved connectivity, sustainable energy, enhanced education and business opportunities, better health through clean water, increased employment, skill development, and empowered local leadership. By investigating these mean values will provide insight into the positive prospects and potentials that respondents believe the project has created within their communities.

According to Table (4.13), indicated that the Smart Village Project has generated significant perceived opportunities in Painnekone and Kanpyaung, with high mean values above 4.0. These high values indicate a strong perception of new or enhanced opportunities available to communities, fostering an environment of growth and improvement. Painnekone shows a slightly higher overall perceived sense of opportunity compared to Kanpyaung, but both are very positive.

Both Painnekone and Kanpyaung villages strongly perceive improved roads and bridges as significant opportunities for better connectivity and economic growth. These improvements are seen as foundational for broader development, and ongoing maintenance of these infrastructure is recommended to sustain the benefits. Adequate electricity supply allows for sustainable energy solutions, which can improve daily life and open doors for cleaner energy initiatives. Community-based renewable energy projects, such as solar and mini-hydro, can be explored to build on this perceived opportunity.

Table (4.13) Opportunities of Implementing Smart Village Project

No	Characteristics	Painnekone		Kanpyaung	
		Mean	Standard Deviation	Mean	Standard Deviation
1	Improved roads and bridges offer better connectivity and economic growth.	4.02	0.62	3.98	0.58
2	Adequate electricity supply allows for sustainable energy solutions.	4.12	0.59	4.01	0.61
3	Increased internet access enables better education and business opportunities.	4.37	0.54	4.22	0.63
4	Access to clean water improves health and supports agriculture.	3.99	0.61	4.03	0.59
5	More employment opportunities boost local economies and reduce unemployment.	4.21	0.64	4.07	0.71
6	Better education resources enhance learning and skills development.	4.12	0.58	4.08	0.55
7	Improved infrastructure empowers local leadership and self-sufficiency.	3.98	0.6	3.99	0.51
Overall Mean Value		4.12		4.05	

Source: Survey Data, (2025)

Increased internet access offers better education and business opportunities, with both villages recognizing its potential. Promoting digital literacy, e-learning, and online marketplaces can help achieve this. Access to clean water improves health and helps agriculture, suggesting a need for programs on water conservation and efficient irrigation.

Finally, more employment opportunities are seen as a way to boost local economies and reduce joblessness, especially in Painnekone. This highlights a clear economic benefit that can improve lives and potentially slow migration out of villages. Better education resources are also valued for improving learning and skills, showing that investing in people is recognized as important for self-sufficiency.

CHAPTER V

CONSLUSION

5.1 Findings

The Smart Village Project (SVP) in Painnekone and Kanpyaung villages has demonstrated statistically significant positive changes across multiple dimensions of socio-economic development, proving to be a highly effective intervention. The paired samples t-tests confirmed a significant improvement in overall perceptions from "Before" to "During" SVP implementation for both Painnekone ($t=17.45$, $df=4$, $p<0.05$) and Kanpyaung ($t=20.63$, $df=4$, $p<0.05$). Its success is rooted in a transparent and participatory approach, characterized by strong local leadership involvement and clear communication, which fostered high community satisfaction and understanding.

While both villages share a strong presence of farming as a primary occupation, they present distinct socio-demographic profiles; Kanpyaung features an older age distribution, higher male dominance, predominantly lower formal education levels, and more households with one or two children, whereas Painnekone has a higher proportion of households without children and a slightly less diversified employment landscape than Kanpyaung. Both communities, however, show considerable engagement in training and possess vocational skills. The SVP received overwhelmingly positive feedback, indicating its effectiveness in addressing community needs and improving overall living conditions.

This led to a significant positive economic transformation in both villages, with substantial improvements across all seven economic indicators, including household income stability, job creation, and market access, and a notable reduction in rural-to-urban migration. Painnekone showed the highest mean score for improved household incomes, though both villages indicated a need for further perceived impact in training and knowledge sharing. Social well-being also significantly improved through better access to education, health, and public services, enhanced community cohesion, gender equality awareness, and crucial infrastructure like concrete roads, which vastly improved connectivity. Financial support for vulnerable populations and improved

access to clean drinking water and sanitation were also key achievements, though Painnekone registered comparatively lower improvements in some infrastructure areas.

The project also enhanced the villages' technology setup, increasing access to fast internet and promoting the use of modern technology for employment, education, agriculture, health, banking, and waste management, although the full potential of IT Knowledge Centers has yet to be realized. Environmentally, the SVP brought about a significant positive transformation, promoting eco-friendly practices, improving waste management, and enhancing environmental awareness and community participation in conservation efforts, with Kanpyaung experiencing a more profound positive change.

Despite these successes, the SVP faced persistent and significant challenges, primarily concerning limited funding, which caused widespread project delays. Insufficient basic infrastructure, particularly in Kanpyaung, was a major issue, and Painnekone uniquely highlighted the lack of grants or financial assistance. Difficulties also arose in strengthening government-private sector collaboration for long-term sustainability and in adapting modern technologies to the rural context. While communication difficulties due to unstable internet/phone lines and insufficient monitoring/support were perceived as obstacles, they were less critical than funding and infrastructure. Kanpyaung generally perceived these challenges more acutely, highlighting potential village-specific complexities.

The project successfully generated substantial opportunities, particularly through increased internet access, which enabled better education and business avenues. The project was seen to boost local economies, create employment, and enhance skill development. Adequate electricity supply was perceived as an opportunity for sustainable energy solutions, and improved roads and bridges were core opportunities for better connectivity and economic growth. Access to clean water was recognized for improving health and supporting agriculture, and the improved infrastructure was believed to empower local leadership and foster self-sufficiency, strengthening local governance.

5.2 Suggestions

To enhance the Smart Village Project's impact and ensure its long-term success, several key strategies are recommended. Future efforts should prioritize sustainable funding mechanisms and continued investment in foundational infrastructure.

Programs should be designed to fit different age groups, leveraging existing skills and expanding targeted digital literacy and vocational training and educational support across all levels, with a specific focus on income-generating training with measurable outcomes and the development of market linkages to strengthen local economies and reduce outward migration. Infrastructure must be prioritized, ensuring reliable physical amenities like roads, water, and waste management, along with affordable, high-speed digital connectivity for all.

Concurrently, sustainable farming practices and renewable energy solutions should be strengthened, alongside formalized waste management and increased environmental awareness, particularly in areas needing greater perceived impact on sustainable farming. The project must also empower local leadership, secure diverse and sustained funding, document best practices, and adapt to village-specific challenges, with specific frameworks for long-term maintenance and local governance empowerment being critical.

Furthermore, considering the recent earthquake, the SVP's 2025-2026 budget may need reallocation for emergency recovery. To minimize long-term delays and ensure continued effectiveness, it is suggested to actively seek additional international funding for earthquake recovery to ease the SVP's financial strain. It is also recommended to establish a dedicated backup plan for disaster recovery, including a specific contingency fund within the overall budget, to ensure core project activities are not jeopardized by future crises. Future SVP planning must integrate climate-resilient technologies and disaster preparedness, fostering stronger, more adaptable rural communities. Addressing the identified challenges while capitalizing on these new opportunities will be critical for ensuring the sustained socio-economic development and self-sufficiency of Smart Villages in Myanmar.

REFERENCES

- Alston, D. (2021). The future of rural communities: Building resilient economies with smart villages. *Sustainable Rural Futures*, 33(1), 45-61.
- Asian Development Bank (ADB). (2019). Myanmar rural roads and infrastructure: A development overview.
- Asian Development Bank (ADB). (2020). Myanmar rural development: Current challenges and opportunities.
- AIT. (2020). Smart villages: Digital transformation in rural communities. *Asian Institute of Technology*.
- Bisht, P., Singh, S., & Rawat, A. (2020). Smart Water Management for a Sustainable Tomorrow: A Digital Twin Approach for Rural India. *Journal of Water, Sanitation and Hygiene for Development*, 10(4), 843–851.
- Bishoge, A., Jadhav, R., & Somwanshi, S. (2020). Integrating sustainability in Smart Village projects. *Rural Sustainability Journal*, 12(3), 118-130.
- Bishoge, O., Kimaro, J., & Lyimo-Macha, J. (2020). Smart Village Concept for Sustainable Rural Development: A Case of Tanzania. *Journal of Rural Planning and Development*, 3(2), 10–22.
- Calderón, C., & Servén, L. (2010). Infrastructure and Economic Development in Sub-Saharan Africa. *Journal of African Economies*, 19(Suppl. 1), i13–i87.
- Chatterjee, A., & Kar, S. (2018). *Smart Village: A Policy Perspective*. Notion Press.
- Ciolac, R., Iancu, T., Popescu, G., Adamov, T., Feher, A., & Stanciu, S. (2022). Smart tourist village—an entrepreneurial necessity for Maramures rural area. *Sustainability*, 14(14), 8914.
- Department of Population, Ministry of Immigration and Population. (2024). *2024 Population and Housing Census: Provisional Results, Census Report Volume (1)*. The Republic of the Union of Myanmar
- Dobrotă, C. (2022). The role of smart villages in sustainable development: A case study of Chiscani Village, Romania. *Rural Sustainability Journal*, 29(3), 99-110.
- DFDL. (2025). Myanmar enacts rural roads development law.
- Economic and Social Commission for Asia and the Pacific (UNESCAP). (n.d.). *Economic and Social Commission for Asia and the Pacific (UNESCAP) - Sustainable Development Goals*. The United Nations.

- European Network for Rural Development. (2018). *Smart Villages: Revitalising Rural Services*.
- Food and Agriculture Organization (FAO). (2020). Agricultural productivity in Myanmar.
- Garrocho, S. (2020). The concept of the Smart Village: A sustainable rural development approach. *Rural Sustainability Review*, 5(1), 22-34.
- GlobalData. (2024). Rural population in Myanmar: Statistics and trends.
- GIZ. (2021). Sustainable rural development: Case studies and best practices. *German Agency for International Cooperation*.
- Gupta, V., & Tiwari, D. (2021). Environmental Benefits of Smart Villages: A Review. *Journal of Environmental Management*.
- Guzal-Dec, D. (2018). Intelligent Development of the Countryside – The Concept of Smart Villages: Assumptions, Possibilities, and Implementation Limitations. *Economic and Regional Studies*, 11(3), 32-49.
- Heeks, R. (2009). Health information systems: Failure, success and improvisation. *International Journal of Medical Informatics*, 78(1), 1–12.
- IRENA. (2016). *Renewable Energy in Mini-Grids for Rural Electrification*.
- International Fund for Agricultural Development (IFAD). (2020). Smart village initiatives: Enhancing rural resilience.
- International Fund for Agricultural Development (IFAD). (2021). Rural development and ethnic communities in Myanmar.
- International Renewable Energy Agency (IRENA). (2019). *Tracking SDG 7: The Energy Progress Report*. IRENA.
- Jadhav, S. P., Sharma, R. K., & Gupta, A. (2025). Digital Transformation and Rural-Urban Migration: Insights from Smart Village Initiatives. *Journal of Rural Studies*.
- Jadhav, R., & Sharma, S. (2021). Smart villages in India: Challenges and innovations. *Technology and Rural Development Journal*, 14(2), 55-67.
- Johnson, H., & McGee, K. (2019). Smart villages in developing countries: Challenges and opportunities. *Technology for Development*, 27(3), 120-134.
- Klerkx, L., Jakku, E., & Labarthe, P. (2019). A review of social science on digital agriculture, smart farming, and digitally enabled innovation. *Agricultural Systems*, 184, 102906.

- Komorowski, Ł., & Stanny, M. (2020). Smart Villages: Where Can They Happen? *Land*, 9(5), 151.
- Kumar, A., & Singh, R. (2018). Rural development and the challenges faced by rural communities. *Rural Development Journal*, 25(3), 15-30.
- LIFT Fund. (2016). Rural governance and community participation in Myanmar.
- Ministry of Cooperatives and Rural Development. (2023). Annual report on rural development and the Smart Village project in Myanmar.
- Ministry of Cooperatives and Rural Development (MoCRD). (2022). Department of Rural Development: *Annual progress report*.
- Ministry of Information. (2025, January 1). Myanmar's 2024 Census Provisional Results: Population at 51.3M.
- Ministry of Planning and Finance. (2018). Myanmar sustainable development plan 2018-2030.
- Ministry of Planning and Finance. (2020, June 24). Myanmar Micro, Small and Medium Enterprise Survey 2019.
- Ministry of Planning and Finance. (2022, February 25). Myanmar Sustainable Development Plan (2018 – 2030). *Myanmar Water Portal*.
- Misra, R., Pathak, R., & Agarwal, R. (2020). Smart Villages: Bridging the Urban-Rural Divide in India. *International Journal of Rural Management*, 16(1), 1-16.
- Mohanty, S., Mohanta, B., Nanda, P., Sen, S., & Patnaik, S. (2020). Smart Village Initiatives: An Overview. In *Smart Village Technology* (pp. 3-24).
- Naldi, L., Nilsson, P., Westlund, H., & Wixe, S. (2015). What is Smart Rural Development? *Journal of Rural Studies*, 40, 90-101.
- Okamoto, S. (2024, November 6). Agriculture and the related input supply, processing, trade, and retail. *CGSpace*.
- Polettini, M., Renukappa, S., & Somwanshi, S. (2022). Rural development and the role of technology in transforming communities. *Journal of Rural Development and Technology*, 10(4), 211-224.
- Phyo Htet Aung (2024). *The Effect of Rural Road Infrastructure Development on Socioeconomic Status in Kungyangon Township, Yangon Region*. Thesis for MEcon, Yangon University of Economics.
- Ray, C. (2001). Culture, intellectual property and territorial rural development. *Sociologia Ruralis*, 41(1), 3–20.

- Renukappa, S., Suresh, S., Abdalla, W., Shetty, N., Yabbati, N., & Hiremath, R. (2022). Evaluation of Smart Village Strategies and Challenges. *Smart and Sustainable*.
- Renukappa, S. H., Akintoye, A., & Jayasena, N. S. (2022). *Smart Villages: A Paradigm Shift for Rural Development*. Routledge.
- Saha, P., & Ray, P. K. (2020). *Smart Villages in a Globalized World: Emerging Themes and Case Studies*. Elsevier.
- Singh, M., Verma, S., & Sharma, R. (2020). Sustainable Energy Solutions in Smart Villages: A Case Study from India. *Renewable Energy Journal*, 155, 456-465.
- Somwanshi, S., Jadhav, R., & Sharma, S. (2016). Rural development and the smart village model. *Technology and Rural Development Journal*, 11(1), 67-82.
- Su Mon Mon Phu.(2022). *A Study on Rural Road Infrastructure Development in Gyopinkauk Township*. Thesis for MEcon(Eco), Yangon University of Economics.
- Taylor, A., & Wright, K. (2022). The role of ICT in smart village development. *International Journal of Rural Development*, 48(1), 89-102.
- United Nations. (2021). Rural development and the SDGs: The role of smart villages in sustainable development. *United Nations Economic and Social Council*.
- Vaishar, A., & Šťastná, M. (2019). Smart villages and agricultural innovation: Bridging the gap between rural and urban economies. *Rural Development and Economic Change*, 21(3), 14-23.
- Visvizi, A., & Lytras, M. D. (2018). Digital transformation in rural areas: A critical review of smart villages and their impact on rural migration. *Journal of Rural Technology and Development*, 18(1), 62-75.
- World Bank. (2020). *Global rural development report: Challenges and strategies*.
- World Bank. (2022). *World Development Report 2022: Finance for an Equitable Recovery*. The World Bank.
- Xinhua. (2023). Rural development in Myanmar: Strategies for poverty reduction and sustainable livelihoods.
- Zavratnik, V., Kos, A., & Stojmenova Duh, E. (2018). Smart Villages: Comprehensive Review of Initiatives and Practices. *Sustainability*, 10(7), 25-59.

APPENDIX (A)

Overview of Rural Development Programs in Myanmar

Sr No	Project Name	Project Duration	Funding Organization	Budget	Coverage Area	Focus Area
1	National Community Driven Development Project (NCDDP)	2013-2025	World Bank, Gov, Italy, Japan, DFID	\$549 M	63 Tsp	Infrastructure, participatory governance
2	Evergreen Village Development Project	2014-Present	Government of Myanmar	370.5B kyats	15173 villages	Microloans for livelihoods
3	Village Development Plan Project (VDP)	2015-2016, annually	UNDP, DRD	231279.8M Kyats	17471 Villages, Nationwide	Participatory planning and budgeting
4	Rural Electricity Plan (NEP Off-Grid)	2011-2030	JICA, ADB, FIZ	\$400 M	Nationwide	Off-grid electrification
5	Cash for Work Project	2016	DRD	28230.00M Kyats	0.44M Households 0.55M Labors	Public works and income support
6	Technical Assistance and Livelihood Training	2016	MoCRD, NGOs	Not specified	Nationwide	Vocational training for youth and women
7	Rural Business Fund Project	2017-2025	DRD	300M kyats	149 Villages	Microfinance and business support

APPENDIX (A). Continued

Sr No	Project Name	Project Duration	Funding Organization	Budget	Coverage Area	Focus Area
8	Resilient Community Development Project (RCDP)	2020-2026 (7yrs)	ADB, EU, JFPR, Gov Fund	\$244.95 M	2,942 villages	Climate-resilient infrastructure
9	Western States Agribusiness Project (WSAP)	2018-2024 (6years)	IFAD, Govt., NGOs, Private Sector	\$20.257 M	Magway & Chin	Climate-resilient agriculture
10	Agricultural Production Road Projects	2018-present	Govt. (Federal and State)	28230.00M Kyats	2,572 villages	Roads and bridges Infrastructure
11	Village Revolving Fund Project (VRFP)	2019-2020	DRD (CERP)	41.50 B Kyats	1,710 villages	Microloans post-COVID
12	Rural Water Supply Projects	2010-2030	UNICEF, Government	Not specified	81,384 villages	Water access & sanitation
13	Smart Village Project	2021 (5yrs)	ASEAN, AIT, GIZ	60.00M Kyats/Village	Pilot villages	ICT and renewable energy, Infrastructure development
14	East Asia Poverty Reduction Cooperation	2018-2021	CFRD, China	\$13.34 M	Pilot areas	Poverty reduction pilots

Source: Rural Development Projects by DRD

APPENDIX – B
Sample Survey Questionnaire
Section (I)

The Smart Village Project for Socio-Economic Development in Rural Areas
(A Case Study of Painnekone and Kanpyaung Villages in Yangon South District)

Section I

I. Personal Information

1. Gender:

Male

Female

2. Age:

3. Marital Status:

Single

Married

4. Highest level of education completed:

Primary School	Middle School	High School	Graduate	Vocational Training	Never

5. Main occupation:

Occupation	Before the Project Start (2022-2023)	After 2022 (ongoing Project 2024-2025)
Farmer		
Business Owner		
Government Staff		
Laborer		
Fisherman		
Unemployed		
Other		

6. Estimated monthly household income (in MMK):

Income	Before the Project Start (2022-2023)	After 2022 (ongoing Project 2024-2025)
Less than 100,000		
100,000-199,999		

200,000-299,999		
300,000-499,999		
500,000 or more		

7. Number of people in household: _____
8. Number of children in household: _____
9. Are you currently attending any school or training?
 Yes
 No
10. Do you have any vocational or technical skills?
 Yes (Please specify): _____
 No

Section- II

This section focuses on the respondent of Head of household in Painnekone and Kanpyaung Village.

Instructions: Please indicate your level of agreement with the following statements. (Choose one)

1=Strongly Disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly Agree

I. Economic Impact of Smart Village Project (Before Smart Village Implementation)

No.	Statement	1	2	3	4	5
1.	The project has created stable and sufficient household income for us.					
2.	The project has improved household incomes.					
3.	This project has created new job opportunities.					
4.	The project has improved the market access for our products.					
5.	"Cash for Work" development programs have provided income opportunities for the villagers.					
6.	Training programs and business knowledge sharing from the project have been beneficial.					
7.	The project has reduced rural-to-urban migration.					

II. Economic Impact of Smart Village Project (During Smart Village Implementation)

No.	Statement	1	2	3	4	5
1.	The project has created stable and sufficient household income for us.					
2.	The project has improved household incomes.					
3.	This project has created new job opportunities.					
4.	The project has improved the market access for our products.					
5.	"Cash for Work" development programs have provided income opportunities for the villagers.					
6.	Training programs and business knowledge sharing from the project have been beneficial.					
7.	The project has reduced rural-to-urban migration.					

III. Social Impact of Smart Village Project (Before SVP Implementation)

No.	Statement	1	2	3	4	5
1.	The infrastructure improvements have contributed to better access to education, health, and public services.					
2.	Primary school students have access to school uniforms and writing materials.					
3.	Financial support is available for elderly people aged 85 and above.					
4.	Community participation in awareness programs related to gender equality has increased.					
5.	There is an increase in cooperation and unity among the villagers.					
6.	The construction of concrete roads through the project has made it easier to travel within the village and nearby areas.					
7.	Access to clean drinking water and a proper sanitation system (toilets) is available.					

IV. Social Impact of Smart Village Project (During SVP Implementation)

No.	Statement	1	2	3	4	5
1.	The infrastructure improvements have contributed to better access to education, health, and public services.					
2.	Primary school students have access to school uniforms and writing materials.					
3.	Financial support is available for elderly people aged 85 and above.					
4.	Community participation in awareness programs related to gender equality has increased.					
5.	There is an increase in cooperation and unity among the villagers.					
6.	The construction of concrete roads through the project has made it easier to travel within the village and nearby areas.					
7.	Access to clean drinking water and a proper sanitation system (toilets) is available.					

V. Technological Impact of Smart Village Project (Before SVP Implementation)

No.	Statement	1	2	3	4	5
1.	The fast internet access has improved communication and allowed better use of digital services.					
2.	The introduction of digital technology has supported education, innovation, and community collaboration in the village.					
3.	Health and banking services are now easily accessible online.					
4.	Modern technology is now being used for employment and educational purposes.					
5.	Waste management, systematic disposal, and sanitation services have improved due to the use of technology in the village.					
6.	After the establishment of the IT Knowledge Center (Information Technology Knowledge Center) in the village, there have been more opportunities for training, Wi-Fi access, and computer lessons.					
7.	Technology is visibly improving the efficiency of agricultural practices (e.g., weather forecasting, smart irrigation) in our village.					

VI. Technological Impact of Smart Village Project (During SVP Implementation)

No.	Statement	1	2	3	4	5
1.	The fast internet access has improved communication and allowed better use of digital services.					
2.	The introduction of digital technology has supported education, innovation, and community collaboration in the village.					
3.	Health and banking services are now easily accessible online.					
4.	Modern technology is now being used for employment and educational purposes.					
5.	Waste management, systematic disposal, and sanitation services have improved due to the use of technology in the village.					
6.	After the establishment of the IT Knowledge Center (Information Technology Knowledge Center) in the village, there have been more opportunities for training, Wi-Fi access, and computer lessons.					

No.	Statement	1	2	3	4	5
7.	Technology is visibly improving the efficiency of agricultural practices (e.g., weather forecasting, smart irrigation) in our village.					

VII. Environmental Impact of Smart Village Project (Before SVP Implementation)

No.	Statement	1	2	3	4	5
1.	The project has promoted environmentally friendly practices such as rainwater harvesting and systematic waste disposal.					
2.	The introduction of sustainable farming systems through the project has improved the village environment.					
3.	The project has enabled the systematic management of waste within the village.					
4.	The village community has gained more awareness and understanding of environmental conservation and long-term sustainability.					
5.	The project has led to a cleaner environment and an improved standard of living.					
6.	The community is now more active in participating in environmental conservation efforts.					
7.	The project has provided better awareness and training on environmental protection.					

VIII. Environmental Impact of Smart Village Project (During SVP Implementation)

No.	Statement	1	2	3	4	5
1.	The project has promoted environmentally friendly practices such as rainwater harvesting and systematic waste disposal.					
2.	The introduction of sustainable farming systems through the project has improved the village environment.					
3.	The project has enabled the systematic management of waste within the village.					
4.	The village community has gained more awareness and understanding of environmental conservation and long-term sustainability.					
5.	The project has led to a cleaner environment and an improved standard of living.					
6.	The community is now more active in participating in environmental conservation efforts.					
7.	The project has provided better awareness and training on environmental protection.					

IX. Infrastructure Impact of Smart Village Project (Before SVP Implementation)

No.	Statement	1	2	3	4	5
1.	The new infrastructure has contributed to the creation of new job opportunities in the village.					
2.	The infrastructure improvements have contributed to better access education, health access to education, health, and public services.					
3.	Access to electricity and energy has become more reliable.					
4.	The construction of concrete roads through the project has made it easier to travel within the village and nearby areas.					
5.	Adequate training was provided to use the new technology and infrastructure.					
6.	Maintenance and technical support for the new infrastructure are available when needed.					
7.	The infrastructure has contributed to improved access to education, health, or public services.					

X. Infrastructure Impact of Smart Village Project (During SVP Implementation)

No.	Statement	1	2	3	4	5
1.	The new infrastructure has contributed to the creation of new job opportunities in the village.					
2.	The infrastructure improvements have contributed to better access to education, health access to education, health, and public services.					
3.	Access to electricity and energy has become more reliable.					
4.	The construction of concrete roads through the project has made it easier to travel within the village and nearby areas.					
5.	Adequate training was provided to use the new technology and infrastructure.					
6.	Maintenance and technical support for the new infrastructure are available when needed.					
7.	The infrastructure has contributed to improved access to education, health, or public services.					

Section III

This section focuses on the respondent of Village Administrators, staff from the Project Implementation Team.

I. General Perception of the Smart Village Project

Instructions: Please indicate your level of agreement with the following statements. (Choose one)

1=Strongly Disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly Agree

No	Statement	1	2	3	4	5
1.	The Smart Village Project has improved the overall quality of life in the village.					
2.	The project addresses the real needs of the community.					
3.	Community members clearly understand the goals of the Smart Village Project.					
4.	The village leadership was well informed and involved from the start.					
5.	The project has been implemented fairly and transparently.					
6.	I am satisfied with the progress of the Smart Village Project so far.					
7.	The project has positively influenced community cooperation and unity.					

Section IV

This section focuses on the respondent of Head of household in Painekekone and Kanpyaung Village.

I. Challenges on Implementation Smart Village Project

No.	Statement	1	2	3	4	5
1.	Basic infrastructure is insufficient (electricity, internet, roads, bridges, buildings, etc.).					
2.	Limited funding sources have caused delays in the implementation of the project in the village.					
3.	Collaboration between the government and private sector in rural areas has been challenging for long-term sustainability.					
4.	Unstable internet and phone lines have caused communication difficulties.					
5.	There has been insufficient action taken to monitor and provide the necessary support for the project.					
6.	It is difficult for modern technologies to adapt to the rural context.					
7.	Our village faces more challenges and difficulties compared to other villages.					

II. Opportunities on Implementation Smart Village Project

No.	Statement	1	2	3	4	5
1.	Improved roads and bridges offer better connectivity and economic growth.					
2.	Adequate electricity supply allows for sustainable energy solutions.					
3.	Increased internet access enables better education and business opportunities.					
4.	Access to clean water improves health and supports agriculture.					
5.	More employment opportunities boost local economies and reduce unemployment.					
6.	Better education resources enhance learning and skills development.					

No.	Statement	1	2	3	4	5
7.	Improved infrastructure empowers local leadership and self-sufficiency.					

Thanks for your time.