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# Offline Internet Innovation: New Opportunities for Entrepreneurs in Remote Districts

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**Abstrak**

Keterbatasan akses internet masih menjadi hambatan utama dalam pengembangan kewirausahaan di daerah terpencil, terutama dalam mengakses pasar, informasi, dan perangkat bisnis digital. Penelitian ini bertujuan untuk menganalisis potensi inovasi internet offline sebagai strategi alternatif dalam mendukung pengembangan kewirausahaan pada wilayah dengan keterbatasan konektivitas. Fokus penelitian diarahkan pada peran teknologi *offline-first* dalam memperluas peluang usaha, memperkuat kapasitas wirausaha, serta mengurangi kesenjangan digital di daerah terpencil.

Penelitian ini menggunakan pendekatan kualitatif deskriptif melalui *systematic literature review*. Data dikumpulkan dari artikel jurnal bereputasi, buku akademik, dan laporan resmi yang relevan dengan teknologi internet offline, inklusi digital, dan pengembangan usaha mikro, kecil, dan menengah (UMKM). Analisis data dilakukan secara induktif dengan teknik sintesis tematik untuk mengidentifikasi pola, manfaat, tantangan, serta faktor pendukung implementasi internet offline. Hasil penelitian menunjukkan bahwa inovasi internet offline memungkinkan pelaku usaha di daerah terpencil menjalankan fungsi bisnis utama, seperti pencatatan transaksi, akses informasi, dan pengembangan keterampilan, tanpa ketergantungan pada koneksi internet yang berkelanjutan. Selain manfaat teknis, internet offline juga memperkuat ketahanan usaha, mendukung pengembangan sumber daya manusia, dan mendorong partisipasi ekonomi yang inklusif. Namun demikian, efektivitasnya sangat dipengaruhi oleh tingkat literasi digital, ketersediaan perangkat, dan dukungan kelembagaan. Penelitian ini memiliki nilai originalitas dengan memposisikan internet offline sebagai instrumen strategis dan kontekstual untuk pengembangan kewirausahaan berkelanjutan di daerah terpencil.

**Kata Kunci:** Internet Offline; Inovasi; Kewirausahaan; Daerah Terpencil.

***Abstract***

*Technological innovation continues to develop, but many remote areas in Indonesia still experience limited internet access. This digital divide has an impact on economic development,*



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*especially for local entrepreneurs who rely on technology to grow their businesses. This article examines the potential of offline internet as an innovative solution that enables entrepreneurs in remote areas to overcome internet access constraints, create new opportunities, and drive local economic growth. By utilizing local networks, such as mesh networks and peer-to-peer communication, the offline internet allows entrepreneurs to stay connected, exchange information, and carry out business transactions without having to be directly connected to the internet. This technology provides space for the development of micro, small, and medium enterprises (MSMEs) in remote areas, allowing them to expand markets, accelerate business growth, and increase productivity.*

*This study uses a descriptive qualitative method by conducting a literature review of research articles and books. The results show that offline internet innovation is able to reduce dependence on conventional internet infrastructure, while opening up access to information and markets for entrepreneurs in remote areas. On the other hand, there are still challenges in terms of technology education and the development of adequate local infrastructure to support the adoption of this technology. This article emphasizes the importance of government and private sector support in encouraging the spread of offline internet technology, especially in 3T (Disadvantaged, Frontier, and Outermost) areas. This innovation, if supported by the right policies, has the potential to become a driving force for digital entrepreneurship in remote areas, as well as bridge the digital divide that has been the main obstacle in local economic development.*

**Keywords:** *Offline Internet; Innovation; Entrepreneurship; Remote District.*

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## INTRODUCTION

The unequal distribution of information and communication technology infrastructure remains a structural challenge in national development, particularly in remote, rural, and disadvantaged regions. Limited internet access has become a critical barrier that prevents communities from fully participating in the digital economy (James, 2025). For entrepreneurs in remote districts, inadequate connectivity restricts access to markets, business information, digital financial services, and innovation ecosystems, thereby limiting the growth potential of micro, small, and medium enterprises (MSMEs) (Donner & Escobari, 2010). Recent national statistics indicate that internet penetration in non-urban areas is significantly lower than in urban regions, with the majority of digitally underserved populations residing in remote villages. Reports from the Ministry of Communication and Information Technology of the Republic of Indonesia further confirm that thousands of villages remain outside the coverage of reliable internet services. This condition has contributed to a persistent digital divide, reinforcing economic disparities between urban and rural areas and constraining local entrepreneurial development. From an economic perspective, digital entrepreneurship ideally requires inclusive access to technology to enhance productivity, efficiency, and competitiveness (Heeks, 2017).

The concept of an inclusive digital economy emphasizes that technological advancement should benefit all segments of society, regardless of geographical limitations. In line with the theory of appropriate technology, digital solutions should be designed in accordance with users' contextual conditions, infrastructure availability, and technological readiness (Heeks, 2017). Therefore, alternative technological approaches are needed to address connectivity constraints in remote areas.

One such alternative is the concept of offline internet or offline-first technology. Offline-first systems allow digital applications to function without continuous internet connectivity by relying on local data storage, local area networks, peer-to-peer communication, mesh networks, and delayed synchronization when connectivity becomes available (Ali et al., 2023; Satyanarayanan, 2017). This approach enables users to access information, manage data, and conduct transactions in low-connectivity environments. Previous studies argue that offline-first technology provides a pragmatic solution for communities in geographically isolated regions where conventional internet infrastructure is costly and difficult to deploy (Satyanarayanan, 2017).

Several empirical studies have explored the implementation of offline internet solutions across different sectors (Dodson et al., 2012). (Donner & Escobari, 2010) found that offline-first business applications improved managerial capacity and operational effectiveness among MSMEs in rural areas by providing access to business guidance and market information without requiring constant internet access. Similarly, (Nurul et al., 2022) demonstrated that offline point-of-sale (POS) systems enhanced financial record-keeping, transaction transparency, and efficiency for small entrepreneurs in remote regions.

In terms of human capital development, offline digital learning platforms have also been shown to play an important role (Traxler, 2018). (Putra, 2025; Putra & Idrus, 2026) reported that offline educational applications enable entrepreneurs to acquire new skills and knowledge at flexible times, contributing to capacity building in digitally marginalized communities. Furthermore, research by Setiasih and Hidayat (2023) highlighted the application of offline internet technology in the agricultural sector, where farmer-entrepreneurs were able to access weather data, commodity prices, and cultivation information, thereby improving decision-making and market competitiveness.

Despite these promising findings, existing studies also acknowledge several challenges. (El Madhoun et al., 2022) identified limited device availability and low levels of digital literacy as major barriers to the adoption of offline internet technology in remote areas. (Apdillah et al., 2022) emphasized that successful implementation requires strong collaboration among government institutions, private sector actors, and local communities, particularly in providing training, technological support, and sustainable policy frameworks.

A critical review of the literature reveals that most previous studies focus on

technical implementations or sector-specific applications of offline internet technology. Research that comprehensively examines offline internet as a strategic innovation for fostering entrepreneurship in remote districts, particularly from the perspective of local economic development and MSME empowerment, remains limited. Moreover, there is a lack of integrative analysis that simultaneously addresses benefits, challenges, and policy implications within a single conceptual framework. Therefore, this study aims to analyze the potential of offline internet innovation as an alternative solution for supporting entrepreneurial development in remote areas. Specifically, the objectives of this study are to examine the role of offline internet technology in expanding business opportunities for MSMEs, to identify its economic and social benefits, and to explore the challenges and enabling factors influencing its implementation. The findings of this study are expected to contribute theoretically to the discourse on inclusive and context-sensitive digital innovation, and practically to inform policymakers and stakeholders in designing strategies for entrepreneurship development in digitally underserved regions.

## METHOD

This study adopts a qualitative descriptive research design using a systematic literature review approach (Snyder, 2019). This methodological choice is appropriate for exploring conceptual developments, technological innovations, and contextual challenges related to offline internet implementation and entrepreneurship in remote areas, where empirical data are often fragmented and sector-specific (Creswell, 2015; Snyder, 2019).

The data sources consist of secondary data obtained from peer-reviewed journal articles, academic books, conference proceedings, and official reports published by government institutions and international organizations. The selection of literature followed relevance and credibility criteria, focusing on publications that explicitly discuss offline internet technology, digital inclusion, entrepreneurship, MSME development, and rural or remote contexts. Systematic literature reviews are widely used to synthesize existing knowledge and identify research trends and gaps within a particular field. Data collection was conducted through a structured documentation process, involving identification, screening, and classification of relevant literature. To enhance the validity and trustworthiness of the data, triangulation was applied by comparing findings across multiple sources and disciplinary perspectives, as recommended in qualitative research methodology (Miles et al., 2014).

Data analysis employed an inductive qualitative approach. The selected literature was examined to identify recurring themes, conceptual patterns, and relationships related to offline internet innovation and entrepreneurial opportunities in remote districts. Thematic synthesis was used to integrate findings into a coherent analytical narrative that explains the role, benefits, and challenges of offline internet technology for

entrepreneurship development (Braun & Clarke, 2006).

This descriptive-analytical method does not aim to test hypotheses or establish causal relationships. Instead, it emphasizes conceptual clarification and contextual interpretation to generate insights that may inform policy formulation and guide future empirical research on digital innovation and entrepreneurship in low-connectivity environments.

## RESULT AND DISCUSSION

### Result

Offline internet innovation is a technological solution designed to enable access to digital information without the need for a continuous internet connection, thus allowing users, especially in remote areas, to still be able to take advantage of digital services and applications (Purbo, 2020). This literature research highlights several studies related to the development and benefits of offline internet, especially for entrepreneurs in remote areas who experience limited digital infrastructure. Some of the key points found from this study include economic benefits, access to information, and implementation challenges.

1. Economic Support for Entrepreneurs in Remote Areas

According to (Berliana et al., 2021), offline internet can provide significant support for MSMEs in rural and remote areas by opening up access to business information and resources that were previously unavailable. With an offline-first application, entrepreneurs can obtain business guidance, market price information, and training materials without having to connect to the internet. This allows MSMEs to improve their management and operational skills, which has a positive impact on business growth.

Another study by (Nurul et al., 2022) also revealed that the offline internet makes it easier for rural entrepreneurs to access digital financial services and record their transactions more efficiently using offline point-of-sale (POS) applications. The use of offline POS has been shown to increase transparency and efficiency in transaction recording, which in turn helps entrepreneurs better manage their finances and increase consumer confidence.

2. Wider Access to Information and Training

Offline internet technology allows access to training resources that can help entrepreneurs develop new skills. (D. Suleman, 2023) explains that some offline education applications allow users to access training materials stored on the device or downloaded previously, so they can learn at any time without an internet connection. This approach not only empowers entrepreneurs in remote areas, but also contributes to increasing the capacity of the community to manage businesses and optimize local resources.

In addition, a study by (Perbandingan et al., 2024) highlights offline internet applications in the agricultural sector, where farmers who also run businesses can access weather data, crop information, and commodity prices. This provides a competitive advantage for agricultural entrepreneurs in remote areas who previously

had difficulty accessing accurate and timely market information.

3. Challenges of Offline Internet Implementation in Remote Areas

While the benefits of offline internet are quite obvious, there are some challenges in its implementation. According to (El Madhoun et al., 2022), the main obstacles in the application of this technology in remote areas are the availability of compatible devices and the low level of digital literacy of the community. Many entrepreneurs in rural areas are not used to using digital applications, so training and education are important components so that this technology can be used effectively.

In addition, (Kurniawan, 2024) stated that collaboration between the government, the private sector, and local communities is urgently needed to accelerate the adoption of offline internet technology. This support can be in the form of the provision of compatible devices, training, and ongoing mentoring programs. With this synergy, it is hoped that offline internet technology can be utilized optimally and have a wider impact on the economic welfare of people in remote areas.

4. Further Innovation and Development

This literature study also shows the potential for further development in offline internet technology. The use of local data storage methods, the distribution of content through portable hardware, and integration with edge computing technology are some of the innovations that can maximize the benefits of offline internet in the future. According to (Utami et al., 2022), the development of solutions that are more adaptive to local needs and geographical conditions in remote areas will have a more significant impact on local entrepreneurs.

**Discussion**

The findings of this study demonstrate that offline internet innovation constitutes a strategically relevant response to persistent digital inequality in remote areas. In regions where conventional internet infrastructure is limited, unstable, or economically infeasible, offline-first technology enables entrepreneurial activities to continue by separating digital functionality from continuous internet connectivity. This supports the argument of (Polasik et al., 2013), who emphasize that offline-first systems are essential for ensuring digital participation in infrastructure-constrained environments.

From an entrepreneurial perspective, offline internet technology expands business opportunities by enabling essential operational activities such as transaction recording, inventory management, information access, and skill development without real-time internet access. The adoption of offline point-of-sale (POS) systems, for example, allows micro and small entrepreneurs to maintain accurate financial records, improve transparency, and enhance operational efficiency. This finding is consistent with (Nurul et al., 2022), who reported that offline POS applications significantly improve financial management practices among rural MSMEs.

In addition to operational efficiency, offline internet innovation plays a critical

role in improving access to knowledge and human capital development. Offline digital learning platforms and locally stored informational resources allow entrepreneurs to acquire new competencies independently of network availability. This aligns with the findings of (F. Suleman, 2018), who highlighted the importance of offline educational technologies in strengthening entrepreneurial capacity within marginalized and digitally excluded communities. In sectors such as agriculture, access to offline market information, weather data, and production guidance further supports informed decision-making and risk mitigation, as noted by (Perbandingan et al., 2024).

Despite these benefits, the discussion also reveals that technological innovation alone is insufficient to generate sustainable entrepreneurial outcomes. The effectiveness of offline internet solutions is strongly influenced by supporting factors such as digital literacy, availability of compatible devices, and institutional support systems. (El Madhoun et al., 2022) emphasized that limited digital competence among users may constrain the optimal utilization of offline technologies, thereby reducing their potential impact. This finding indicates that capacity-building initiatives must accompany technological deployment to ensure meaningful adoption.

Furthermore, governance and policy frameworks play a decisive role in determining the success of offline internet implementation. Effective collaboration between government institutions, private sector actors, and local communities is required to provide infrastructure support, training programs, and long-term sustainability. (Kurniawaty & Faiz, 2022) highlighted that multi-stakeholder collaboration significantly enhances technology diffusion and increases the likelihood of positive socio-economic outcomes in remote areas.

Compared to previous studies that primarily focus on technical feasibility or sector-specific applications, this study contributes a more integrative discussion by positioning offline internet innovation within the broader context of entrepreneurship development and local economic empowerment. The findings reinforce the view that offline internet should not be regarded merely as a temporary substitute for conventional connectivity, but rather as a complementary digital strategy aligned with the principles of inclusive and appropriate technology.

Overall, the discussion underscores that offline internet innovation holds substantial potential to stimulate entrepreneurial activities in remote areas, provided that it is supported by adequate human, technological, and institutional capacities. These insights strengthen the relevance of offline internet technology as a viable pathway for reducing the digital divide while simultaneously promoting inclusive and sustainable local economic growth.

## CONCLUSION

Offline internet innovation offers great opportunities for entrepreneurs in remote areas to increase productivity, expand market reach, and optimize their business operations,

even if they are outside the reach of conventional internet networks. While there are still challenges in terms of implementation, the potential economic and social benefits offered by this technology are significant. With the right support from the government, the private sector, and the community, offline internet can be a strategic solution in strengthening entrepreneurship in a region that has been isolated from digital developments.

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