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EXPLORING THE IMPACT OF INTERNET COVERAGE AND INTERNET READINESS IN PROMOTING DIGITAL INCLUSION AMONG ORANG ASLI COMMUNITIES IN GRIK, PERAK

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Abstract:

This study critically examines the role of Internet services in facilitating the socio-economic development of Orang Asli and rural communities in Gerik, Perak. Recognizing the transformative potential of digital connectivity, this research delves into how internet services influence various dimensions of community upliftment, from economic opportunities to social inclusion. The study pursues three key objectives: (1) assess the satisfaction levels of internet users in these communities, (2) evaluate their readiness to adopt digital technologies and engage with online services, and (3) explore the extent to which improved Internet connectivity can act as a catalyst for socio-economic progress and digital inclusion. A mixed-methods approach, comprising quantitative analysis from 250 survey responses and qualitative insights from 10 in-depth interviews with key stakeholders, is employed to ensure a comprehensive understanding of the subject. Preliminary findings are expected to offer critical insights into the intersection between digital infrastructure and socio-economic development, with implications for policymaking and future broadband initiatives. However, potential limitations, such as self-reporting biases and the challenge of extrapolating findings to regions with differing levels of digital literacy and infrastructure, are acknowledged. This research ultimately aims to provide evidence-based recommendations for expanding digital access and fostering socio-economic resilience among marginalized rural communities.

Keywords:

Digital Divide, Digital Inclusion, Internet Coverage, Readiness, Rural Community

Introduction

The Orang Asli, the indigenous peoples of Peninsular Malaysia, comprise 18 distinct sub-ethnic groups, each with its rich cultural heritage, language, and traditions. According to the Jabatan Kemajuan Orang Asli (JAKOA) under the Ministry of Rural and Regional Development, these communities have historically inhabited remote, rural areas and primarily engaged in traditional livelihoods such as hunting, gathering, and subsistence agriculture. Despite their long-standing connection to the land, Orang Asli communities often face socio-economic marginalization, limited access to modern infrastructure, and exclusion from mainstream economic development. As of 2024, approximately 215,215 Orang Asli are living across Peninsular Malaysia, with the largest populations in Pahang, followed by Johor and Selangor (JAKOA, 2024).

Table 1: Orang Asli Population in Malaysia

State	Malay Proto	Negrito	Senoi	Total
Johor	16,541	2	71	16,524
Kedah	13	290	28	331
Kelantan	89	2,143	16,668	18,900
Melaka	2,001	1	31	2,033
Negeri Sembilan	12,349	3	125	12,477
Pahang	42,887	1,265	36,468	80,620
Perak	653	2,796	58,140	61,589
Selangor	16,003	6	5,682	21,691
Terengganu	85	40	925	1,050
Total	90,531	6,546	118,138	215,215

Source: Jabatan Kemajuan Orang Asli (JAKOA)

The Orang Asli population is notably youthful, with a higher proportion of children and a lower median age compared to the national average. However, this demographic advantage is tempered by significant challenges, particularly in access to education and healthcare. Historically, Orang Asli communities have faced systemic barriers to these essential services, resulting in lower literacy rates, higher poverty levels, and increased health-related issues. These disparities perpetuate cycles of socio-economic marginalization, making it difficult for these communities to engage fully in Malaysia's broader development initiatives.

In recent years, government agencies and non-governmental organizations have intensified efforts to improve infrastructure, education, and economic opportunities for Orang Asli communities. These initiatives, which aim to address long-standing inequalities, focus on enhancing the overall quality of life for the Orang Asli by promoting greater access to essential services and creating pathways to socio-economic mobility (“Orang Asli | data.gov.my,” 2024). Despite these efforts, significant work remains to ensure that these communities can fully benefit from modern digital services and infrastructure, particularly in terms of bridging the digital divide and fostering digital inclusion.

Despite ongoing efforts to improve their socio-economic conditions, the Orang Asli continue to face considerable challenges in integrating into Malaysia's broader socio-economic framework. One of the most critical contemporary issues is the persistent digital divide that separates these communities from the rest of the nation. Limited access to reliable Internet services and digital technologies has severely restricted the Orang Asli's capacity to engage in the digital economy, thereby deepening existing socio-economic inequalities. This lack of digital inclusion not only limits access to essential services such as education, healthcare, and employment opportunities but also hinders community development and participation in Malaysia's digital transformation initiatives (Mat Dong, Midmore, & Plotnikova, 2022).

Problem Statement

Access to the Internet and digital tools holds transformative potential for Orang Asli communities by offering enhanced educational resources, improved healthcare delivery, and expanded economic opportunities. However, the persistent digital divide remains a formidable obstacle. Many Orang Asli, particularly those residing in remote and rural areas, continue to face significant barriers such as inadequate infrastructure, limited access to affordable digital devices, and low levels of digital literacy. These challenges prevent them from fully capitalizing on the opportunities provided by digital inclusion, thereby reinforcing cycles of poverty and marginalization. Without targeted interventions to bridge these gaps, the benefits of digital connectivity will remain out of reach for many within these communities, further widening the socio-economic disparities they face (Chew et al., 2022).

Efforts to bridge the digital divide among the Orang Asli have gained momentum through various government and non-governmental initiatives aimed at improving digital connectivity. Projects such as Broadband Wireless Access (BWA) have been introduced to enhance Internet access in rural areas, including Orang Asli settlements. The success of these initiatives is crucial for enabling Orang Asli communities to fully participate in Malaysia's evolving digital economy and for promoting their broader socio-economic development.

The Malaysian Government has launched the Satellite Connectivity aimed at addressing the critical internet connectivity needs of underserved and vulnerable communities in rural and remote areas. This initiative serves as a temporary yet crucial solution for overcoming connectivity challenges in regions characterized by difficult geographical conditions. Given the complexities involved, including varying population densities and challenging terrains, establishing permanent infrastructure for public cellular services and mobile broadband in these remote areas will require a considerable amount of time and resources (Bernama, 2024).

Under this initiative, a total of 839 locations have been designated across the country, covering remote regions in Johor, Kelantan, Negeri Sembilan, Pahang, Perak, Selangor, Sabah, and Sarawak. This network includes Orang Asli settlements in Peninsular Malaysia as well as isolated Orang Asli communities in Sabah and Sarawak. To enhance connectivity, the project involves the installation of public WiFi hotspots at these locations, ensuring that residents have access to high-speed internet. Each hotspot will provide free WiFi with an average speed of 35 Mbps, significantly improving internet access for these communities and supporting the national effort to close the digital divide and promote digital inclusion for all Malaysians. The Orang Asli, due to their geographic isolation, frequently experience lagging access to educational resources, economic opportunities, and technological advancements compared to their urban counterparts. Addressing these disparities is essential to ensure that these

communities can engage meaningfully in the digital age and overcome the barriers posed by their remote locations (Bernama, 2024).

This research focuses on addressing the digital inclusion gap for "at-risk and excluded" groups. Its primary objective is to evaluate the effectiveness of the Satellite Connectivity initiative in empowering these communities by facilitating their access to digital services. By assessing current usage and exploring areas for improvement, the study aims to provide valuable insights that will inform future initiatives, ultimately contributing to a more equitable digital landscape and ensuring that all communities, including the most isolated, benefit from advancements in technology.

Literature Review

Digital readiness in rural and indigenous communities, such as Malaysia's Orang Asli, is often hindered by socioeconomic and infrastructural challenges. There are several factors that contributed to these situations which are limited infrastructure, lower income levels, and reduced access to educational resources contribute to their lag in digital readiness compared to urban areas (Hashim, Idris, Ustadi, Merican, & Fuzi, 2012). Additionally, cultural and language barriers, coupled with a general mistrust of technology, further exacerbate the challenges faced by these communities. Therefore, digital inclusion programs are essential in bridging this digital divide by providing infrastructure and training, thereby enhancing these communities' ability to participate in the digital economy. Improving digital literacy is also crucial, as it empowers individuals with the skills and knowledge necessary to effectively use digital tools, with targeted education and culturally relevant training playing significant roles in this development (Haleem, Javaid, Qadri, & Suman, 2022).

The readiness of these communities to engage with digital services hinges not only on access to technology but also on the perceived usefulness and ease of use of these services. According to the Technology Acceptance Model (TAM), services that meet immediate needs, such as those related to health, education, and financial services, are more likely to be adopted. However, barriers like mistrust of technology and privacy concerns can impede participation. Success in digital service adoption often relies on user-friendly platforms, strong community support systems, and the involvement of local leaders in technology initiatives (Martin, 2022).

On the other hand, satisfaction with internet services in rural and indigenous communities, such as the Orang Asli, is influenced by several key factors such as service quality, including the speed, reliability, and latency of the connection, which is a primary determinant of user satisfaction. Rural users often experience lower satisfaction due to service interruptions and slower speeds resulting from limited infrastructure (Morris, Morris, & Bowen, 2022). Accessibility also plays a crucial role; communities that are physically distant from service providers or lack sufficient infrastructure may have lower satisfaction levels. Internet services that effectively address these accessibility issues are generally viewed more favourably (Alcaide Manthey, 2024). Affordability is another significant factor, as high costs for devices and data plans can deter usage and diminish satisfaction, particularly in economically marginalized areas (Hashim et al., 2012).

When it comes to preferences for other service options, rural and indigenous communities may consider alternatives like satellite internet, mobile data services, or fibre-optic connections. The preference typically depends on a balance between service quality and cost. Studies have shown that communities often favour services that provide consistent connectivity and are less

susceptible to weather-related disruptions, such as satellite internet, despite its higher cost (Büchler, ter Hoeven, & van Zoonen, 2020). The adoption of alternative technologies is also influenced by the community's level of digital literacy and prior experience with technology. Communities with higher digital literacy are more likely to explore and adopt new technologies (Weck & Afanassieva, 2023).

Research Objectives

This research aims to investigate the effects of Internet services on the social and behavioural transformations, economic progress, and general well-being of vulnerable communities, with a particular focus on the Orang Asli in Malaysia. The study will evaluate how satisfied the Orang Asli are with Internet services, their perceptions and experiences, and their preferences for alternative or additional service options. It will also examine their readiness and level of digital literacy to engage with various digital services and applications.

Additionally, the research will assess the impact of internet services on social and economic outcomes, including the enhancement of community welfare. Furthermore, the study will explore the expectations and interests of the Orang Asli regarding future broadband technologies, providing insights to the Commission for developing effective strategies to advance digital inclusion and improve broadband access in rural and indigenous areas across Malaysia.

- RO1: To investigate *Orang Asli* / Rural Communities' readiness to participate in various digital services and applications, including their maturity level in digital literacy,
- RO2: To measure *Orang Asli* / Rural Communities' satisfaction with internet services coverage and their preference towards other possible service options.
- RO3: To assess the impact of Internet service on communities' social and behavioural changes, economic uplifting, and well-being

Conceptual/Theoretical Framework

Digital inclusion is crucial for advancing the socio-economic development of the Orang Asli by enhancing their internet connectivity. Improved internet access creates opportunities for education, healthcare, and economic activities that were previously out of reach due to geographic isolation and limited infrastructure. With better connectivity, the Orang Asli can access online educational tools, engage in remote learning, and acquire new skills that enhance their job prospects. Additionally, increased internet access facilitates the use of telehealth services, which is particularly beneficial in remote areas where medical services are limited. This connectivity also allows the Orang Asli to participate in e-commerce, access government services, and become more involved in the economy, contributing to their overall socio-economic progress (Hashim et al., 2012)

In addition, better internet connectivity promotes social inclusion by linking the Orang Asli to broader networks within and beyond their communities. It enables them to preserve and share their cultural heritage through digital platforms while also gaining exposure to new opportunities and ideas. By empowering them to communicate and collaborate online, digital inclusion helps the Orang Asli advocate for their rights, participate in decision-making, and strengthen community bonds. This increased connectivity not only improves their quality of life but also supports their integration into the national and global economy, fostering sustainable socio-economic development for their communities.

Technology Acceptance Model (TAM), developed by Davis (1989), to assess the readiness of rural and indigenous communities, such as the Orang Asli, to adopt digital services. TAM focuses on two main factors: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). PU refers to the extent to which technology is believed to enhance daily life, including improvements in healthcare, education, and access to government services. For the Orang Asli, services that are culturally relevant and incorporate local languages are more likely to be viewed as useful and accepted (Martin, 2022).

PEOU addresses how easy technology is to use, which is crucial given the Orang Asli's current levels of digital literacy. If technology is perceived as challenging to use, it may discourage adoption, regardless of its benefits. Therefore, the design and usability of digital platforms are critical. User-friendly and intuitive platforms can enhance perceived ease of use, making technology more accessible. Initiatives like the BWA Project, which aim to improve digital literacy, can positively impact how technology is perceived, thus increasing its adoption.

The attitude towards technology in rural communities is influenced by both PU and PEOU. Positive experiences with useful and easy-to-use technology can foster favorable attitudes, leading to higher adoption rates. However, building trust is essential, especially if there is skepticism or past negative experiences with technology. Effective communication and community engagement are crucial to overcoming these barriers. According to TAM, behavioral intention strongly predicts actual technology use. Although there may be a strong intent to use digital services, practical challenges such as limited infrastructure and device access must be addressed. Better internet coverage can enhance readiness by improving infrastructure, offering training, and ensuring that digital services are accessible and relevant to the Orang Asli.

Expectancy Theory, proposed by Victor Vroom in 1964, offers a framework for understanding the motivation behind individuals' actions, particularly within organizations. It highlights three key components: Expectancy, Instrumentality, and Valence. When applied to the satisfaction of rural and indigenous communities like the Orang Asli with digital services, the theory explains how their expectations and perceived outcomes influence their satisfaction and engagement. Expectancy refers to the belief that putting in effort, such as learning to use digital tools, will lead to successful performance. For the Orang Asli, this means that access to digital literacy training and reliable infrastructure increases their confidence that their efforts will result in effective use of digital services, thereby enhancing satisfaction (Ramli & Jusoh, 2015).

Instrumentality, the second component, is the belief that successful performance will yield desirable outcomes. For the Orang Asli, this pertains to their perception that using digital tools will lead to tangible benefits, such as better access to healthcare, education, or economic opportunities. If the digital services provided align with their needs and are reliable, their belief in achieving positive outcomes through these services is strengthened, leading to higher satisfaction. However, if the services are frequently disrupted or difficult to use, this belief—and consequently their satisfaction—may diminish.

Valence, the final component, relates to the value the Orang Asli places on the outcomes of using digital services. When the benefits of these services align with their cultural values, social needs, and aspirations—such as improving community well-being or preserving cultural practices—the perceived value is high, increasing overall satisfaction. By integrating these

three components, Expectancy Theory demonstrates that when rural communities believe their efforts will lead to valuable outcomes through reliable digital services, their satisfaction with those services is significantly enhanced.

- H1: There is a significant relationship between the readiness to use the Internet and satisfaction with Internet usage among the Orang Asli in Grik, Perak
- H2: There is a significant relationship between satisfaction with Internet coverage and the upliftment of socio-economic development among the Orang Asli in Grik, Perak.
- H3: There is a significant relationship between the readiness to use the Internet and the upliftment of socio-economic development among the Orang Asli in Grik, Perak when Orang Asli satisfied with Internet coverage in the area

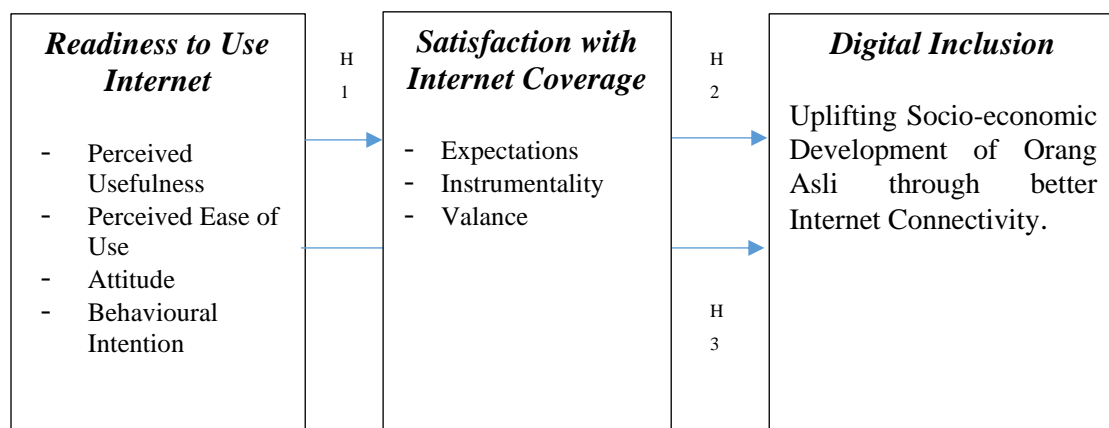


Figure 1: Theoretical Framework

Research Methodology

This research employs a mixed-methods approach, combining both qualitative and quantitative techniques to gain a comprehensive understanding of the topic. The study focuses on the Orang Asli Jahai, one of the 18 Orang Asli groups in Peninsular Malaysia. Traditionally, Orang Asli Jahai were hunter-gatherers residing in the Belum-Temenggor Forest areas in northeastern Perak.

The research specifically targets the Jahai communities in Kampung Kabel, Sungai Raga, and RPS Banun, located in Grik because these communities have access to a reliable internet connection. These communities provide a representative sample for exploring the research objectives. It is estimated there are 250 individuals. This approach allows for a detailed analysis of both numerical data and personal experiences, offering a well-rounded perspective on the digital readiness and engagement of these rural communities, while also considering their rich cultural heritage, including their musical traditions inspired by the surrounding flora and fauna.

Survey

To collect quantitative data on the *Orang Asli* / Rural Communities' satisfaction and readiness to participate in various digital services and applications, including their maturity level in digital literacy. This survey will provide a broader picture of the internet technology acceptance by the community. A questionnaire that includes closed and open questions about the background of the respondents, the level of participation in the new economy, the support

received, and the challenges faced. 250 respondents from Orang Asli communities will involve with an emphasis on demographic age between 18-50 years old. Descriptive and inferential statistics to identify patterns and relationships between variables.

In-depth Interview

To collect qualitative data on the insight of the orang Asli communities on the impact of Internet service on communities' social and behavioural changes, economic uplifting, and well-being. These interviews will help to understand the challenges and opportunities from their point of view as well as assess the level of support and effectiveness of the initiatives that have been implemented. 10 respondents consisting of the orang Asli community members and government officials who work with Orang Asli communities. Thematic analysis will be used to identify key themes and patterns in the data obtained.

Field Observation

To obtain direct information about the current situation of the local community and the economic activities carried out, these observations will provide visual and practical context to data collected through other methods. Locations such as social and economic areas in the communities. Field notes will be analyzed descriptively to complement qualitative and quantitative data

Challenges Identified

The project may face several challenges that impact its effectiveness in improving internet connectivity for the Orang Asli and other rural communities. One major issue is limited infrastructure, which can lead to unreliable internet connections and poor service quality. To combat this, the project needs to identify the communities that have good network coverage, potentially through partnerships with local authorities and private sector entities. Another significant challenge is low digital literacy among the Orang Asli, which affects their ability to use new technologies effectively. Addressing this requires implementing targeted digital literacy training programs that are hands-on and accessible in local languages, thereby boosting the community's confidence and skills in using digital tools. Additionally, cultural and language barriers can hinder the acceptance of digital services if they do not align with local traditions or languages. The project should ensure that services are culturally relevant and incorporate local languages to enhance their usability and acceptance.

Implications and Impact of Research for Regulatory and/ or Policy Action

This study underscores the need for targeted infrastructure investments to enhance connectivity in underserved areas. Policymakers should prioritize the development and expansion of broadband infrastructure to ensure reliable and high-quality internet access, which is essential for supporting educational, healthcare, and economic activities in rural regions. Additionally, the research highlights the importance of integrating digital literacy programs into national policies. Effective training programs tailored to the specific needs and contexts of rural communities can significantly improve digital skills and enable better use of technology. Policymakers should support and fund such initiatives, ensuring they are accessible and culturally relevant to maximize their impact.

Conclusion

According to the research, some of the provisions that need to be in place in order for the communal digital gap experienced by the Orang Asli communities to be breached is having

community readiness and reliable internet access. Increasing the reach of the internet infrastructure improves access to crucial information, educational resources, and public utilities that can enhance social and economic benefits. Nevertheless, the complete picture of real digital inclusion is not only access to the internet, but also the community's readiness to embrace technology including the skill set. This helps to assert that the combination of improving internet connectivity together with equipping the Orang Asli with digital skills enhances their participation in the digital sphere, thereby improving their quality of life and progressive community development.

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