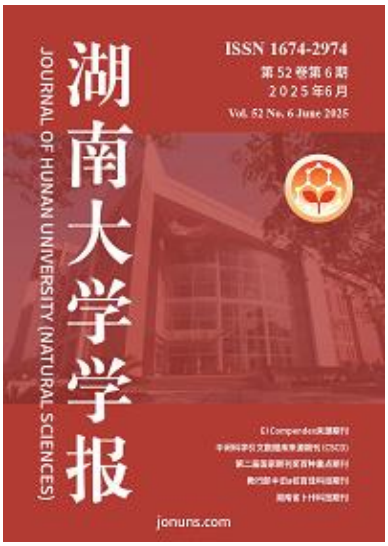

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The Impact of Policy Inconsistency on Digital Broadcasting Transformation in Indonesia's Border Regions

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Abstract: The media landscape in Indonesia closely follows global trends in the broadcasting industry, with digitalization bringing significant changes to the sector and its implementation. This study examines the consistency of broadcasting digital transformation policies amid technological disruption, focusing specifically on border areas of the country. Using a qualitative approach and literature review, the research investigates factors that hinder policy implementation and assesses their impact on border communities in West Kalimantan province. The findings reveal that inconsistent policy implementation regarding digital transformation in broadcasting has resulted in local communities being deprived of balanced and accurate information, making them vulnerable to biased or incomplete news. This information gap significantly affects the social cohesion and development opportunities of border populations. To address these challenges, the study recommends that government authorities enhance coordination and monitoring mechanisms to ensure uniform policy enforcement. Additionally, investment in digital infrastructure and capacity-building programs for local broadcasters and communities is essential to improve access and media literacy. Strengthening these areas will help guarantee equitable information distribution, empower border communities, and support inclusive national development.

Keywords: digital transformation, digital broadcasting, country border areas.

政策不一致对印尼边境地区数字广播转型的影响

摘要：印度尼西亚的媒体格局紧跟全球广播行业的发展趋势，数字化给该行业及其实施带来了重大变革。本研究考察了技术变革背景下广播数字化转型政策的一致性，并特别关注该国的边境地区。研究采用定性方法和文献综述，探讨了阻碍政策实施的因素，并评估了这些因素对西加里曼丹省边境社区的影响。研究结果表明，广播数字化转型政策实施不一致，导致当地社区无法获得均衡准确的信息，使其容易受到带有偏见或不完整新闻的影响。这种信息差距严重影响了边境人口的社会凝聚力和发展机会。为了应对这些挑战，本研究建议政府部门加强协调和监督机制，以确保政策的统一执行。此外，投资于数字基础设施和当地广播公司及社区的能力建设项目，对于提高媒体的可及性和媒体素养至关重要。加强这些领域的建设将有助于保障信息的公平传播，赋能边境社区，并支持包容性的国家发展。

关键词：数字化转型、数字广播、国家边境地区

1. Introduction

1.1. Research Background

Discussions about digital transformation have been widely conducted, particularly in the era of the Fourth Industrial Revolution (Industry 4.0), where transformation is defined as a fundamental change in society, including industries, involving the use of digital technology [1], [2]. Digitalization drives changes in business models, products, processes, organizations, and companies [3], entailing a shift in information coding from analog to digital formats [4]-[6]. The application of digital technology enables the optimization of business processes, facilitates efficient coordination across processes, and enhances value for users [7]. As a digital transformation process, it also reflects how organizations respond to environmental changes caused by technological disruption, yielding positive outcomes when potential implementation barriers are taken into account [8].

In the media industry, digital transformation is characterized by the migration from analog to digital broadcasting. The Analog-to-Digital Migration was a joint agreement among 100 countries in Geneva in 2006 under the International Telecommunication Union (ITU), a specialized agency of the United Nations (UN) responsible for regulating and coordinating the global radio frequency spectrum. The consensus reached in *PRC-06 – NEW DIGITAL TERRESTRIAL BROADCASTING PLAN* became the basis for the future development of digital television and radio broadcasting using the frequency bands 174–230 MHz and 470–862 MHz. This agreement stipulates a plan for the termination of analog broadcasting by June 2017 in Africa, Europe, parts of Asia, the Commonwealth of Independent States, and Iran [9]. The United States and Japan were the first countries to implement digital broadcasting in 2010. Japan became the pioneer in broadcasting high-definition (HD) content through the NHK television station, offering significantly improved image quality. The U.S. Congress viewed this transition as a challenge of the modern era, with television broadcasters advocating for HDTV-based broadcasting as early as 1990. *General Instrument Corporation* (GI), an electronics company in the U.S., announced the world's first digital television system. This technology was designed by an engineer named Woo Paik, born in Korea. Subsequently, Paik became known as the Father of HDTV [10]. This momentum marked the imminent end of the analog broadcasting era.

The perspective of audio-visual media has changed significantly due to technological advancements [11]. Digitalization has transformed the viewing experience, making it increasingly individual rather than collective [12]. Meanwhile, a Deloitte report on the future of television and video in 2030 identifies several parameters affected by digital transformation, including the aging of traditional audiences, content producers, the diversification of players in the television and video industry, transmission frequencies, and public digital literacy [13].

As an ITU member state [14], Indonesia, like other countries, has initiated the transition from analog to digital broadcasting. The implementation of the *Analog Switch-Off* (ASO) in Indonesia was established through Regulation of the Minister of Communication and Information Technology No. 22 of 2011 on the Implementation of Terrestrial Digital Television

Broadcasting, which stipulates that digital broadcasting must be fully implemented by the end of 2017 [15]. This regulation also specifies the selection of multiplexing operators, who are required to complete the migration to digital within one year after the broadcasting institution begins multiplexing services in its coverage area.

A recent study highlights disparities in access to digital infrastructure in border regions [16]. It finds that while central governments often announce digitalization policies, their implementation in border areas is frequently hindered by limited infrastructure, a shortage of local skilled labor, and poor coordination between local and central government agencies. This research reveals that border regions are often marginalized in digital transformation policies, resulting in significant gaps in technology adoption, particularly in the broadcasting sector.

1.2. Problem Statement

The lack of a clear and comprehensive strategy in the industry is one of the main obstacles to the implementation of digital transformation [17]. Digital transformation involves comprehensive digitalization and requires cultural change, with human actors at its core; it is not merely about technology adoption. According to [18], resistance to transformation often stems from actors who are comfortable with the status quo and fear losing influence in the industry. Cross-country studies conducted by Microsoft, including in Indonesia, show that while the majority of business leaders in Indonesia agree on and believe in the need for comprehensive digital transformation, only 27% actually have a large-scale digital transformation strategy. The remaining 51% are still in the planning phase, and the other 22% have no strategic plan related to digital transformation [19].

The government, through Law No. 11 of 2020 concerning Job Creation, revised the deadline for the migration from analog to digital broadcasting, which was further adjusted by Government Regulation No. 46 of 2021 on Posts, Telecommunications, and Broadcasting, requiring the transition from analog terrestrial broadcasting to digital technology to be completed no later than November 2022. However, Indonesia only managed to complete the full analog switch-off in August 2023. The country experienced a seven-year delay in implementing the migration from analog to digital. This digital migration involves 701 national and local television broadcasting institutions in Indonesia that previously broadcast analog signals on the *free-to-air* spectrum, transitioning to free digital TV broadcasting [15], and affects approximately 40 million households accustomed to watching television via analog transmission. The higher the number of viewers relying on the analog platform, the more difficult and time-consuming the transition becomes [9].

The factors contributing to the delay in digital broadcasting migration in Indonesia are: (i) inadequate infrastructure, considering that the construction of digital transmission networks requires significant time and budget; (ii) broadcasting industry readiness, digital equipment is required to produce content according to High Definition (HD) standards; (iii) coordination between the government as regulator and broadcasting institutions, including the refusal of some national private broadcasters to migrate; (iv) public socialization and education to improve digital literacy; and (v) *set-top boxes*, providing decoder devices as additional receivers, since the DVB-T2 format is incompatible with older television sets. This situation is challenging because consumers must make additional investments in receiving equipment; therefore, the switchover strategy must be carefully implemented to avoid viewer loss, as occurred in some countries during the transition from analog TV to DVB-T2 [9].

Based on these factors, the research questions were formulated as follows:

Has the digital transformation policy in broadcasting been implemented consistently?

What is the impact of this policy implementation in border areas, particularly in the province of West Kalimantan?

2. Method

This study employs a descriptive qualitative approach, aiming to provide a description or overview of the phenomenon of digital broadcasting policy consistency in Indonesia, particularly in the country's border areas. Data collection is conducted through literature reviews and an analysis of relevant laws and regulations.

3. Results and Discussion

Policy implementation in practice is often difficult to execute. Edward III's theory of policy implementation describes this as a complex process, not because of flaws in the policy itself, but due to challenges in execution, as many factors involved cannot be fully controlled by policymakers.

Policy implementation involves both political and technical challenges [20]:

- The complexity of the process, as it involves numerous actors and institutions as well as multiple stages, with each actor having different interests, interpretations, and priority scales regarding the same policy. This process is non-linear and therefore prone to irregularities and disruptions from the outset.
- Communication, information, and instructions from policymakers often fail to reach the implementation level consistently or completely, including the risk of distortions that alter meaning, cause delays, or lead to divergent interpretations.
- Limited resources, which are a key factor in policy implementation failure, including budget constraints, insufficient personnel, lack of expertise, and inadequate infrastructure, may prevent implementers

from carrying out their duties effectively. Additionally, implementers' lack of support for or understanding of policy objectives can hinder execution.

- A clear bureaucratic structure, effective coordination mechanisms, and strong supervision are critical; however, bureaucratic complexity often impedes the implementation process.

3.1. Digital Transformation in the Broadcasting Industry

The Government of Indonesia has established criteria for *free-to-air* digital broadcasting using the *Digital Video Broadcasting–Terrestrial Second Generation* (DVB-T2) standard. The migration from analog-based to digital broadcasting brings several benefits, including:

1. Improved image quality due to wider *bandwidth* and support for *High Definition* (HD) resolution. In contrast, analog signals are susceptible to *noise* and interference, which depend on the distance from the transmitting station. The farther the receiver is from the transmitter, the weaker the signal becomes for the broadcast antenna to capture. Digital broadcasting also enables more channels per multiplexing operator, allowing one frequency to transmit six to twelve different TV channels simultaneously, thereby offering consumers greater choice. Additionally, digital technology supports the delivery of video, internet, and content services across multiple platforms, including mobile devices.

2. Efficiency in spectrum use leads to significant frequency savings. Analog television broadcasting occupies the 700 MHz band, using 328 MHz, while digital broadcasting requires only 176 MHz for the same service. This results in a saving of 112 MHz, which can be reallocated to enhance internet network speeds, help bridge the digital divide, and improve connectivity in remote areas. Furthermore, the state retains a 40 MHz frequency reserve to accommodate future technological developments. This efficient spectrum reallocation can benefit the country by up to USD 10.5 billion (approximately 145.3 trillion rupiah), according to [21], through the potential of the digital economy enabled by internet utilization. According to McKinsey, digital technology in Indonesia could contribute up to USD 150 billion by 2025 by increasing labor force participation to 70%, reducing unemployment to a low of 5.5%, and enabling 3% of the population to engage in *online* employment, or adding approximately one million new workers [22]. However, this digital dividend remains largely unrealized for the Indonesian people, as despite sufficient speed and *bandwidth* for content delivery across platforms and increasing internet penetration, the internet's contribution across the Indonesian archipelago remains low [23].

Figure 1 shows that internet penetration and the contribution of internet users remain low across several major islands in Indonesia, due to limited digital literacy and the predominant use of the internet for non-business purposes such as social media, entertainment, and communication [24].

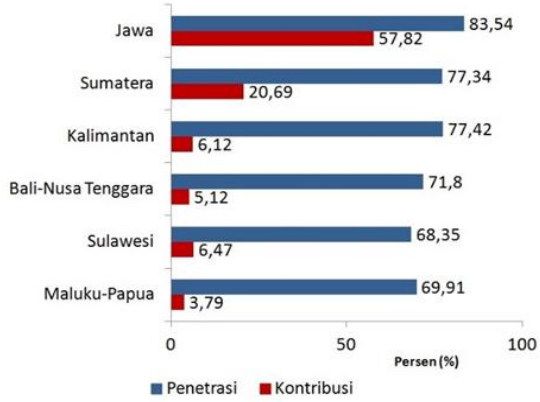

Figure 1. Internet penetration and the contribution of internet users. Source: [23]

3.2. Release

According to [25], mass media serves as: (i) a window of personal experience, enabling individuals to understand events objectively without direct intervention; (ii) an interpreter – an expert who explains the event; (iii) a bearer and introducer of news and opinion; (iv) an interactive network facilitating mutual relationships between the audience and the messenger; (v) a guide, providing direction or instruction; (vi) a filter; (vii) a mirror, reflecting the community's self-image; and (viii) a curtain, concealing the truth due to propaganda. Among mainstream media, television is particularly influential because it conveys events clearly through audio-visual formats, combining sound and images to deliver information [26]. Television content enters the central cognitive system of the human mind and is internalized into systems of values, preferences, perceptions, opinions, ethics, and culture [27]. Events presented on television screens illustrate how the portrayed culture directly impacts society and shapes audience tastes.

Television broadcasting in Indonesia before entering the ASO stage has reached 60%-70% of Indonesian territory in 225 service areas with 754 public broadcasting institutions and private broadcasting institutions [28]. TVRI Public Broadcasting Institution has the widest coverage of up to 75% of Indonesia's territory with a strong signal, with services up to 3T, frontier-outermost and disadvantaged areas. Meanwhile, the most extensive private broadcasting institution is RCTI up to 70% of Indonesia, followed by SCTV 65% of Indonesia, Indosiar 60% of Indonesia, Trans TV reaching more than 55% of Indonesia and Global TV 55% of Indonesia. The transfer of frequencies to digital

is expected to expand the broadcasting reach in areas that have been included in the category *blank spot* due to geographical factors, such as in Eastern Indonesia [29]. After the implementation of ASO according to the Ministry of Communication and Information, 678 television stations have broadcast digitally terrestrial [30] and based on data reported by Nielsen, there was a slight decline in the number of terrestrial viewers.

Table 1. Comparison of the number of viewers before and after Analog Switch Off (Source: [30] (processed))

Region	Before ASO	After ASO	Percentage Decrease
National Total	130 million people	124 million people	4.6%
Greater Jakarta, Bandung, Surabaya and Semarang	59 million people	56 million people	5.1%

Nielsen's audience measurement in 11 major cities in Indonesia, using *peoplemeters* across 12,000 households, shows that 124 million Indonesians have watched digital TV [31]. The cities surveyed include Jakarta, Bandung, Semarang, Yogyakarta, Surakarta, Surabaya, Denpasar, Makassar, Medan, Palembang, and Banjarmasin.

The data produced by Nielsen differ from the number of digital transmission networks built by multiplexing operators and from the reported broadcast coverage percentages.

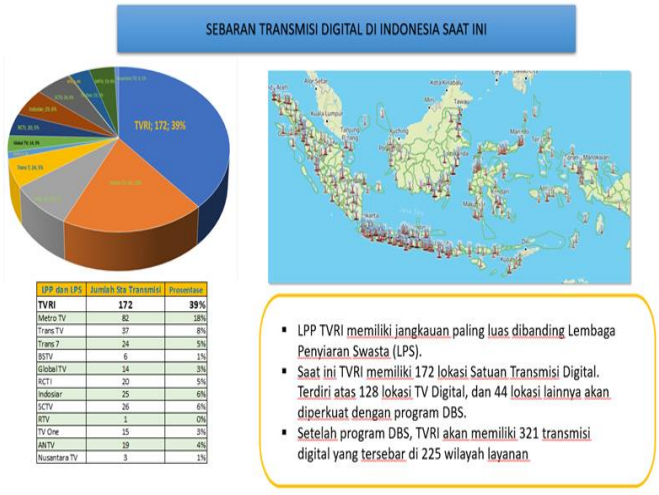

Figure 2. Digital Broadcasting Distribution Chart in Indonesia. Source: [32] (processed)

The reach of digital TV broadcasting remains limited due to insufficient digital transmission infrastructure, particularly in areas outside Greater Jakarta. The multiplexer operators entrusted with establishing digital transmission have not operated at full capacity. Currently, the largest multiplexing provider is the TVRI Public Broadcasting Institution, operating 39% (172 digital transmission stations).

3.3. Boundaries

Border areas include regions under cross-sectoral management, as outlined in Presidential Regulation No. 118 of 2022 on the Master Plan for the Management of State Boundaries and Border Areas for 2020–2024. The objectives are: (i) strengthening state sovereignty; (ii) optimizing state presence to support the fulfillment of citizens' rights in border areas; (iii) reinforcing the strategic position of border regions as gateways for entry and exit to and from the Republic of Indonesia; (iv) positioning borders as national front doors and international linkages; (v) achieving equitable development in border areas; (vi) enhancing synergy among the central government, regional governments, and border management stakeholders; and (vii) implementing affirmative development that considers the specific conditions of border regions. One of the provinces with the longest land borders with neighboring countries is West Kalimantan.

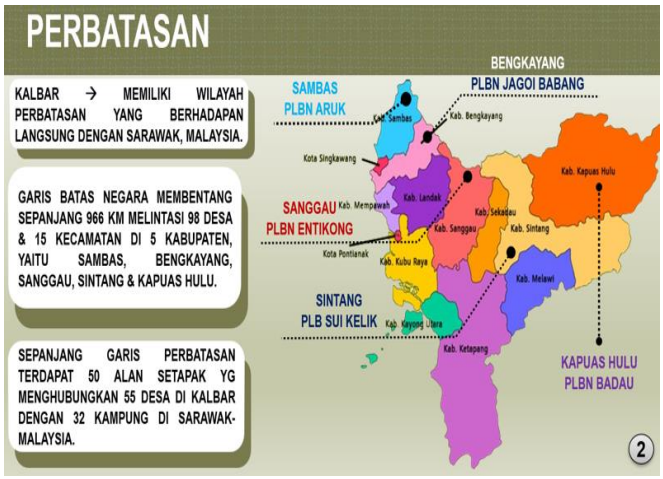

Figure 3. West Kalimantan Boundary Map. Source: [33]

West Kalimantan, the second-largest province in Indonesia, has four official PLBNs (Cross-Border Posts) connecting it with Malaysia: PLBN Entikong in Sanggau Regency, PLBN Aruk in Sambas Regency, PLBN Nanga Badau in Kapuas Hulu Regency, and PLBN Jagoi Babang in Bengkayang Regency (Figure 3). Official data recognize only four border crossings between the two countries, but in practice, hundreds of unofficial routes exist along the border, which are vulnerable to misuse for human trafficking, illegal migration, smuggling of dangerous goods, drugs, firearms, explosives, and staple food items; these activities can impact the economy through inflation. Another challenge facing West Kalimantan is the high prevalence of stunting or malnutrition, which reached 27.8% in 2022, compared to the national average of 24.4%. Poverty, driven by low economic growth in border areas relative to other parts of West Kalimantan Province, remains a persistent and unresolved issue. In addition to domestic challenges, the West Kalimantan border is also exposed to external threats linked to the

power struggle in the South China Sea, involving several countries, including China, Vietnam, and Indonesia. In December 2021, China applied to claim part of the sea as its territorial waters through diplomatic channels. Indonesia opposed the application, citing international agreements and court decisions (Figure 4).

The threat to border areas in West Kalimantan does not stem solely from physical problems but also includes media infiltration. Following the completion of the analog-to-digital terrestrial broadcasting migration in both Indonesia and Malaysia, Malaysian television broadcasts have encroached on Indonesia's sovereign territory.

Figure 4. Map of the conflict in North Natuna. Source: [33]

These broadcasts are accessible via five channels: RTM1, RTM2, RTM3, the private Malaysian TV station TV3, and Astro Awani News TV. Information and communication sources in the border region originate from neighboring countries and are perceived as potential threats to national sovereignty [34]. The overflow of foreign television signals, including news segments, content about migrant workers, and programming targeting ethnically similar groups in border areas, may disrupt cultural integration, political cohesion, nationalism, and centralized social and economic planning [35].

In fact, according to [36], the negative impacts of mass media include: (i) the spread of false information; (ii) bias and agenda setting; (iii) violence and harmful content; (iv) objectification and stereotypes; and (v) commercialization and materialism. These impacts are particularly concerning in border regions, where external media influence may undermine national narratives and social stability

Digital broadcasting in West Kalimantan after ASO is inversely proportional to the situation in Malaysia. While neighboring countries strengthen broadcasting in their border areas, terrestrial digital television services provided by public broadcasters, national private broadcasting institutions, and local television stations in Indonesia remain inaccessible to local communities in border regions. TVRI, the public broadcasting service, operates four transmission units in districts adjacent to neighboring countries: Sambas, Sanggau, Ketapang, and Bengkayang. However, with a transmission power of 5,000 watts and modulation, the signal reaches a maximum distance of 67 km in open areas. In contrast, the distance from the transmission units to the border is significantly greater; for example, the Singkawang transmission unit is 342.3 km from PLBN Entikong. This gap prevents terrestrial broadcasting services from being fully accessible to local communities in border areas.

The media groups of national private broadcasting institutions (MNC Group, Emtek Group, Trans Corp, and VIVA Group) provide free-to-air terrestrial digital broadcasting *only* in the provincial capital, Pontianak. Table 2 shows media groups based on the information of West Kalimantan Regional Indonesian Broadcasting Commission (KPID).

Table 2. Indonesian media groups (compiled by the authors based on [37])

Media Group		Frequency	Channel: UHF
MNC	RCTI	538	29
	GTV	634	41
	iNEWS	634	41
	MNCTV	634	41
EMTEK	SCTV	682	47
	Indosiar	682	47
HURRAH	TV One	634	41
	ANTV	634	41
CT CORP	Trans TV	634	41
	Trans7	634	41
	CNN Indonesia	634	41
	CNBC Indonesia	634	41
NET TV	NET TV	538	29
KOMPAS TV	KOMPAS TV	682	47

The gap in broadcasting infrastructure that looks sharp between urban areas and remote areas such as borders occurs because investment in areas like this requires high costs and is not attractive to the private sector [34].

3.4. Regulation

The Government of Indonesia has established regulations regarding the Analog Switch-Off (ASO) and the complete cessation of analog broadcasting through a series of laws and regulations. In addition, the government has enacted rules prohibiting cross-ownership in the media sector to ensure fairer distribution of *free-to-air terrestrial broadcasting* services. These regulations are stipulated in several legal instruments:

(a) Law No. 40 of 1999 concerning the Press;

(b) Law No. 32 of 2002 on Broadcasting, Article 18 Paragraphs (1) and (2);

(c) Government Regulation No. 50 of 2005 on the Implementation of Broadcasting by Private Broadcasting Institutions, Article 31, which limits share ownership in private television, radio, and print institutions;

(d) Government Regulation No. 46 of 2021 on Posts, Telecommunications, and Broadcasting, Article 4, which explicitly prohibits media ownership centralization and cross-ownership.

This ban on cross-ownership aims to prevent media monopolies by individuals or corporations, which could compromise journalistic independence and reduce content quality. Furthermore, cross-ownership may create conflicts of interest between media owners and the public interest. Such practices can undermine the public's right to balanced, objective, and unbiased information.

To support the adoption of terrestrial digital broadcasting services among low-income households requiring additional decoder equipment, Government Regulation No. 46 of 2021, Article 85, mandates government assistance in the provision of *set-top boxes*, funded through the State Budget and contributions from private multiplexing operators. Data on low-income households eligible for *set-top box* aid, sourced from the Ministry of Social Affairs, indicate that 6,737,971 poor households were affected in the ASO service area. By early 2022, the government had prepared 1 million set-top boxes, and multiplexing operators had committed to providing 4,177,760 STB units [38]. However, by the analog broadcasting switch-off deadline, private broadcasting institutions had distributed only 5.4% of the STBs stipulated in their commitment.

4. Conclusion

The implementation of the Analog Switch-Off (ASO) in Indonesia, after a seven-year delay, has finally been completed comprehensively, marking the transition from free-to-air terrestrial analog broadcasting to digital technology. While ASO has delivered significant benefits in other countries, such as improved broadcast quality and the generation of digital dividends, the situation in Indonesia, particularly in border areas, remains incomplete. This is due to digital inequality and low digital literacy, which have prevented the digital transformation from yielding substantial economic benefits. In these areas, internet technology use is still largely limited to entertainment rather than business or productive purposes.

Border regions face challenges regarding the public's right to access information and digital broadcasting services, largely due to inconsistent government policies on media cross-ownership—policies that, although legally established, have not been fully enforced. The absence of a comprehensive strategy for distributing set-top boxes to low-income households in these regions has further exacerbated the issue, leaving many without access to essential information. These communities are vulnerable to foreign broadcasts that may undermine national identity and sovereignty.

To address these issues, the government, through the Ministry of Communication and Information Technology, must reevaluate the planning and placement of digital transmission units in the upcoming Digital Broadcasting System project, ensuring that these units prioritize areas based on national needs and potential security threats. Furthermore, improving coordination between government agencies and broadcasting organizations, as well as accelerating infrastructure development and digital literacy programs, is essential to ensure that border communities can fully benefit from digital broadcasting and the broader digital transformation.

Declarations

Author Contributions

Conceptualization, D.I.; methodology, D.I. and E.P.; software, R.F.; validation, D.I.; formal analysis, R.F.; investigation, D.I. and E.P.; resources, D.I.; data curation, D.I.; writing—original draft preparation, all authors contributed equally.; writing—review and editing, D.I.; visualization, R.F.; supervision, D.I.; project administration, E.P. All authors have read and agreed to the published version of the manuscript.

Data Availability Statement

The data presented in this study are available on request from the corresponding author.

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Conflicts of Interest

The authors declare no conflicts of interest.

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