The 7th Open Society Conference (OSC) 2025
Faculty of Law, Social and Political Science
Universitas Terbuka
DOI: 10.33830/osc.v3i1.7062 / ISSN: 3032-2227

Inclusive Digital Technology for People with Communication Disabilities in Indonesia

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Abstract

The global digital transformation offers significant opportunities to enhance the quality of life for persons with disabilities, especially those with communication impairments. Access to digital technology should not be viewed merely as a technical matter but as a fundamental human right. In Indonesia, several legal frameworks, including Law No. 8 of 2016 on Persons with Disabilities and Government Regulations No. 13/2020 and No. 70/2019, emphasize reasonable accommodation, accessibility, and the national disability roadmap. Collaborative efforts from government, private sector, and civil society—such as inclusive digital literacy programs, development of adaptive applications, and community-driven innovations—reflect promising progress. Nevertheless, substantial challenges remain, including unequal access to internet and devices, low levels of digital literacy among marginalized groups, and limited implementation of international accessibility standards such as WCAG. Addressing these gaps requires stronger policy enforcement, cross-sector partnerships, and inclusive design approaches. This paper explores policies, practices, challenges, and opportunities for advancing inclusive digital technologies in Indonesia, with particular attention to communication disabilities.

Keywords: *Accessibility, Adaptive Technology, Communication Disabilities, Digital Inclusion*

INTRODUCTION

The development of digital technology in the last two decades has brought about major changes in human life. The presence of the internet, mobile devices, and communication applications has enabled social interaction, education, work, and even public services to take place more quickly, efficiently, and without the constraints of space or time [1]. However, not all groups in society have benefited equally from this progress. One group that still faces serious challenges is people with disabilities, especially those with communication barriers. These barriers include speech, language, hearing, or certain neurological conditions that reduce a person's ability to convey or receive information. For this group, the existence of inclusive digital technology is not just an additional facility, but a basic need so that they can participate in educational, work, and social activities on an equal footing with the general public. Although Indonesia has various regulations related to fulfilling the rights of persons with disabilities, the reality on the ground shows that digital inclusion has not been fully realized. Surveys conducted by various independent institutions show that most government websites are still not friendly to persons with disabilities. Public service applications also do not meet international accessibility standards, such as the Web Content Accessibility Guidelines (WCAG) [2]. In addition, the use of digital-based communication aids that can support people with communication disabilities is still limited, and

DOI: 10.33830/osc.v3i1.7062 / ISSN: 3032-2227

their prices are relatively high, making them difficult for the wider community to access. This condition shows that there is a real digital divide between the general public and people with communication disabilities. This issue is the starting point for this study, namely how to implement inclusive digital technology for people with communication disabilities in Indonesia, the extent to which existing regulations support its fulfillment, how it is actually implemented in the field, and what challenges and opportunities can be identified to realize truly equal digital access.

Globally, the issue of digital inclusion for persons with disabilities has become an important agenda. The United Nations, through the Convention on the Rights of Persons with Disabilities (CRPD), emphasizes that member states are obliged to guarantee equal access to information and communication technology for all persons with disabilities [3]. Developed countries, such as Japan and Australia, have even developed artificial intelligence-based communication devices, sign language translation applications, and automatic captioning systems in various online services. Indonesia actually already has a fairly clear policy direction. Law Number 8 of 2016 concerning Persons with Disabilities, for example, is an important legal basis for promoting inclusion. However, the implementation of these policies is still partial and does not yet fully address digital aspects, especially in relation to people with communication disabilities. Therefore, this study attempts to present a systematic analysis to identify gaps, strengthen regulations, and encourage the emergence of local technological innovations that suit the needs of users. This study aims to examine Indonesian government policies and regulations related to digital inclusion, analyze their implementation across public and private sectors, and identify key challenges and opportunities to foster inclusive digital ecosystems for people with communication disabilities. In other words, this study is not only based on evaluation, but also presents a framework of solutions that can be adopted for the future.

Theoretically, this study is grounded in the Policy Implementation Theory proposed by George C. Edwards III, which states that the success of policy implementation is determined by four main factors, namely communication, resources, implementer disposition, and bureaucratic structure. This theory is used as an analytical framework to analyze the extent to which Indonesia's digital inclusion policy has been effectively implemented for people with communication disabilities. Through this theory, this study aims to identify the obstacles and opportunities that arise in the policy implementation process, both in terms of inter-agency coordination, resource availability, and the attitudes of implementers at the bureaucratic and community levels.

In addition to this theory, this study also uses three supporting concepts to strengthen the analytical framework, namely (1) social and digital inclusion, (2) technological accessibility, and (3) the digital divide. The concept of social and digital inclusion explains the importance of equal participation for all individuals in the digital space without discrimination [4]. Technology accessibility emphasizes that every digital product must be designed based on the principle of *design for all*, so that it can be accessed by all users, including those with sensory, motor, or cognitive limitations, in accordance with international WCAG standards [5]. Meanwhile, the digital divide describes inequality in access to and use of technology caused by economic, educational, geographical, or physical differences, which often place people with disabilities as the group most vulnerable to digital exclusion [6]. This study also places Augmentative and Alternative Communication (AAC) as an applied approach that represents the application of

DOI: 10.33830/osc.v3i1.7062 / ISSN: 3032-2227

technology accessibility principles in the context of communication disorders. AAC includes the use of digital devices and applications, such as text-to-speech, electronic communication boards, and eye tracking, which are designed to help people with communication disorders interact effectively [7]. In this study, the concept of AAC is viewed as an example of *best practice* in the application of inclusive digital technology in Indonesia, while also demonstrating the direct link between policy, technological innovation, and social empowerment.

Thus, this study not only reviews existing policies and practices, but also uses these three main concepts to map the challenges and opportunities in implementing digital inclusion policies in Indonesia. This theoretical approach forms the basis for analysis conducted through a *literature review* using a SWOT analysis framework, in order to produce a strategic overview of the position and direction of inclusive digital technology development for people with communication disabilities in Indonesia. Based on this explanation, this study is expected to provide both theoretical and practical benefits. From a theoretical perspective, the research can enrich the literature on digital inclusion in Indonesia, especially regarding communication-impaired individuals, who have rarely been addressed in local research. From a practical perspective, the research results can be used as a reference for the government in formulating policies, for application developers in designing inclusive digital products, and for educational institutions and disabled communities in advocating for the needs of communication-impaired individuals. Furthermore, this research is expected to encourage the creation of a truly equitable digital ecosystem in Indonesia, where people with communication disabilities are no longer marginalized, but rather an active part of the national digital transformation.

METHOD

This study uses a qualitative approach based on secondary data that focuses on policy analysis. This approach was chosen based on the research objective, which is to gain a comprehensive understanding of the policies, practices, and challenges of implementing inclusive digital technology for people with communication disabilities in Indonesia. This method allows researchers to systematically review and synthesize various research results and relevant policy documents without conducting direct field data collection. The data obtained will greatly influence the final results of the study. Therefore, in this study, in order to maintain the validity of the data, data collection was carried out through literature searches from various academic and policy sources. The databases used included Google Scholar, Scopus, and the Directory of Open Access Journals (DOAJ) for international publications, as well as the Garuda Portal and Neliti for national publications. The criteria for the literature included were: (1) published between 2015 and 2025, (2) discussing issues related to social inclusion, technology accessibility, the digital divide, and communication disability policies, and (3) having conceptual or empirical relevance to the Indonesian context.

The analysis was conducted through content analysis to identify the main themes of each literature source. In analyzing the implementation, the author uses George C. Edwards III's implementation analysis tool, which explains that the success of a policy's implementation is influenced by four main factors: communication, resources, implementer disposition, and bureaucratic structure. This theory is used to examine the extent to which Indonesia's digital inclusion policy has been effectively implemented for people with communication disabilities.

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After understanding how policies for people with disabilities are implemented in Indonesia, the author will attempt to formulate several development strategies through the application of SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis as a synthesis framework. The SWOT approach is used to map the various findings obtained from the literature study, then analyze them by describing and providing an in-depth understanding of each aspect that arises. Data and information from the literature are then grouped into four SWOT dimensions, namely strengths, weaknesses, opportunities, and threats. The results of this identification are entered into a SWOT matrix for further analysis, assessment, and use as a basis for formulating policy strategies in accordance with the most dominant quadrant position.

This series of analyses is based on three main concepts described in the introduction, namely (1) social and digital inclusion, (2) technology accessibility, and (3) the digital divide, which are used to classify the literature results into the four SWOT dimensions. Through this framework, the study can describe the strategic position of digital inclusion policies in Indonesia, while identifying areas for improvement and potential for future development.

RESULTS AND DISCUSSION

Based on Edward III's model, the success of policy implementation is largely determined by four key interrelated variables. First, communication must be ensured, including clarity of policy messages, consistency of information, and widespread dissemination to all parties. Second, adequate resources are essential, including the availability of competent personnel, financial support, supporting facilities, and accurate information. Third, the attitude or disposition of policy implementers is decisive, as reflected in their commitment and willingness to implement policies in accordance with their objectives. Finally, the bureaucratic structure must be supportive, with a focus on clear standard operating procedures (SOPs) and effective organizational coordination.

In addition, the results of this study were also analyzed using SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis to identify internal strengths and weaknesses, as well as external opportunities and threats that affect policy effectiveness. The discussion is divided into several subsections according to the actors and context of policy implementation, namely (1) national policy, (2) implementation by the government, (3) the role of the private sector, (4) community innovation, and (5) lessons from international practices. Each subsection is analyzed based on Edwards III's theoretical factors and linked to the results of the SWOT analysis.

National Policy

National policy concerning the fulfilment of the rights persons with disabilities in Indonesia are regulated through Law Number 8 of 2016 on Persons with Disabilities and Government Regulation Number 13 of 2020 concerning Appropriate Accommodations for Students with Disabilities. These regulations emphasize the state's obligation to guarantee equal access to information technology.

However, most Indonesian government websites still do not comply with the *Web Content Accessibility* Guidelines *(WCAG)* standards due to a lack of consistent understanding among public institutions regarding digital accessibility principles. The guidelines developed by *Open Government Indonesia (OGI)* have also not been fully adopted, resulting in implementation gaps at the executive level [2].

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According to Edwards III (1980), unclear policy communication will cause policies to fail to be effectively translated in the field. The situation in Indonesia shows that despite a strong legal framework, the dissemination and communication of digital inclusion policy messages are still limited, resulting in different perceptions of accessibility standards among implementers at the regional level.

Government Implementation

In practice, the government has initiated a number of digital inclusion programs. The inclusive digital literacy program carried out through the National Digital Literacy Movement (Siberkreasi) is one concrete step. Activities such as training, seminars, and workshops involving the disability community have begun to expand, including collaboration with universities such as UGM, which in 2023 organized digital skills training for students with disabilities [8].

In addition, there is an information and communication technology (ICT) competition for people with disabilities, which is participated in by thousands of participants from various regions. This competition is not only a forum for innovation, but also a means of improving digital skills and community networking.

However, the implementation of disability-friendly public applications is still limited. Several government websites have added accessibility features, such as alternative text for images or high contrast options, but the majority do not yet comply with the international Web Content Accessibility Guidelines (WCAG) standards [9]. This condition indicates that although there has been progress, the steps taken are still partial and not yet evenly distributed across all agencies.

The World Bank (2023) findings show that many inclusive schools and special needs schools in Indonesia still lack assistive technology devices and educators who understand how to use them. The digital infrastructure gap between urban and rural areas also widens the access gap for people with disabilities.

From Edwards III's perspective, resource constraints are a major obstacle to policy implementation. Although institutional support and budgets for digital transformation are available, the allocation of resources specifically for communication assistive technology remains minimal. As a result, policy implementation is general in nature and fails to reach groups with specific needs, such as those with communication disabilities.

The Role of the Private Sector

The private sector has also begun to get involved in supporting digital accessibility. Telkom Indonesia, for example, organizes digital skills training in various cities and distributes the i-Chat application for students with special needs or Sekolah Luar Biasa (SLB). This application facilitates text and voice-based communication for those with speech impairments [10].

In addition, a number of social startups have developed artificial intelligence (AI)-based applications that support text-to-speech and speech-to-text conversion in Indonesian. This innovation is very important because it supports the communication independence of people with disabilities with a local language that is more appropriate to the Indonesian cultural context. However, most of these products are still limited in scale, so access is not yet evenly distributed [11].

Private sector participation remains sporadic and uncoordinated with the government. There

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are no institutional mechanisms or formal partnerships linking technology developers with national inclusion policies.In Edwards III's theory, fragmented bureaucratic structures become obstacles to policy implementation. Prihatin and Sutangsa (2025) highlight the weak cross-sector coordination that prevents digital-based inclusive education policies from having uniform implementation standards. As a result, innovations emerging from the private sector cannot yet be optimally utilized in government programs.

Community Innovation

In addition to the government and private sector, community groups and organizations for persons with disabilities play an important role in promoting digital inclusion. Communities such as Kopi Berbagi in Bandung have developed Smart Glasses to assist deaf people in communicating by displaying other people's speech in real time, while other groups such as the Indonesian Digital Disability Movement (GDDI) actively provide digital literacy training for persons with disabilities [12]

According to Edwards III's theory, the attitudes and commitment of policy implementers have a significant impact on the effectiveness of implementation. In this context, implementers at the community level demonstrate high enthusiasm and motivation despite limited resources. However, as noted by Martiningsih (2023), these community initiatives have not received adequate structural support and funding, so their sustainability is highly dependent on volunteers.

This condition shows that the disposition of implementers at the community level is a social force that needs to be facilitated by the government. By strengthening the network between communities, the government, and the private sector, policy implementation collaboration can run more effectively and sustainably.

International Benchmarks

Compared to other countries, Indonesia still lags behind in implementing accessibility standards. Australia, through the Disability Discrimination Act, requires all government websites to comply with WCAG standards [13]. Japan has implemented real-time AI-based captioning applications in public transportation, making it easier for hearing-impaired people to communicate [14]. The United States, through the Americans with Disabilities Act (ADA), even requires the public and private sectors to ensure disability-friendly digital services, with legal consequences for violations [15].

These countries demonstrate that the four factors in Edwards III's theory, namely effective policy communication, adequate resources, positive dispositions among implementers, and a collaborative bureaucratic structure, can work synergistically.

Meanwhile, Indonesia does not yet have regulations that require detailed technical standards, let alone clear sanction mechanisms. This makes digital inclusion efforts voluntary and inconsistent. Communication barriers and bureaucratic structures remain major problems, while potential community and private sector initiatives have not been fully integrated into national policy.

Strategy Formulation

In this journal, researchers formulate strategies using SWOT analysis. According to

DOI: 10.33830/osc.v3i1.7062 / ISSN: 3032-2227

Purwanto in Rusmawati (2017:919), when conducting SWOT analysis, it is necessary to consider external and internal factors as the main components, namely:

a. External Factors

External factors play a role in the formation of opportunities and threats. These factors are related to conditions outside the organization that influence the decision-making process.

b. Internal Factors

Internal factors influence the formation of strengths and weaknesses. These factors are related to conditions within the company that influence decision-making.

Researchers will maximize strengths and opportunities and minimize weaknesses and threats. Rangkuti (2014:83) explains that the tool used to compile a company's strategic factors is the SWOT matrix, which can produce four sets of possible strategic alternatives, namely:

- **SO Strategy** This strategy is formed by optimizing all existing strengths when seizing or utilizing existing opportunities.
- **ST Strategy** This strategy is executed by using all existing strengths to minimize incoming threats.
- **WO Strategy** This strategy refers to the use and exploitation of existing opportunities while reducing existing weaknesses.
- **WT Strategy** This strategy refers to implementation that is protective or defensive and seeks to reduce existing weaknesses while simultaneously avoiding existing threats

The following are some of the external and internal factors, as well as their combinantions, found by the author in the implementation of the communication based disability policy:

Table 1. IFAS–EFAS Matrix: Internal and External Factor Analysis Summary for Digital Accessibility Development

IFAS (Internal Factory Analysis Summary) / **EFAS** (External Factory Analysis Summary)	**Strengths (S)**	**Weaknesses (W)**
	• Clear legal basis, adequate legal foundation/grounds. • Private sector support. • Community Innovation arising from the disability community itself. • Increased Public/social Awareness	• Weak implementation of regulations and policies. • Limitations in infrastructure and adaptive technology. • Digital divide (internet access gap) and the high cost of adaptive devices. • Lack of Experts/limited number of experts in related fields. • Continuing social stigma, namely strong social prejudice and
Oppurtunities (O) • Development of AI/Machine Learning,	**Strengths-Opportunities (SO Strategy)**	**Strategi WO (Weaknesses-Opportunities - WO Strategy)**

DOI: 10.33830/osc.v3i1.7062 / ISSN: 3032-2227

namely advanced technology for communication personalization (e.g., speech-to-text with local accents). (External & Positive) • Multisectoral Collaboration, namely the opportunity to build a digital inclusion ecosystem through cooperation between government, private sector, academia, and the community. • Availability of international support for the rights of persons with disabilities. • Existence of investment opportunities in inclusive technology. • Increasing social movements and advocacy that can push for more progressive regulation.	• Mandatory Government Regulation must clearly adopt global WCAG standards, leveraging Global Support (O3/O4). • 'Disability IncubaTech': Utilize Community Innovation (S3) and Private Sector Support (S2) to be funded under AI/ML Development (O1)	• Adaptive Local Innovation Subsidy' Program: Utilize AI/ML Development (O1) to overcome Infrastructure/Costly Equipment Limitations (W2). • Multisectoral Accessibility Audit Task Force: Leverage Multisectoral Collaboration (O2) to address Weak Policy Implementation (W1).
Threats (T) • Digital divide or access gap between urban and rural areas, with the potential for further marginalization. • Risk of marginalization: When digital access is uneven, it will exacerbate inequality. • Dependence on Foreign Products, such as adaptive technology and products from abroad. • Weak Law Enforcement, the lack of firm sanctions for public institutions that do not implement digital accessibility.	**Strengths-Threats (ST Strategy** • Massive Anti-Stigma Campaign by leveraging Increased Public Awareness (S4) to combat Social Stigma (W4) and promote digital access as a human right, thereby reducing the Risk of Marginalization (T2). • Local Patenting and Standardization: Utilize strong Community Innovation (S3) to reduce Dependence on Foreign Products (T3) and prioritize local solutions.	**Strategi WT (Weaknesses-Threats - WT Strategy)** • Prioritized Infrastructure Focus by allocating limited budget to address the Digital Divide (T1) in the most vulnerable areas, starting with basic Infrastructure (W2) that is accessible to the disabled population (e.g., digital community centers). • Strengthening Implementation Sanctions by addressing Weak Policy Implementation (W1) with clear sanctions (tackling Weak Law Enforcement - T4) to prevent Further Marginalization (T2).

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Based on the impact and urgency level analyzed by the researcher, the researcher will assign a weight to each factor, as follows:

Table 2. Evaluation of Internal Strategic Factors with Assigned Weights, Ratings, and Scores

Internal Factors	Weight	Rating	Score	Brief Description
Strengths				
S1: Sufficiently Clear Legal Foundation	0,15	3	0,45	Strong legal basis, and its implementation
S2: Private Sector Support	0,10	3	0,30	Support exists, but is sporadic
S3: Disability Communication Innovation	0,10	4	0,40	A highly relevant source of ideas and solutions
S4: Increased Public Awareness	0,05	3	0,15	The importance of social acceptance.
Weaknesses				
W1: Weak policy implementation	0,20	1	0,20	The main problem/issue hindering implementation
W2: Limitations in infrastructure and adaptive technology	0,25	1	0,25	Fundamental issues and high costs
W3: Shortage of experts	0,05	2	0,10	Hinders development and maintenance
W4: Strong social stigma	0,10	2	0,20	Hinders acceptance
Total	**1,00**		**2,05**	

Internal Factor Evaluation (IFE) Total Score: (2.5)
Interpretation: The total score is slightly above average. This indicates that the internal factors (Strengths vs. Weaknesses) tend to be balanced, but Weaknesses still have a more dominant combined weight (0.60) compared to Strengths (0.40)

Table 3. Evaluation of External Strategic Factors with Assigned Weights, Ratings, and Scores

Eksternal Factors	Weight	Rating	Score	Brief Description
Opportunities				
O1: AI Development	0,25	4	1,00	The biggest technology opportunity for personalization
O2: Multisectoral	0,20	3	0,60	Key to a sustainable

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Collaboration				ecosystem
O3: Global Support	0,05	3	0,15	Provides legitimacy and standard references
O4: Investment and Advocacy Potential	0,10	2	0,30	Funding drive and regulatory support
		Threats		
T1: Digitalization Gap	0,25	4	1,00	**The biggest threat supporting marginalization**
T2: Risk of Further Marginalization	0,05	2	0,10	**Involves the risk of cost and**
T3: Dependence on Foreign Products	0,00	2	0,10	Involves the risk of cost and availability
T4: Entrenched social stigma	0,10	4	0,00	Already covered in W1
Total	**1,00**		**3,55**	

External Factor Evaluation (EFE) Total Score: (3.55)

Notes: T4 (Law Enforcement) is given a weight of (0.0) because this factor is internal (a problem with the implementation and commitment of government organizations) and is already represented by W1. The total score is far above the average (2.5), indicating that the external environment offers very large Opportunities (combined weight 0.60) even though threats are also significant. It can therefore be concluded that the strategic position of digital inclusion in Indonesia is in the **Hold and Maintain** strategy quadrant, but is very close to the **Grow and Build** quadrant due to the very high EFE score.

CONCLUSION

Conclusion

This study concludes that the implementation of inclusive digital technology for persons with communication disabilities in Indonesia is supported by a solid legal foundation, particularly Law No. 8 of 2016 and its derivative regulations. However, based on Edwards III's Policy Implementation Theory, the four determinants of successful implementation—communication, resources, implementer disposition, and bureaucratic structure—have not functioned optimally, creating a gap between policy design and field execution.

The SWOT analysis positions Indonesia's digital inclusion policy in the **"Hold and Maintain" quadrant**, indicating the need to preserve current strengths and opportunities while addressing major weaknesses, particularly in adaptive infrastructure and policy enforcement. Cross-sector collaboration and the advancement of AI-based technologies present promising opportunities for accelerating inclusive digital transformation. Thus, building a truly inclusive digital ecosystem requires consistent policy communication, enhanced human resource capacity, and sustained collaboration among government bodies, the private sector, and disability communities.

DOI: 10.33830/osc.v3i1.7062 / ISSN: 3032-2227

Recommendations

- The **government** should establish and enforce technical regulations that explicitly adopt **WCAG standards**, accompanied by clear sanctions for non-compliance.
- **Local innovation in assistive technology** should be strengthened through research funding, fiscal incentives, and social-tech incubation programs.
- **Digital literacy and training programs** for persons with communication disabilities, educators, and public officials should be expanded nationwide.
- **Cross-sector partnerships** among government institutions, academia, private entities, and disability communities should be institutionalized to ensure policy integration and sustainability.

ACKNOWLEDGEMENTS

We would like to express our sincere gratitude to the Institut Pemerintahan Dalam Negeri (IPDN) for the support and opportunity given during the process of writing this article. We are also deeply thankful to our academic advisor for their valuable guidance, constructive feedback, and continuous encouragement throughout this research.

This article, titled *"Inclusive Digital Technology for People with Communication Disabilities in Indonesia,"* would not have been completed without the support and contributions from both IPDN and our advisor. Their commitment to education and inclusive innovation has greatly inspired our work.

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DOI: 10.33830/osc.v3i1.7062 / ISSN: 3032-2227

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