Access Denied: Algorithmic Inequality in Comparative Welfare States - A Four Country Analysis

สิทธิที่ถูกปฏิเสธ: ความเหลื่อมล้ำเชิงอัลกอริทึมในรัฐสวัสดิการหลากระบบ - การวิเคราะห์สี่ประเทศ

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Abstract

Digital welfare systems create new forms of exclusion despite promises of improved accessibility. This comparative study examines digital welfare access barriers across Thailand, China, Germany, and the United States using the Digital Justice Matrix[2] framework to analyze how different legal frameworks affect digital inclusion outcomes for citizens and migrants across diverse political contexts. Through systematic policy analysis of government documents, legal frameworks, and academic literature (2018-2024) examining government digital services across four countries, the study finds that legal frameworks, not technological

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[2] Digital Justice Matrix : An analytical framework developed in this study to evaluate digital welfare systems based on two dimensions: technological accessibility and procedural fairness.

sophistication, determine inclusive outcomes. Germany's comprehensive legal approach achieves inclusion despite limited infrastructure, while China's advanced technology creates systematic exclusion. Thailand excludes digitally disadvantaged populations; the US shows fragmented geographic inequality. The study demonstrates that legal frameworks rather than technological sophistication determine inclusive outcomes. The study introduces the Digital Justice Matrix framework and provides actionable policy framework for developing countries implementing digital welfare systems[3], with specific recommendations for Thailand's constitutional and legal reforms to ensure inclusive digital access.

Keywords: Digital welfare systems; Algorithmic governance; Digital divide; Comparative policy analysis; Digital inclusion

[3] Digital Welfare Systems: Government service delivery platforms that use digital technologies to provide social benefits, healthcare access, education services, and other public welfare programs.

1. Introduction

Digital welfare systems have changed how governments provide services, but they also create new barriers for people who cannot access technology. This technological shift affects two distinct groups: citizens seeking welfare benefits, and migrants/foreign workers accessing basic services like healthcare and education. While digital welfare systems promise increased efficiency and improved service delivery, they simultaneously create exclusion mechanisms that undermine vulnerable populations' access to essential services.[4]

Modern digital welfare systems show tension between new technology and inclusive service delivery. States increasingly rely on algorithmic systems for benefit allocation and service delivery, yet these systems often reproduce existing inequalities rather than addressing them.[5] The COVID-19 pandemic accelerated digital welfare adoption globally, exposing fundamental gaps in digital inclusion strategies.[6]

The objective of this comparative study is to understand how digital welfare systems create exclusion barriers for citizens and migrants across different political contexts, examine how different legal frameworks affect digital inclusion outcomes, and identify policy reforms that can ensure inclusive digital welfare access. This analysis is particularly crucial

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[4] Gordon, Automating Inequality: How High-Tech Tools Profile, Police, and Punish the Poor. New York: Picador, St Martin's Press. Law, Technology and Humans, (2019), p.162, https://doi.org/10.5204/LTHJ.V1I0.1386.

[5] *Ibid*.

[6] UNDESA, E-Government Survey 2022, Chapter3, Public Administration, (2022), p.87,95, https://desapublications.un.org/sites/default/files/publications/2022-09/Chapter%203.pdf.

for developing countries like Thailand, where digital-first policies risk undermining constitutional rights without adequate legal protections.

This article establishes a crucial analytical distinction between Citizen Welfare Rights (Government Benefits Available to Nationals Through Citizenship-Based Entitlements) and Basic Human Rights (Healthcare, Education, and Essential Services That Should be Accessible Regardless of Citizenship Status). Thailand's "Paotang" app exemplifies this distinction. Since 2020, elderly citizens, informal workers, and those in remote areas face consistent exclusion from government economic stimulus programs despite legitimate citizenship rights.[7]

2. Theoretical Framework: The Digital Justice Matrix

Digital inequality extends beyond basic access to encompass usage capabilities and outcome achievement.[8] While technology access alone cannot guarantee equitable outcomes.[9]automated welfare systems

[7] นงนุชปัญจธรรมเจริญ และ กฤตพัทธ์ ฝึกฝน, "ความเหลื่อมล้ำและการถูกเอาเปรียบในการเข้าถึงสวัสดิการทางสังคม ด้วยเทคโนโลยีดิจิทัลของผู้สูงอายุ: การวิจัยเชิงคุณภาพ," วารสารวิทยาลัยพยาบาลพระจอมเกล้า จังหวัดเพชรบุรี. วารสารวิทยาลัยพยาบาลพระจอมเกล้า จังหวัดเพชรบุรี ปีที่ 6, ฉ. 3 (กันยายน–ธันวาคม 2566), https://he01.tcithaijo.org/index.php/pck/article/view/266534.

[8] Stiakakis, E., Kariotellis, P., & Vlachopoulou, M. , From the Digital Divide to Digital Inequality: A Secondary Research in the European Union. Lecture Notes of the Institute for Computer Sciences, Social-Informatics and Telecommunications Engineering, 26 LNICST, 43–54, (2010), p.44, https://doi.org/10.1007/978-3-642-11631-5_4.

[9] Hargittai, E., Digital Na (t) ives? Variation in Internet Skills and Uses among Members of the "Net Generation", Sociological Inquiry, 80(1), (2010), p.95, https://doi.org/10.1111/J.1475-682X.2009.00317.X.

can create restrictive digital environments without adequate transparency or appeal mechanisms.[10]

2.1 Digital Justice Matrix Framework

This study develops the Digital Justice Matrix as a measurable analytical tool evaluating digital welfare systems across two dimensions:

Digital Technology Access (0-100 Scoring):

- Infrastructure Accessibility Score: Device availability (25%), connectivity coverage (25%), interface design (25%), system reliability (25%, Weighted Equally)
- User Experience Metrics: Completion time, error rates, satisfaction scores, accessibility compliance

Procedural Fairness[11] (0-100 Scoring):

- Legal Protection Index: Constitutional guarantees (30%), administrative protections (25%), appeal mechanisms (25%), transparency requirements (20%)
- Inclusion Safeguards: Offline alternatives, vulnerable population protections, non-discrimination enforcement

Four-Quadrant Classification:

Each country receives combined scores creating four classifications:

[10] Veale, M., & Binns, R., Fairer machine learning in the real world: Mitigating discrimination without collecting sensitive data. Big Data and Society, 4(2), (2017), p.7, https://doi.org/10.1177/2053951717743530.

[11] The principle that government decision-making processes should be transparent, consistent, unbiased, and provide adequate opportunities for citizen participation and appeal.

- Digital Divide[12] (0-50 Access, 0-50 Fairness): Limited access and weak protections
- Algorithmic Bias (51-100 Access, 0-50 Fairness): Advanced technology without safeguards
- Equitable Access (0-50 Access, 51-100 Fairness): Strong protections despite technological limits
- Universal Access (51-100 Access, 51-100 Fairness): Comprehensive digital justice

2.2 Framework Application

The matrix enables systematic comparison across political contexts, revealing that technological sophistication without procedural safeguards often creates more systematic exclusion than limited technology with strong legal protections. This challenges assumptions equating digital advancement with improved citizen access.

3. Comparative Analysis Across Four Countries

Enhanced Methodology with Detailed Procedures:

The comparative analysis examines Thailand, China, Germany, and the United States through systematic policy analysis utilizing secondary data and document analysis from 2018-2024.[13]

[12] The gap between individuals, households, businesses, or geographic areas at different socio-economic levels with regard to their opportunities to access information and communication technologies.

[13] Bowen, G. A., Document analysis as a qualitative research method. Qualitative Research Journal, 9(2), (2009), p.32, https://doi.org/10.3316/QRJ0902027.

Document Selection Criteria: (1) Official government policy documents and legal frameworks, (2) Peer-reviewed academic literature on digital welfare systems published in indexed journals, (3) Government agency reports and implementation guidelines from relevant ministries, (4) International organization assessments and comparative studies from UN, OECD, and World Bank sources.[14]

Data Collection and Verification Procedures: Systematic document coding using thematic analysis protocols with triangulation through multiple source verification[15]. Independent document review by research team members with cross-referencing of policy outcomes across different institutional sources.

Reliability and Validity Measures: Transparent source selection criteria documented in research protocols[16]. Systematic documentation of analytical decisions with audit trail maintenance. Acknowledgment of limitations in cross-national policy comparison including temporal variations and contextual differences[17].

Bias Reduction Strategies: Multiple researcher verification of country classifications to enhance inter-coder reliability[18]. Use of standardized Digital Justice Matrix scoring criteria. Regular verification checks during analysis process.

This "most different political systems design" enables examination of how digital inequality manifests across democratic versus

[14] Yin, (2018).

[15] Braun & Clarke, (2006).

[16] Creswell & Pot, (2018).

[17] Lijphar, (1971).

[18] Krippendorff, (2013).

authoritarian systems, advanced versus emerging economies, and different welfare state traditions[19].

3.1 Thailand: Digital Divide and Constitutional Rights Erosion

Thailand's digital welfare transformation shows how technological ambition without inclusive design creates systematic exclusion of vulnerable populations. The government's digital-first approach modernizes service delivery but creates persistent barriers that deny constitutional rights to government assistance. This case exemplifies the Digital Divide category: low digital access combined with low procedural fairness.

Thailand's Government Super App integrates over 112 government services with 7.5 million cumulative users, offering services from land tax verification to insurance information access[20]. However, this digital-first approach systematically excludes citizens lacking digital literacy or appropriate devices. The emerging Digital ID framework aims to expand e-government services from 400 to 1,000 by 2027, but fundamental barriers persist including device unavailability, insufficient digital skills requiring external assistance, and frequent system failures.[21]

Since 2020, the "Paotang" application became the primary platform for economic recovery programs, requiring multiple complex procedures: website registration, mobile application installation, Know

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[19] Przeworski & Teune, (1970).

[20] Digital Government Development Agency, (2023).

[21] นงนุชปัญจธรรมเจริญ และ กฤตพัทธ์ ฝึกฝน, "ความเหลื่อมล้ำและการถูกเอาเปรียบในการเข้าถึงสวัสดิการทางสังคม ด้วยเทคโนโลยีดิจิทัลของผู้สูงอายุ: การวิจัยเชิงคุณภาพ," วารสารวิทยาลัยพยาบาลพระจอมเกล้า จังหวัดเพชรบุรี. วารสารวิทยาลัยพยาบาลพระจอมเกล้า จังหวัดเพชรบุรี ปีที่ 6, ฉ. 3 (กันยายน–ธันวาคม 2566), 45, https://he01.tcithaijo.org/index.php/pck/article/view/266534.

Your Customer verification through facial recognition scanning, and Krung Thai Bank account integration. Despite government promotion emphasizing convenience and comprehensiveness, practical implementation reveals structural limitations affecting elderly citizens, informal sector workers, and individuals outside the formal banking system.[22]

Citizens in remote communities face substantial costs and transportation difficulties accessing banking facilities, creating disproportionate participation burdens in urban-centered digital welfare systems. Recent digital wallet implementation demonstrates ongoing exclusion mechanisms, with 43,000 citizens unable to complete fund transfers due to technical system failures, disproportionately affecting elderly and rural populations lacking alternative access methods.[23]

Thailand's 2017 Constitution lacks explicit guarantees for digital access rights in government service delivery. While Section 51 provides public information access rights, this addresses transparency rather than digital service accessibility[24]. The Personal Data Protection Act (2022) establishes basic data protection frameworks but lacks specific provisions addressing vulnerable population needs or digital welfare access rights. Despite hosting 4.9 million foreign workers through the Health Insurance Card Scheme allowing undocumented worker access to national health

[22] ฐานเศรษฐกิจ,ถอดบทเรียนแอปทางรัฐล่มตั้งแต่ยังไม่ลงทะเบียนเงินดิจิทัลกับคำเตือนธปท, (2567), Thansettakij.Com/Business/Economy.https://www.thansettakij.com/business/economy/603118.

[23] เพิ่งอ้าง.

[24] constitute project, Thailand 2017 Constitution - Constitute, (2017), https://www.constituteproject.org/constitution/Thailand _2017.

insurance, non-citizens remain systematically excluded from digital welfare platforms.

3.2 China: Algorithmic Bias Through Technological Sophistication

China presents comprehensive digital welfare practice through integration of private platforms (Alipay, WeChat Pay) with state systems, creating advanced technological infrastructure that simultaneously enables widespread service access and systematic behavioral control. This case exemplifies Algorithmic Bias: high digital access combined with low procedural fairness.

Important Clarification on China's Social Credit System Complex Structure:

China's Social Credit System operates through multiple interconnected but distinct subsystems rather than a unified national database. The system encompasses: (1) Central government databases managed by the National Development and Reform Commission, (2) Provincial and municipal systems implementing varying criteria and enforcement mechanisms, (3) Financial credit systems administered by the People's Bank of China, (4) Industry-specific platforms governing different economic sectors, and (5) Corporate credit systems evaluating business entities.[25]

This fragmented implementation creates complex exclusion patterns where citizens may experience restrictions in certain jurisdictions

[25] Creemers, R., China's Social Credit System: An Evolving Practice of Control, Papers.Ssrn.Com, (2018), p.12, https://doi.org/http://dx.doi.org/10.2139/ssrn.3175792.

while maintaining access in others, making systematic exclusion more pervasive than unified system administration would generate.

Chinese citizens access remarkable digital infrastructure with 94.2% smartphone penetration enabling comprehensive government service access through integrated platforms: Alipay serves 652.4 million users while WeChat Pay accommodates 1.133 billion users.[26] Citizens can process divorce applications, business license requests, traffic violation payments, hospital registrations, and utility bill settlements through these platforms without physical government office visits.

This technological integration operates through algorithmic welfare distribution mechanisms. Citizens receive behavioral scores ranging from 300-950 points based on financial records, social conduct, and online activity monitoring. High-scoring citizens receive expedited service delivery and priority healthcare access, while low-scoring citizens face comprehensive restrictions including transportation ticket purchase prohibitions and educational limitations for their children, affecting an estimated 33 million citizens placed on various restriction lists despite maintaining legal service eligibility.[27]

Citizens cannot appeal social credit determinations or access algorithmic explanation for welfare access decisions, effectively eliminating due process protections. China's 297.5 million internal migrant workers experience additional digital exclusion through the household registration (Hukou) system, where Chinese nationals face urban digital welfare service denial based on birthplace rather than

[26] *Ibid.*

[27] *Ibid.*

citizenship status, with only 19% receiving health insurance compared to 68% of registered urban residents.[28]

3.3 Germany: Universal Access Through Legal Innovation

Germany exemplifies digital welfare system design prioritizing inclusive principles through hybrid model development connecting online public services with mandatory offline alternatives ensuring equal access. This demonstrates Universal Access with high digital access combined with high procedural fairness through comprehensive legal protection frameworks.

The 2023 Bürger geld reform demonstrates successful inclusive implementation, providing €502 monthly benefits with automatic health insurance enrollment through both digital platforms and offline service centers. The system effectively serves 5.5 million recipients, including rapid Ukrainian refugee integration comprising 48% of foreign benefit recipients, demonstrating scalability during crisis situations despite Germany's infrastructure challenges, ranking second-to-last in European Union fiber coverage at 29.8% while achieving 52.2% basic digital skills coverage[29].

Germany provides authentic digital equality through comprehensive legal frameworks: after 18 months, asylum seekers receive identical social benefits and healthcare access as German citizens through integrated digital systems rather than separate platforms. With 973,000 Syrians residing in Germany by 2023, of whom 75% possess

[28] *Ibid.*

[29] Ministry Federal of Laboure and Social Affairs, Accessibility Improvement Act - BMAS, (2023), www.Bmas.de/DE/. https://www.bmas.de/DE/Service/Gesetze-und-Gesetzesvorhaben/barrierefreiheitsstaerkungsgesetz.html.

protection status, the system demonstrates large-scale integration capabilities[30].

Germany maintains robust legal frameworks through the Digital Accessibility Act 2021, mandating government digital service accessibility with specific implementation guidelines and independent monitoring mechanisms. The legislation requires 30-day appeal processes for algorithmic decisions with mandatory human review, demonstrated through explainable artificial intelligence requirements in benefit allocation systems. German''s distinctive "inclusive by design" policy ensures offline service channels remain available as long as any citizen demographic cannot effectively access digital services, creating genuine universal access rather than digital-first policies excluding vulnerable populations.[31]

3.4 United States: Fragmented Implementation and Geographic Inequality

The United States demonstrates digital welfare implementation within federal systems where individual states maintain significant autonomy, creating fragmented digital welfare approaches with varying accessibility and inclusivity levels. This represents variable access and variable fairness creating systematic exclusion where digital rights depend on geographic location.[32]

Important Analysis of US Federal Digital Accessibility Framework:

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[30] Federal Statistical Office, (2023).

[31] Federal Ministry of Labour and Social Affairs, (2021).

[32] Pamela Herd, & Donald P. Moynihan, Administrative Burden: Policymaking by Other Means. Russell Sage Foundation, (2018), p.85, https://dokumen.pub/administrative-burden-policymaking-by-other-means-9781610448789-1610448782.html.

While the United States lacks comprehensive federal digital welfare access legislation, existing laws provide partial protection mechanisms. The Americans with Disabilities Act increasingly applies to government digital services through evolving court interpretations, requiring accessibility accommodations for individuals with disabilities. Section 508 of the Rehabilitation Act mandates federal agency digital service accessibility for disability populations, establishing technical standards and procurement requirements.

However, these protections focus primarily on disability access rather than comprehensive digital inclusion, creating protection gaps for additional vulnerable populations including elderly citizens, non-English speakers, and individuals lacking digital literacy skills.

Following the 2013-2014 Healthcare.gov system rescue led by the United States Digital Service, the platform successfully provides marketplace access to federally subsidized health insurance serving millions of Americans through improved digital infrastructure. Advanced states demonstrate impressive technological capabilities: Arkansas launched artificial intelligence-powered career guidance platforms, Utah established dedicated AI Policy offices, and Massachusetts created Digital Accessibility and Equity Governance Boards. However, this creates systematic inequality where citizens'digital rights depend on state residence rather than universal federal standards.

State-level systems demonstrate systematic bias particularly affecting minority and rural populations. Michiga's MiDAS unemployment fraud detection system incorrectly flagged 40,000 beneficiaries during 2013-2015, predominantly affecting African American and low-income

applicants.[33] During COVID-19, unemployment systems failed disproportionately for immigrants, with Texas alone experiencing over 2.3 million application backlogs partly due to system inadequacies and digital literacy gaps.

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[33]Joshua A. Kroll, Joanna Huey, & Solon Barocas,“ Accountable Algorithms by Joshua A. Kroll, Joanna Huey, Solon Barocas, Edward W. Felten, Joel R. Reidenberg, David G. Robinson, Harlan Yu, ” SSRN. Papers.Ssrn.Com, no.3 (2016): 685, https://papers.ssrn.com/sol3/papers.cfm ?abstract_id=2765268.

launched artificial intelligence-powered career guidance platforms, Utah established dedicated AI Policy offices, and Massachusetts created Digital Accessibility and Equity Governance Boards. However, this creates systematic inequality where citizens'digital rights depend on state residence rather than universal federal standards.

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4. Legal Frameworks and Digital Inclusion Outcomes

The comparative analysis reveals that legal frameworks determine inclusive outcomes more than technological capacity, challenging assumptions about digital development priorities.

4.1 Digital Rights as Gateway Rights

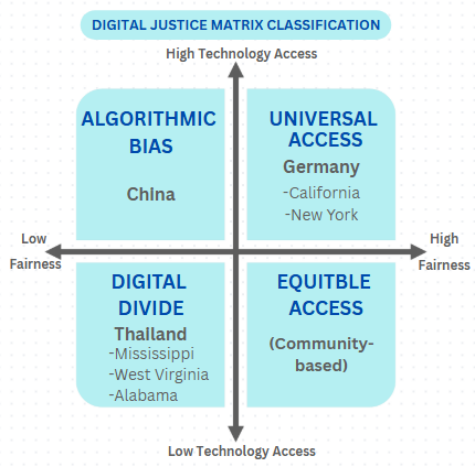
Digital accessibility rights function as gateway mechanisms determining access to fundamental constitutional protections. Education Rights Connection: Thailand's "Paotang" exclusion demonstrate how technology barriers deny educational support access for digitally disadvantaged families. Healthcare Rights Integration: German's system shows digital integration can enhance healthcare access when proper safeguards exist, successfully integrating 973,000 Syrians with identical

[34] Migration Policy Institute (n.d.), The digital divide hits U.S. immigrant households disproportionately during the COVID-19 pandemic, Www.Migrationpolicy.Org., (2020), p.3, Retrieved May 25, 2025, from https://www.migrationpolicy.org/article/digital-divide-hits-us-immigrant-households-during-covid-19.

healthcare access as German citizens. Economic Rights Enablement: Digital welfare systems control employment benefits and social security access – exclusion effectively denies constitutional economic rights, as demonstrated by Thailand's 43000 citizens unable to access digital wallet transfers due to system failures.

4.2 Cross-Country Legal Framework Analysis

Figure 1: Digital Justice Matrix Framework



*USA spans multiple positions due to federal system fragmentation

Table 1: Comparative Legal Framework Outcomes / *Country Classifications:*

	Digital Access	Procedural Fairness	Legal Framework Characteristics
Germany (Universal Access)	Moderate (29.8% Fiber Coverage)	High (Digital Accessibility Act 2021)	Mandatory offline alternatives, 30-day appeals, explainable AI
China (Algorithmic Bias)	High (94.2% Smartphone Usage)	Low (Surveillance Laws)	Technology without accountability, 33M citizens affected

Thailand (Digital Divide)	Low (Paotang Exclusions)	Low (No Constitutional Guarantees)	Section 51 transparency only, parallel systems for non-citizens
USA (Fragmented Practice)	Variable by state	Variable by state	No federal mandate, "Postcode Lottery" conditions

China's Technology Without Accountability: Cybersecurity Law (2017) enables comprehensive digital delivery but legally mandates behavioral surveillance.[35] Personal Information Protection Law (2021) contains broad "national security" exceptions nullifying privacy protections.

Thailand's Legal Framework Gaps: 2017 Constitution lacks explicit digital access rights. Section 51 addresses transparency rather than accessibility, enabling discriminatory platforms while barring 4.9 million foreign workers from digital welfare despite health insurance access.[36]

US Fragmented System: No federal digital accessibility mandate creates geographic inequality. 1996 Personal Responsibility Act.[37] systematically excludes 22.4 million non-citizens while state-level algorithmic bias operates without federal oversight.[38]

[35] Creemers R., China's Social Credit System: An Evolving Practice of Control. Papers.Ssrn.Com., (2018), p.18, https://doi.org/http://dx.doi.org/10.2139/ssrn.3175792.

[36] *Ibid.*

[37] Pamela Herd, & Donald P. Moynihan, Administrative Burden: Policymaking by Other Means. Russell Sage Foundation, (2018), p.85, https://dokumen.pub/administrative-burden-policymaking-by-other-means-9781610448789-1610448782.html.

[38] *Ibid.*

4.3 Constitutional and Administrative Law Analysis

- US: No federal mandate ⟶ state-level fragmentation [39]
- Germany: Strong constitutional digital rights [40]
- China: Administrative surveillance laws override tech potential
- Thailand: Constitutional silence on digital access ⟶ platform discrimination

4.4 Cross-National Patterns and Digital Citizenship

Legal frameworks, not technological sophistication, determine inclusion/exclusion. Germany achieves universal access via law; China weaponizes tech via law. Thailand and the US show legal gaps create geographic/digital inequality.

These patterns suggest digital welfare systems are creating new forms of digital citizenship where access depends on technological capability rather than legal rights. Germany extends digital citizenship based on protection status, while China's hukou system creates differential citizenship among nationals. Thailand's digital wallet failures affecting 43,000 citizens demonstrate how system instability disproportionately affects vulnerable populations without alternative access methods.[41]

4.5 Policy Framework for Inclusive Digital Welfare Design

Based on comparative analysis, this study proposes a framework prioritizing legal protections and institutional accountability over

[39] 1996 Act, algorithmic bias.

[40] Digital Accessibility Act.

[41] ฐานเศรษฐกิจ, เงินดิจิทัล 10,000 โอนไม่สำเร็จ 4.3 หมื่นคน เร่งผูกพร้อมเพย์ก่อนตัดสิทธิ, (2567), Thansettakij.Com/Business/Economy. https://www.thansettakij.com/business/economy/612574.

technological sophistication. The framework emphasizes coordinated legal, technical, and administrative reforms rather than technology-first approaches.

Core Principles: Establish constitutional rights to digital accessibility before implementing digital welfare systems; require parallel offline service delivery; implement explainable AI requirements with robust appeal mechanisms; prioritize accessible design accommodating diverse user capabilities; avoid parallel systems reinforcing differential treatment based on citizenship status.

4.6 Specific Recommendations for Thailand

Thailand should establish a comprehensive Digital Equity Act addressing citizen exclusion documented in the "Paotang" case study. This legislation must mandate offline alternatives for all government welfare programs, ensuring no citizen loses access to constitutional rights due to technological barriers. Critical provisions should include appeal processes for algorithmic decisions, adapting Germany's explainable AI requirements. Constitutional amendments to Section 43 (Education) and Section 52 (Healthcare) should explicitly guarantee digital accessibility rights.[42]

Thailand should adapt Germany's Digital Accessibility Act 2021, mandating that government digital services be accessible and provide alternative access methods.[43] While avoiding China's surveillance model, Thailand should incorporate privacy protections for digital welfare

[42] *Ibid.*

[43] Ministry Federal of Laboure and Social Affairs, Accessibility Improvement Act - BMAS, (2021), Www.Bmas.de/DE/. https://www.bmas.de/DE/Service/Gesetze-und-.

systems, including data minimization principles and citizens' rights to understand and challenge automated decision-making.

4.7 Key Legal Lessons

The analysis reveals five lessons for digital welfare governance. First, technology alone is insufficient – China's sophisticated infrastructure without legal protections creates systematic exclusion. Second, federal coordination is crucial - U.S. fragmentation amplifies inequality. Third, inclusive design requirements are essential – Germany's mandatory offline alternatives prevent exclusion. Fourth, appeal mechanisms are fundamental - algorithmic accountability requires legal frameworks for citizen challenge rights. Fifth, integration approaches work better than separation.

Germany shows comprehensive legal frameworks enable inclusive digital welfare despite infrastructure limitations. China illustrates how advanced technology enables systematic exclusion without legal protections. Thailand demonstrates how digital transformation creates citizenship inequality when legal frameworks lack digital access rights. The U.S. shows how federal systems amplify inequality when coordination mechanisms are absent.[44]

[44] Ministry Federal of Laboure and Social Affairs, Accessibility Improvement Act - BMAS, (2021), Www.Bmas.de/DE/. https://www.bmas.de/DE/Service/Gesetze-und-.

5. Conclusion: Policy Implications and Recommendations for Thailand

Based on the comparative analysis, Thailand should establish a comprehensive Digital Equity Act addressing citizen exclusion documented in the "Paotang" case study. This legislation must mandate offline alternatives for all government welfare programs, ensuring no Thai citizen loses access to constitutional rights due to technological barriers. The act should require accessibility compliance standards with meaningful penalties for agencies that exclude citizens through inaccessible digital design.

Constitutional amendments to Section 43 (Education) and Section 52 (Healthcare) should explicitly guarantee digital accessibility rights, ensuring no citizen faces exclusion from government services due to technological inability.[45] Thailand should establish central coordination mechanisms preventing the fragmented approach that enabled "Paotang" exclusion patterns and community centers nationwide targeting elderly and rural populations systematically excluded from digital welfare.

Thailand should adapt Germany's Digital Accessibility Act 2021, which mandates that all government digital services must be accessible and provide alternative access methods.[46] Key provisions include explainable AI requirements in government decision-making systems and mandatory parallel offline services alongside digital platforms.

The Thai experience reveals the risks of digital-first policies without legal protections. The "Paotang" app's systematic exclusion illustrates

[45] *Ibid.*

[46] *Ibid.*

how technological modernization can undermine constitutional rights without inclusive design principles. Countries with comprehensive legal protections achieve inclusive outcomes regardless of technological limitations, while those prioritizing technological advancement without legal accountability create systematic exclusion.

The Digital Justice Matrix provides a diagnostic tool for identifying whether proposed systems will create inclusive or exclusionary outcomes, offering practical guidance for policy design. Germany's inclusive approach shows that advanced digital infrastructure can coexist with robust democratic protections when supported by strong institutional safeguards. The path toward inclusive digital welfare requires sustained political commitment to accessibility principles, adequate implementation resources, and recognition that digital transformation serves social and political rather than purely technical goals. The choice between digital justice and digital exclusion remains fundamentally political, shaping the future of social protection in the digital age.

รายการอ้างอิง

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Gordon, F. (2019). Virginia Eubanks (2018) Automating Inequality: How High-Tech Tools Profile, Police, and Punish the Poor. New York: Picador, St Martin's Press. *Law, Technology and Humans*, *1*, 162-164. https://doi.org/10.5204/lthj.v1i0.1386.

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