Realizing Accessibility in Thailand: Make the Right Real, Lifelong Education, and Decent Work for Persons with Mobility Disabilities

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Abstract

This Mixed-Methods research aims two objectives: (1) to identify systemic barriers that hinder Persons with Mobility or Physical Disabilities (PMDs) in Thailand from accessing Lifelong Education (LE) and Decent Work (DW); and (2) to propose a scalable framework integrating Universal Design and AI-driven technologies, such as NiNA1479, to address these challenges. The study aligns with global frameworks like the CRPD, SDGs, and Thailand's "Make the Right Real" initiative, ensuring a robust integration of local and international perspectives. Quantitative data from 400 PMDs aged 15 and above from five provinces participated in the quantitative phase, with ANOVA analysis revealing significant differences in satisfaction with LE based on education level ($F(6, 143) = 3.97$, $p < .001$, $\eta^2 = 0.09$). Higher education groups reported the highest satisfaction ($M = 3.60$, $SD = 0.98$) compared to primary education levels ($M = 2.75$, $SD = 1.10$). For DW, higher education groups also scored highest ($M = 3.75$, $SD = 0.92$) compared to primary education groups ($M = 2.80$, $SD = 1.10$; $F(6, 143) = 5.19$, $p < .001$, $\eta^2 = 0.13$). Income levels also showed significant effects ($F(5, 144) = 6.20$, $p < .001$, $\eta^2 = 0.11$). Interviews with 18 stakeholders identified barriers including weak law enforcement and inadequate infrastructure. The NiNA1479 framework, developed through this research, features a three-tier structure: (1) personalized AI learning pathways addressing cognitive and physical limitations, (2) a skill-to-employment matching algorithm

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reducing geographical barriers, and (3) a continuous feedback mechanism ensuring adaptive support. Recommendations include stronger enforcement of CRPD-aligned policies, public-private collaborations, and investments in assistive technologies to empower PMDs and set a benchmark for inclusive development.

Keywords: Make the Right Real, Lifelong Education, Decent Work, AI-driven Technologies, Persons with Mobility Disabilities

1. Introduction

1.1 Background and Problem Statement: Access to **Lifelong Education (LE)** and **Decent Work (DW)** is a fundamental right recognized globally through frameworks like the **Convention on the Rights of Persons with Disabilities (CRPD)** and the **Sustainable Development Goals (SDGs)**. These frameworks emphasize inclusivity, equity, and sustainable development for Persons with Disabilities (PWDs) (United Nations, 2018; 2022). However, PMDs in Thailand face systemic barriers that perpetuate exclusion and inequality. Recent statistics reveal that among Thailand's 4.19 million PWDs, or 6% of the population, Of these, 28.9% of children aged 5-17 are out of school, PMDs represent the largest category at 48.73% or approximately 2.04 million individuals (Department of Empowerment of Persons with Disabilities, 2023). Alarmingly, only 6.3% of PMDs have completed higher education, while 62% remain unemployed—significantly higher than the 8% unemployment rate for the general disability population (National Statistical Office of Thailand, 2023; Cheausuwantavee et al., 2021). These disparities are particularly pronounced in rural areas, where 71% of PMDs report severe limitations in accessing educational resources and employment opportunities (MSDHS, 2023). These barriers include weak enforcement of disability-inclusive policies, inadequate infrastructure, and insufficient adaptive technologies, especially in rural areas (Smith, 2019; MSDHS, 2023). Key challenges involve **policy and implementation gaps**, where regulations are inadequately enforced, and costs of services and technologies limit access (Aldawood et al., 2024). **Infrastructure issues** are also prevalent, with inaccessible urban environments and rural areas suffering from a lack of investment in adaptive tools and resources (Saha et al., 2021). Additionally, **resource allocation limitations,** especially budget spending, hinder the implementation of inclusive practices, further exacerbating socio-economic disparities for PMDs (Shirzad et al., 2022). Emerging solutions responding to infrastructure issues, such as **Universal Design** and **AI-driven technologies**, offer scalable interventions to address these challenges. For example, the National Innovation Network Ability (NiNA1479) or **NiNA1479 model** integrates adaptive learning platforms and workplace accommodations to enhance accessibility (NiNA1479, n.d.). AI technologies can optimize navigation systems, empowering PMDs to overcome physical and socio-political barriers (Han et al., 2020; Lam et al., 2020).

1.2 Significance of the Study: This research is critically significant for advancing equity and accessibility for PMDs in Thailand. It makes meaningful contributions in four key areas:

Identifying Systemic Barriers: Highlighting barriers such as weak policy enforcement, inadequate resource allocation, and infrastructure disparities is essential for designing effective interventions. Thailand's rural-urban divide exacerbates these challenges, with rural areas facing a lack of accessible infrastructure and adaptive tools (Shirzad et al., 2022). By identifying these systemic issues, this study lays the foundation for targeted and sustainable solutions.

Enhancing Accessibility: Proposing innovative frameworks that integrate **Universal Design** and **AI-driven technologies** is central to this study. For instance, Universal Design ensures inclusivity in infrastructure and service planning, while AI technologies, like **NiNA1479**, provide real-time, adaptive solutions that cater to individual needs. These approaches align with global best practices, such as Finland's emphasis on adaptive technologies and inclusive education systems (Hirata & Sugimoto, 2020).

Advancing Policy Implementation: The study emphasizes the importance of actionable recommendations to strengthen the enforcement and monitoring of disability-inclusive policies. Effective implementation requires comprehensive audits and capacity-building initiatives for stakeholders. Drawing on lessons from Japan, where employment quotas are backed by strict enforcement, this research highlights the need for similar measures in Thailand to ensure policy compliance (European Disability Forum, 2021).

Empowering PMDs: By addressing urban-rural disparities and promoting resource equity, this study seeks to empower PMDs to achieve independence and social participation. Enhanced accessibility in education and employment directly contributes to improving quality of life, fostering innovation, and reducing socio-economic inequities (Garcia et al., 2017; Suporntum et al., 2019).

Aligned with the CRPD and SDGs, this study advances Thailand's commitment to fostering inclusion and sustainable development while serving as a model for other developing nations.

1.3 Research Objectives: (1) To identify systemic barriers that hinder PMDs in Thailand from accessing lifelong education (LE) and decent work (DW)**. (2) To propose a scalable framework** integrating Universal Design and AI-driven technologies, such as NiNA1479, to address these challenges.

1.4 Research Questions: (1) What systemic barriers hinder that hinder PMDs in Thailand from accessing LE and DW? (2) How can Universal Design and AI-driven technologies enhance accessibility for PMDs?

1.5 Hypothesis: The hypothesis underpinning this research is that **education level and income** significantly influence access to LE and DW for PMDs in Thailand.

2. Literature Review

2.1 Global Frameworks for Inclusion: The **CRPD** emphasizes equitable access to lifelong education (Article 24) and decent work (Article 27), advocating inclusivity in policy and practice (United Nations, 2018). Complementing this, the **SDGs**, particularly Goals 4 (Quality Education) and 8 (Decent Work and Economic Growth), prioritize inclusive development (United Nations, 2022). Operationalizing these principles, the **Make the Right Real (MRR) initiative**, championed by UNESCAP, focuses on regional frameworks to ensure actionable implementation (UNESCAP, 2022). Best practices from various countries demonstrate the effectiveness of these frameworks:

(1) Finland: Leverages Universal Design in education, adaptive technologies, and comprehensive teacher training to create inclusive learning environments (Hirata & Sugimoto, 2020).

(2) Japan: Implements employment quotas with tax incentives and workplace subsidies, significantly increasing workforce participation for PWDs (European Disability Forum, 2021).

(3) Australia: The National Disability Insurance Scheme (NDIS) provides personalized financial support for assistive tools and vocational training, reducing barriers to employment (WHO, 2021).

(4) United States: Enforces the Americans with Disabilities Act (ADA) through stringent นตรaudits and penalties, ensuring compliance in workplaces and educational institutions (National Center for Education Statistics, 2022).

(5) Germany: Uses AI-driven platforms like the Inclusion Portal to bridge vocational training and employment gaps for PWDs (ILO,2023; 2024).

(6) South Korea: Promotes accessibility through AI-driven job-matching systems and robust public-private collaborations (UNESCAP, 2020).

(7) Singapore: Combines Universal Design principles with vocational training programs to enhance mobility and employment opportunities for PWDs (Varaprasad,2022; Pongsanon et al., 2021).

2.2 Thailand's Legislative and Policy Landscape: These figures highlight the need for policy enhancement and effective enforcement to bridge critical accessibility gaps. Thailand's legislative efforts align closely with global frameworks like the CRPD. The **Constitution of the Kingdom of Thailand (2017)** guarantees equal rights for all citizens, while the **Empowerment of Persons with Disabilities Act (2007; revised 2013)** mandates Universal Design and allocates funding for assistive technologies. The Education Provision for Persons with Disabilities Act (2008; revised 2013) ensures lifelong free education, reinforced by the Equitable Education Fund (2018), which subsidizes inclusive educational initiatives. The Promotion of Learning Act (2023) advances universal accessibility through flexible learning environments (Boonyarattanasoontorn, 2024). The **ILO Convention No. 159**, ratified in 2007, underscores Thailand's commitment to vocational rehabilitation

and equal employment for PWDs. Despite progress of the international labour standards application by the Thai government, implementation challenges such as inadequate supporting resources on budget and staff, and weak enforcement mechanisms persist (Suttawet et al., 2022).

Despite this, implementation challenges such as inadequate supporting resources, and weak enforcement mechanisms persist (Chokchai et al., 2022). The **1479 Helpline**, developed by Chapirom et al. (2022), plays a pivotal role in addressing grievances, connecting individuals with resources, and fostering stakeholder collaboration to protect employment rights.

2.3 Systemic Barriers in Thailand: Despite legislative advancements, systemic barriers persist in Thailand, hindering accessibility for persons with disabilities (PWDs), particularly in rural areas with insufficient monitoring mechanisms (Aldawood et al., 2024; Shirzad et al., 2022). Chapirom (2024) identifies **three core roots**—discrimination, lack of empowerment, and poverty—which lead to **seven critical challenges** obstructing effective policy development and implementation: **(1) Attitudinal biases**: Misconceptions among leaders and policymakers restrict opportunities for PWDs (UN, 2022; WHO, 2021). **(2) Weak law enforcement**: Insufficient accountability and monitoring hinder the enforcement of disability-inclusive laws (ILO, 2020; Suporntum et al., 2019). **(3) Budgetary constraints**: Limited funding restricts essential services and accommodations (UN, 2022; World Bank, 2021). **(4) Technological exclusion**: PWDs face barriers in accessing digital tools critical for education and work (World Bank, 2021). **(5) Inadequate infrastructure**: Facilities often fail to meet accessibility standards (Mongkolsawadi, 2018; WHO, 2021). **(6) Transportation challenges**: Limited access to reliable, inclusive public transportation curtails mobility (UN, 2022). **(7) Shortages of skilled personnel**: A lack of trained professionals restricts effective support for PWDs (UNESCO, 2020).

2.4 Opportunities and Technological Innovations: Emerging solutions such as Universal Design and AI-driven technologies offer scalable frameworks to bridge accessibility gaps.

(1) Universal Design: Ensures inclusivity in infrastructure planning, addressing diverse needs. However, traditional models require cultural adaptations to enhance effectiveness in Thailand (Selanon & Chuangchai, 2023; Mongkolsawadi, 2019).

(2) AI-Driven Platforms: Innovations like NiNA1479 provide adaptive solutions for PWDs, offering personalized navigation and vocational support systems (Han et al., 2020; Lam et al., 2020).

(3) Geospatial Data Models: Mobile applications leveraging geospatial data empower users to access customized accessibility information, facilitating equitable resource allocation (Lam et al., 2020).

2.5 Concluding Insights: While Thailand has made legislative strides, significant gaps in enforcement, infrastructure, and societal attitudes remain. Drawing on global best practices, Thailand must enhance policy implementation, invest in technological solutions, and address systemic inequities. Initiatives like the 1479 Helpline and NiNA1479 highlight the potential for scalable, innovative solutions that align with CRPD and SDG goals.

3.Methodology

This study employs a **Sequential Explanatory Mixed-Methods Design** to investigate systemic barriers hindering PMDs in Thailand from accessing LE and DW. Integrating quantitative and qualitative approaches ensures robust findings aligned with the **CRPD** and the **SDGs**. This design responds directly to the study's objectives: **(1) To identify systemic barriers** that hinder PMDs in Thailand from accessing LE and DW**. (2) To propose a scalable framework** integrating Universal Design and AI-driven technologies, such as NiNA1479, to address these challenges. The hypothesis tested is that **education level and income significantly influence accessibility to LE and DW for PMDs**.

3.1 Research Design

Quantitative Phase: A stratified random sample of 400 PMDs, aged 15 and above, was drawn from 212,834 individuals across five Thai provinces, stratified by education and income with 100% response rate. Provincial distribution: Chiang Mai (n=80), Nonthaburi (n=60), Khon Kaen (n=100), Chonburi (n=80), and Nakhon Si Thammarat (n=80). The structured questionnaire assessed: (1) adaptive technology access, (2) LE and DW satisfaction (5-point Likert), (3) perceived barriers, and (4) demographics.

Qualitative Phase: Eighteen key informants were purposively sampled from nine stakeholder groups to provide diverse operational and policy insights: (1) PMDs organization leaders, (2) public/private educational administrators, (3) public/private employers, (4) lifelong education scholars, (5) Ministry of Education, (6) Ministry of Labour, (7) Department of Empowerment of PWDs, (8) disability rights legal expert, and (9) Ministry of Higher Education. Semi-structured interviews, guided by thematic prompts, elicited perspectives aligned with the study’s objectives.

The integration of quantitative and qualitative methods enhances validity, capturing statistical trends and nuanced contextual insights (Creswell & Plano Clark, 2018);

3.2 Data Collection

- Data were collected via surveys and interviews between July 2022 and March 2023.

3.3 Data Analysis

Quantitative Analysis:

- Descriptive and inferential statistical methods were applied to examine satisfaction with and accessibility to LE and DW among PMDs.
- Descriptive statistics, including frequencies, means, and standard deviations, summarized participant responses. Inferential techniques comprised regression analysis to assess associations between education and income with accessibility, and one-way ANOVA to compare satisfaction scores across demographic subgroups.
- These methods provided a rigorous framework for testing the hypothesis and exploring structural disparities in access to LE and DW.

Qualitative Analysis:

- **Thematic Analysis:** Identified recurring issues such as weak policy enforcement, infrastructural inadequacies, and societal stigmas.
- **Integration:** Cross-referenced themes with quantitative findings to create a cohesive narrative.

3.4 Hypothesis Testing

- **Hypothesis:** Education level and income are significantly associated with variations in perceived accessibility to LE and DW among PMDs.
- **Results:** ANOVA results confirmed significant mean differences across education and income groups, supporting the hypothesis and highlighting the need for targeted, inclusive interventions.

3.5 Ethical Considerations

- **Informed Consent:** Accessible formats ensured inclusive participant understanding of objectives.
- **Confidentiality:** Data anonymization and secure storage safeguarded participant privacy.
- **Ethics Approval:** Granted by Huachiew Chalermprakiet University's Research Ethics Committee on September 20, 2022, (Ref. No.1216/2565), following the **Declaration of Helsinki** (World Medical Association, 2013).
- **Cultural Sensitivity:** Research teams were trained for respectful engagement with diverse participants.

4. Findings

This study aims to achieve two core objectives: (1) to Identify systemic barriers that hinder PMDs in Thailand from accessing lifelong education and decent work; and (2) to propose a scalable framework integrating Universal Design and AI-driven technologies, such as NiNA1479, to address these challenges. By synthesizing quantitative and qualitative data, the findings offer a comprehensive analysis contextualized within global frameworks such as the CRPD and the SDGs. The study also incorporates comparative insights from global best practices, presenting actionable recommendations and success metrics for improving accessibility. This research outlines a transformative pathway to foster inclusion and equity for PMDs in Thailand by addressing gaps in policy enforcement, resource allocation, and societal attitudes.

4.1 Quantitative Key Findings

This study surveyed 400 PMDs across five provinces revealed significant socioeconomic disparities. Participants, selected through stratified random sampling, were gender-balanced (51% male, 49% female) and distributed across age groups: 15–30 years (23.8%), 31–45 years (38.3%), 46–60 years (25.5%), and over 60 years (12.4%). Educational attainment varied considerably, with most holding vocational diplomas (35.3%) or upper secondary education (22.5%), while extremes of no formal education and postgraduate degrees each represented only 1% of respondents. Income distribution demonstrated pronounced inequality—38% reported no income whatsoever, while 50% earned below 15,000 THB monthly. Employment status showed 60% employed (predominantly in freelance positions at 35%) against 40% unemployed.

This section presents the quantitative findings, addressing the hypothesis: **"Education level and income significantly influence accessibility to LE and DW for PWDs."** These findings align with the two research objectives to identify systemic barriers and to propose a scalable framework integrating Universal Design, NiNA1479, and AI-driven technologies, enhancing accessibility in alignment with the CRPD and SDGs.

Statistical Analysis

Table 1: ANOVA Results for Education and Income Levels

Measure	Group	N	M	SD	F(df)	p	η^2
Lifelong Education	Primary Education	120	2.75	1.10			
	Secondary Education	150	3.10	1.05	F(6, 393) = 3.97	< .001	0.09
	Tertiary Education	130	3.60	0.98			
Decent Work	Primary Education	120	2.80	1.10			
	Secondary Education	150	3.20	1.02	F(6, 393) = 5.19	< .001	0.13
	Tertiary Education	130	3.75	0.92			
Income Level	Low Income (<10,000 THB)	140	2.75	1.09			
	Medium Income (10,001–20,000 THB)	150	3.10	1.05	F(5, 394) = 6.20	< .001	0.11
	High Income (>20,001 THB)	110	3.60	0.98			

Findings and Key Interpretation

1. Lifelong Education (LE))

(1) Education Level:

- Current: "Higher education levels provide individuals with enhanced access to lifelong learning resources, skills, and adaptive technologies."
- Improved: "The ANOVA results reveal a statistically significant difference in lifelong education satisfaction across education levels, with a medium effect size (η^2 = 0.09). This indicates that approximately 9% of the variance in lifelong education satisfaction can be explained by differences in education level. Post-hoc analysis confirms that tertiary education participants reported significantly higher satisfaction scores (nearly one standard deviation higher) than those with primary education."

(2) Income Level:

- Current: "Financial stability enables better access to educational tools, platforms, and resources for continuous learning."
- Improved: "The ANOVA test demonstrates a significant relationship between income level and lifelong education satisfaction, with a medium effect size (η^2 = 0.11). This means that 11% of the variance in satisfaction scores can be attributed to income differences. The substantial difference in mean scores

(0.85 points on the scale) between high and low-income groups highlights the impact of income on perceived access to lifelong education opportunities."

2. Decent Work (DW)

(1) Education Level:

- Current: "Advanced education provides the qualifications and skills necessary for better job opportunities, enhancing workplace satisfaction."
- Improved: "The ANOVA results show a significant effect of education level on decent work satisfaction with a medium-to-large effect size ($\eta^2 = 0.13$). This indicates that 13% of the variation in decent work satisfaction scores is explained by education level differences. The substantial mean difference (0.95 points) between tertiary and primary education groups suggests education strongly influences workplace experiences and opportunities."

(2) Income Level:

- Current: "Income stability supports access to workplace accommodations, career training, and job development opportunities."
- Improved: "The ANOVA reveals a statistically significant but smaller effect of income on decent work satisfaction ($\eta^2 = 0.05$), indicating that 5% of the variance in decent work satisfaction can be explained by income differences. While the relationship is significant ($p = .03$), the smaller effect size suggests that income may play a less substantial role in decent work satisfaction compared to other factors examined in this study."

These improved interpretations focus more directly on explaining what the ANOVA results mean statistically while adding descriptive context to supplement the numerical findings in your tables.

Discussion

(1) Systemic Barriers Identified:
   - Participants with lower education levels and incomes face significant barriers, including limited access to digital tools, workplace accommodations, and learning resources.
   - Financial and educational disparities remain key obstacles to inclusion.

(2) Framework Development Justified: These findings underscore the need for scalable frameworks integrating Universal Design, NiNA1479, and AI-driven technologies to address barriers effectively.

The hypothesis is strongly supported, demonstrating that both education level and income significantly influence accessibility to lifelong education and decent work. Participants with higher education and income levels experience enhanced satisfaction and reduced barriers.

4.2 Qualitative Key Findings

The qualitative findings provide an in-depth examination of systemic barriers and enabling factors affecting accessibility to LE and DW for PMDs in Thailand. Through interviews with 18 stakeholders across nine categories—advocacy organizations, educational institutions, government agencies, legal experts, and policymakers—the study highlights the pervasive challenges hindering the realization of **"Make the Right Real."** Three foundational factors—**(a) pervasive discrimination, (b) lack of empowerment, and (c) poverty**—serve as key drivers of inequity. These shared views' foundational factors contribute to the continuing persistence of the seven primary barriers obstructing the revisioning and or enhancing of policy formulation and implementation, as follows:

(1) **Attitudinal barriers:** Negative perceptions and stereotypes toward PMDs remain deeply embedded in societal structures, limiting opportunities and reinforcing exclusion.

(2) **Ineffective law enforcement:** Despite legislative frameworks, weak enforcement mechanisms undermine the protection of PMDs' rights, resulting in continued marginalization.

(3) **Budget constraints:** Limited financial resources allocated to disability-inclusive initiatives impede sustainable program development and implementation.

(4) **Technological and internet access challenges:** Significant disparities exist in accessing adaptive technologies and digital platforms, creating a digital divide that disproportionately affects PMDs.

(5) **Physical infrastructure barriers:** Inaccessible public buildings and facilities continue to restrict mobility and participation in community life for PMDs.

(6) **Transportation challenges:** Poorly maintained pedestrian infrastructure and inaccessible public transit systems severely limit independence and access to essential services.

(7) **Qualified personnel shortages:** A critical lack of trained educators and professionals knowledgeable about accessibility needs compromises service quality and appropriate accommodations.

These challenges highlight critical gaps in policy enforcement, resource allocation, and the implementation of inclusive design.

Key Themes and Findings

1. **Policy Enforcement Gaps:** Weak enforcement of policies protecting the rights of Persons with Disabilities (PWDs) emerged as a significant challenge. Despite progressive legislation, implementation remains inconsistent, with limited accountability mechanisms to ensure compliance.
2. **Collaboration Deficits and Resource Gaps:** Stakeholders highlighted insufficient collaboration between public and private sectors, creating fragmented service delivery. Additionally, limited resources in education and employment sectors prevent sustainable program development.

3. **Barriers in Education and Employment:** Participants emphasized the absence of adaptive learning systems and universally accessible infrastructure, which significantly impedes educational attainment and workforce participation among PMDs.
4. **Potential of the NiNA1479 Model:** Stakeholders expressed optimism regarding the NiNA1479 model, which integrates advanced AI-driven adaptive technologies with Universal Design principles. This innovative approach presents promising opportunities for addressing systemic barriers and enhancing accessibility across multiple domains.

4.3 Integrated Analysis

This section synthesizes the quantitative and qualitative findings to provide a holistic understanding of the systemic barriers and actionable solutions affecting LE and DW for PMDs in Thailand. The analysis aligns with the two research objectives.

Key Findings and Synthesis

(1) Systemic Barriers

- **Quantitative Evidence**: Moderate satisfaction with lifelong education (**M = 3.11, SD = 1.11**) and decent work (**M = 3.41, SD = 1.13**) underscores significant gaps in adaptive tools, infrastructure, and workplace accommodations.
- **Qualitative Insights**: Findings highlight critical challenges in policy enforcement, funding, and infrastructure, particularly in rural areas. Key issues include discrimination, lack of empowerment, and poverty, which significantly hinder progress. Seven primary obstacles impede policy formulation and implementation: (1) attitudinal barriers; (2) ineffective legal enforcement; (3) budgetary limitations; (4) technological and internet access challenges; (5) physical barriers in buildings and facilities; (6) infrastructural and transportation constraints; and (7) shortages of qualified personnel. Addressing these is essential for sustainable change.

(2) Demographic Disparities

- Education and income levels emerged as significant predictors of accessibility. Quantitative findings revealed disparities by education (**$F(6, 393) = 3.97$, $p < .001$, $\eta^2 = 0.09$**) and income levels (**$F(5, 394) = 6.20$, $p < .001$, $\eta^2 = 0.11$**).
- Stakeholders highlighted the compounded impact of these disparities, limiting access to essential technologies and resources.

(3) Innovative Opportunities

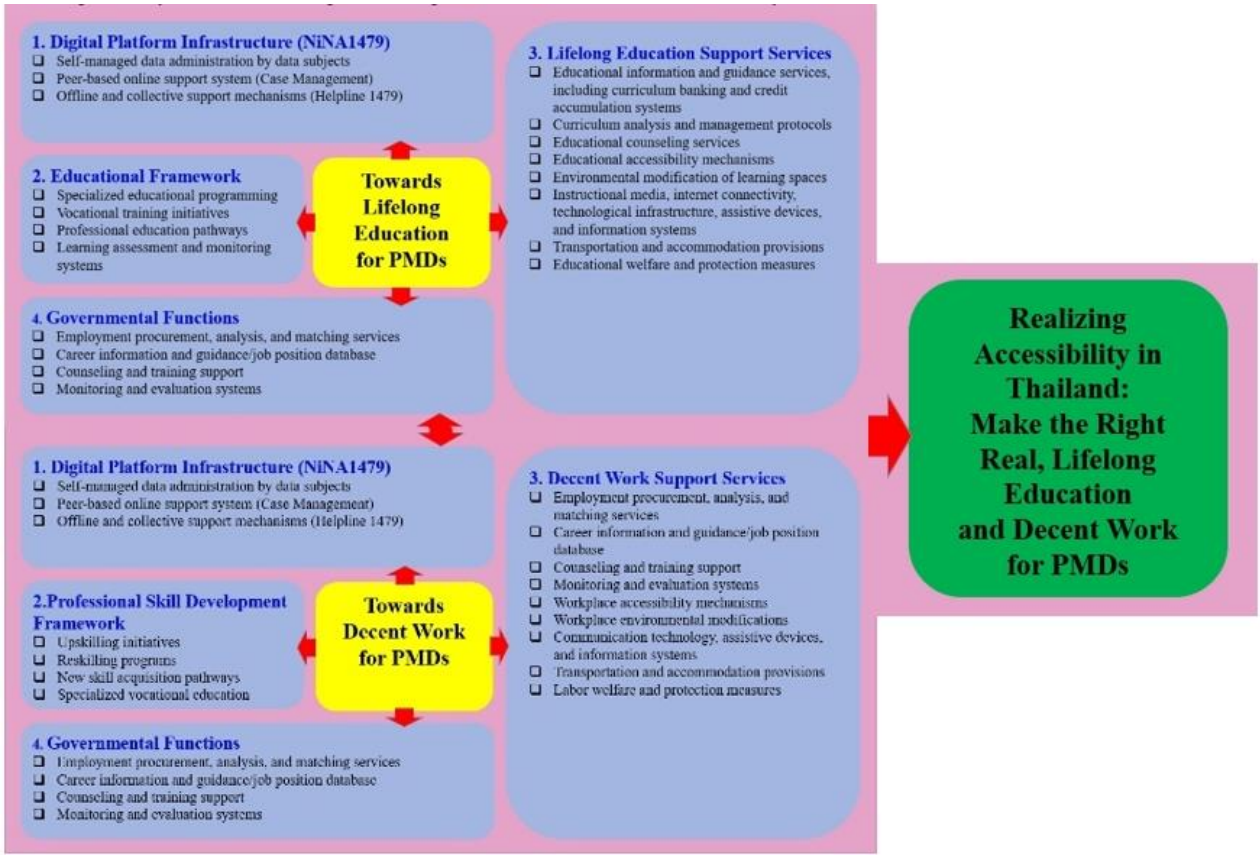
- The **NiNA1479 model**, integrating Universal Design and AI technologies, was recognized as a scalable solution to bridge gaps. Stakeholders emphasized its potential to address resource allocation and infrastructure deficiencies effectively.

The synthesis underscores entrenched disparities in education and employment. The NiNA1479 model, integrating AI and Universal Design, offers scalable, globally aligned solutions to advance equity and inclusion.

4.4 A New Model

Thailand has made commendable progress toward promoting equity and inclusion for PMDs. However, significant systemic barriers continue to limit their access to **LE** and **DW** opportunities (NiNA1479, n.d.). The proposed model, **"Realizing Accessibility in Thailand: Make the Right Real, Lifelong Education and Decent Work for PMDs,"** provides a comprehensive framework to address these challenges. By integrating **two interconnected pathways**—Lifelong Education and Decent Work—and supported by the innovative **NiNA1479 digital platform** and proactive governmental functions, this model aims to bridge the accessibility gap, ensuring sustainable inclusion. This article explores the model's components as depicted in the diagram, critically analyzes its effectiveness, discusses its implications, and highlights best practices from other countries.

Diagram 1: A New Model



Explanation of the Diagram

The model is structured into **two interlinked pathways**: **Lifelong Education (Up pathway**) and **Decent Work (Down pathway).** These pathways are supported by **four foundational components**, which serve as the pillars of the model: (1) **Digital Platform Infrastructure (NiNA1479) (2) Educational Framework (3) Professional Skill Development Framework (4) Governmental Functions**

1. Digital Platform Infrastructure (NiNA1479)

At the core of the model is **NiNA1479**, a centralized digital platform designed to connect and streamline services across the education and employment pathways. Key features include:

(1) **Self-managed data administration:** PMDs can personalize their profiles and manage their educational and employment pathways autonomously.

(2) **Peer-based online support systems:** Interactive tools facilitate case management, counseling, and collaborative problem-solving.

(3) **Offline support mechanisms:** Services like the "Helpline 1479" provide essential assistance for PMDs in underserved rural areas, ensuring inclusivity regardless of digital literacy.

This infrastructure bridges urban-rural divides and ensures seamless transitions between lifelong education and employment services.

2. Lifelong Education for PMDs

This pathway emphasizes adaptive and inclusive educational opportunities tailored to the diverse needs of PMDs.

(1) Educational Framework:

- **Specialized educational programs** that cater to individual learning needs.
- **Vocational training initiatives** providing hands-on skills development.
- **Professional education pathways** offering structured routes for career advancement.

(2) Support Services:

- Assistive technologies, transportation subsidies, and curriculum guidance eliminate logistical and financial barriers.
- Environmental modifications ensure accessibility in both physical and digital learning environments, aligning with Universal Design principles.

(3) Learning Assessment Systems: Tools to monitor progress and evaluate the effectiveness of educational programs.

3. Decent Work for PMDs

The Decent Work pathway equips PMDs with skills and workplace accommodations necessary for stable and meaningful employment.

(1) **Professional Skill Development Framework:**

- Programs for **upskilling and reskilling**, aligned with evolving labor market demands.
- Industry-specific vocational education tailored to PMDs' capabilities and aspirations.

(2) **Support Services:**

- AI-powered job-matching systems and career counseling services.
- Workplace accommodations, such as adaptive devices and ergonomic modifications, remove systemic barriers and foster inclusivity.

4. Governmental Functions

The government plays a pivotal role in sustaining and scaling the model's impact.

(1) **Policy Implementation and Monitoring:** Ensuring accountability through regular audits and evaluation of inclusive policies.

(2) **Incentives for Stakeholders:** Tax benefits and subsidies encourage organizations to adopt inclusive practices.

(3) **Collaboration:** Partnerships with NGOs, private-sector entities, and local communities optimize resource utilization and implementation.

Conclusion

The **"Realizing Accessibility in Thailand"** model offers a transformative solution to addressing systemic barriers faced by PMDs. By integrating Lifelong Education and Decent Work pathways, supported by the NiNA1479 platform and Universal Design principles, the model fosters equity and inclusion. It bridges the gaps in accessibility and aligns Thailand's policies with global standards such as the CRPD and SDGs. Drawing inspiration from international best practices, this model establishes Thailand as a leader in regional PWDs inclusion. As a roadmap for sustainable development, it empowers PMDs to thrive as active contributors to society, setting a benchmark for accessibility and inclusion worldwide.

5. Discussion

This section interprets the findings of the study on accessibility to LE and DW for PMDs in Thailand, integrating quantitative and qualitative insights and comparing them with global best practices. The discussion addresses systemic barriers and presents actionable recommendations aligned with the **CRPD** and the **SDGs**. These findings aim to support Thailand's efforts to enhance inclusivity and accessibility for PMDs.

Table 2: Key Findings and Comparative Analysis Table

Aspect	Thailand's Challenges	Global Best Practices	Proposed Adaptation
Lifelong Education	Limited Universal Design and funding for adaptive tools.	Finland: Universal Design, teacher training, and adaptive technologies (Hirata & Sugimoto, 2020).	Prioritize Universal Design integration and rural resource allocation.
Decent Work	Systemic stigma and lack of workplace accommodations.	Japan: Employment quotas supported by financial incentives (Hirata & Sugimoto, 2020).	Introduce quotas with tax benefits for compliance.
Digital Integration	NiNA1479 proposed but lacks localization for rural access.	Germany: AI-powered Inclusion Portal (European Disability Forum, 2021).	Expand NiNA1479 with localized and multilingual features.
Policy Enforcement	Weak implementation in rural areas.	United States: Strong enforcement through audits and penalties under ADA (Hirata & Sugimoto, 2020).	Conduct annual audits and implement penalties for non-compliance.
Resource Allocation	Insufficient funding for adaptive technologies and vocational training.	Australia: NDIS ensures financial aid for tools and training (WHO, 2021).	Establish financial support programs for adaptive technology access.

Implications

For PMDs: Tailored education and employment pathways empower PMDs, fostering independence and societal participation.

For Thai Society: Inclusive policies reduce systemic inequities, foster innovation, and support economic growth, aligning with SDG goals.

For Sustainability: The NiNA1479 model, combined with Universal Design principles, offers scalable and adaptable solutions to ensure long-term impact and accessibility.

Conclusion

This study highlights significant systemic barriers preventing PMDs in Thailand from accessing lifelong education and decent work. However, integrating global best practices—such as Finland's Universal Design, Japan's employment quotas, and Australia's NDIS—can address these challenges effectively. The NiNA1479 model, integrating AI-driven tools and Universal Design, offers a transformative framework for bridging accessibility gaps. By aligning with CRPD and SDGs, Thailand can position itself as a leader in disability inclusion, empowering PMDs and setting a benchmark for global accessibility.

6. Conclusions and New Knowledge

This study confirms a critical interdependence between LE and DW in promoting equity and empowerment among PMDs. Continuous learning enhances employability across all age groups, particularly among older adults, while decent work sustains lifelong learning engagement. However, this potential is constrained by three interlinked root causes: entrenched discrimination, disempowerment, and structural poverty. These roots generate seven systemic barriers, including attitudinal stigma, weak legal enforcement, inadequate resources, digital exclusion, inaccessible infrastructure, non-inclusive transport, and shortages of trained personnel (Aldawood et al., 2024; Chapirom, 2024; Shirzad et al., 2022). In response, this research introduces a **New Model,** the **NiNA1479 Framework**—a scalable, rights-based model that bridges LE and DW through AI-driven personalized learning, skill-to-job matching, and Universal Design. The model directly aligns with CRPD Articles 24 and 27, SDGs 4, 8, and 10, and UNESCAP's **"Make the Right Real"** initiative. It offers an evidence-based, transferable roadmap for national and ASEAN-level disability policy reform—shifting from fragmented support to systemic inclusion by 2030 (International Labour Organization, 2023).

7.Recommendations

To overcome systemic barriers and implement the NiNA1479 Framework effectively, this study proposes the following key strategies:

(1) Awareness and Advocacy Campaigns: Launch nationwide campaigns to combat stigma, stereotypes, and negative perceptions about PMDs. Highlight the abilities and contributions of PMDs to create an inclusive societal mindset.

(2) **Empowerment Through Education and Technology:** Provide one computer or tablet with internet access to each PMD or their family, enabling access to adaptive learning tools, online resources, and digital literacy programs. Expand the NiNA1479 platform with localized features, such as multilingual support, to enhance accessibility in rural areas.

(3) **Employment Quota System and Incentives:** Introduce a **National Employment Quota System**, requiring companies to allocate 3% of their workforce to PMDs, supported by tax benefits and workplace accommodations. Success Metric: Increase PMD employment rates by 20% within five years.

(4) **Policy Enforcement and Monitoring:** Strengthen CRPD-aligned policy enforcement through annual compliance audits and public reporting mechanisms. Provide training for policymakers and stakeholders to ensure effective implementation. Success Metric: Achieve 90% compliance with CRPD standards within five years.

(5) **Public-Private Collaboration:** Establish a task force involving government agencies, private sectors, and advocacy organizations to optimize resources and drive inclusivity projects. Financial incentives for private sector participation can mobilize greater support for adaptive technologies and infrastructure.

(6) **Expand Educational Access:** Develop affordable and inclusive education programs, with a focus on tertiary and vocational levels for PMDs.

(7) **Subsidize Adaptive Technologies:** Provide financial aid to low-income groups to access learning tools, adaptive technologies, and workplace accommodations.

(8) **Promote Universal Design:** Ensure public spaces and digital platforms adopt Universal Design principles to facilitate accessibility for all.

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