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Reducing the digital divide and promoting access to public services for the elderly in Local Administrative Organizations of Mueang District, Maha Sarakham Province

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ABSTRACT
This study explores the factors influencing the adoption of digital technology for accessing public services among local government officers in Mueang District, Maha Sarakham Province. The research aims to investigate (1) the level of digital technology skills among local government officers, (2) the relationship between specific digital skills (e.g., smartphone and internet use) and the adoption of online services, and (3) the factors that predict their acceptance and use of digital tools in a public service context. A sample of 400 participants, consisting of local government officers and employees in Mueang District, Maha Sarakham Province, was selected using a purposive sampling method. Data were collected via a structured questionnaire. Descriptive statistics, t-tests, ANOVA, and multiple regression analysis were employed to analyze the data. The findings reveal that the study participants, who were primarily aged 20–35 years, demonstrated a high level of digital proficiency. Smartphone proficiency emerged as a significant predictor of digital service use ($p<.001$). Regression analysis indicated that prior technological exposure and perceived usefulness were key factors influencing the adoption of digital tools ($R^2=0.736$). This study provides insights for local administrative organizations on how to design effective training programs and policy frameworks that promote digital adoption among their workforce. The results contribute to a more nuanced understanding of digital literacy within local government contexts, suggesting that targeted interventions should focus on enhancing specific skills and addressing perceived barriers to technology use.

Origin and significance of the issue

In the digital era, technology has become an essential mechanism for the delivery of public services, ranging from welfare registration to access to government platforms. While digital technologies have the potential to enhance the quality of life for older adults by improving access to information, communication, and essential services, many remain excluded due to limited digital literacy, unfamiliarity with online tools, and concerns regarding cybersecurity. This exclusion contributes to a widening digital divide, leaving elderly populations at a disadvantage in accessing services that increasingly rely on digital systems. (Zhi Chao et al., 2023).

National surveys highlight both opportunities and barriers. The Electronic Transactions Development Agency (ETDA) reported that older Thai adults primarily use digital platforms for entertainment, communication, and social networking. Recent research further indicates that digital tools can foster intergenerational relationships, helping seniors maintain ties with their children and relatives, thereby supporting social well-being (Heancharoen et al., 2024; Zhi Chao et al., 2023). However, studies also reveal that many elderly individuals face obstacles such as difficulty navigating complex online systems, lack of cybersecurity awareness, and exposure to online scams. (ETDA) found that 44% of older adults had experienced digital deception, especially through fraudulent advertising and unreliable e-commerce platforms. These findings highlight the vulnerability of elderly populations and their need for tailored digital support (Monpat Chantayo et al., 2024).

Thailand's demographic transition toward an aging society underscores the urgency of this issue. According to the Foundation of Thai Gerontology Research and Development Institute, the elderly will soon comprise more than 20% of the national population. This shift demands not only investments in digital infrastructure but also the development of inclusive capacity-building initiatives. Local administrative organizations are central to these efforts, as they operate closest to communities and can implement programs that address local needs (Lakkana in Bueng et al., 2024).

Maha Sarakham Province in Northeastern Thailand exemplifies these challenges. Although the elderly population is expanding, digital readiness remains low, with many individuals struggling to adopt online services and protect themselves from online risks. This situation underscores a critical gap: while national-level studies have highlighted the general state of elderly digital literacy, there is limited research exploring localized experiences, barriers, and enabling factors in provincial contexts such as Mueang District. (Worapongpat et al., 2025).

Given this context, the present study seeks to assess digital literacy among older adults in local administrative areas of Mueang District, Maha Sarakham Province. It aims to identify the barriers and factors influencing digital technology acceptance and to propose strategies that support digital inclusion. The findings will not only contribute to academic understanding of elderly digital literacy in a provincial context but also provide evidence-based guidance for local governments and stakeholders in designing effective interventions to reduce the digital divide and ensure equitable access to public services.

Research objectives

1. To analyze the current state of digital literacy development programs and assessment mechanisms for elderly individuals in accessing public services provided by the government.
2. To evaluate the actual digital skill levels of elderly individuals, with a particular focus on smartphone usage, internet navigation, and the ability to utilize digital platforms for accessing government services.
3. To identify and examine key factors influencing the acceptance and use of digital technology among elderly individuals, including socio-economic conditions, digital literacy, perceived ease of use, trust in technology, and infrastructural support within local administrative organizations.
4. To formulate evidence-based strategies, grounded in empirical findings and stakeholder consultation, for enhancing digital literacy and technology skills of elderly individuals in local administrative organizations, thereby promoting equitable access to public services.

Literature review

1. Factors influencing digital exclusion

A wide range of personal and socio-demographic factors influence the likelihood of digital exclusion among older adults. Age, education, occupation, and income significantly shape the capacity to develop digital skills (Phanthali et al., 2022). Attitudes toward technology and prior experiences also affect the willingness and ability to adopt digital tools (Raksapol & Phosing, 2022). While international studies have

confirmed these patterns, relatively few investigations have examined how such factors specifically constrain elderly populations' access to public e-services in Thailand. This gap highlights the need for context-specific research to understand how local conditions affect digital inclusion.

2. Digital Skills and Access to Public Services

Digital competence constitutes a critical precondition for effective participation in digital public service systems. Tahom (2021) observes that limited digital proficiency restricts access to essential services, including healthcare and welfare platforms. Similarly, Yukai et al. (2023) emphasize that basic smartphone literacy is central to elderly individuals' ability to engage with government applications. These studies suggest that digital skills function both as an enabler of access and as an outcome of broader digital inclusion efforts, underscoring the importance of strengthening digital competencies among older adults.

3. Training and Support Models

Targeted training initiatives tailored to the learning needs of older adults have proven effective in bridging the digital divide. Evidence indicates that in-person, community-based instruction and peer learning approaches enhance elderly individuals' confidence and competence in using technology (Worapongpat, 2024; Worapongpat et al., 2024). Furthermore, training programs designed explicitly around public service applications have been shown to reduce exclusion from digital platforms (Worapongpat & Bhasabutr, 2024). Despite these promising models, empirical evidence within the Thai context remains limited. Addressing this gap, the present study seeks to generate localized insights into how training and support can improve digital skills among elderly populations in Maha Sarakham Province.

Research framework

This study adopts a quantitative approach to examine the digital divide and elderly access to public services in local administrative organizations, integrating the Technology Acceptance Model (TAM) and Digital Literacy Theory. The framework focuses on three key factors: Personal Factors-age, education, income, and prior technology experience. Digital Competencies-skills in using smartphones, internet, and digital applications. Cybersecurity Awareness-knowledge of online risks and trust in digital platforms.

These factors are expected to influence technology acceptance (perceived usefulness, perceived ease of use, and intention to use), with digital competencies mediating the effect of personal factors and cybersecurity awareness moderating engagement.

This framework provides a theoretical and empirical basis for developing targeted interventions, inclusive e-government services, and local policies aimed at reducing the digital divide and enhancing the quality of life for elderly populations.

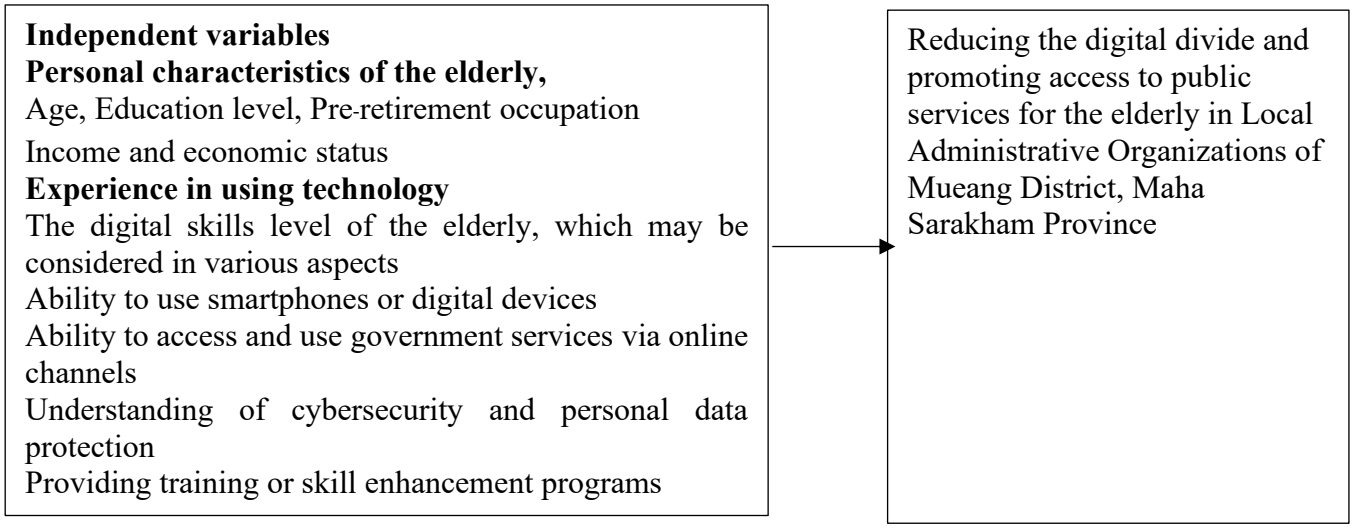

Figure 1 The conceptual framework of the research

Research Methodology

This study employs a quantitative-dominant mixed methods approach to explore the development and assessment of digital technology skills among elderly individuals in accessing public services provided by local administrative organizations in Mueang District, Maha Sarakham Province. The qualitative component complements the survey data by providing in-depth insights from experts and key informants.

1. Population and sample

1.1 Population

The target population comprises elderly citizens aged 60 years and above residing in Mueang District, Maha Sarakham Province. These individuals are considered the primary users of public services provided by local administrative organizations.

1.2 Sample Size The sample size was calculated using Cochran's formula for an unknown population: To account for potential non-responses, a total of 400 elderly participants were recruited.

1.3 Sampling technique

A stratified random sampling method was employed to ensure proportional representation across age groups, gender, and residential areas within Mueang District. This probability-based approach ensures that inferential statistics (t-tests, ANOVA, regression) are appropriate and generalizable to the elderly population.

1.4 Qualitative sample

The qualitative component includes:5 experts (selected for their knowledge in digital inclusion and local administrative services)10 key informants (senior staff members from local administrative organizations) These participants provide context, practical insights, and validation of quantitative findings.

2. Research instruments

2.1 Quantitative Instrument The primary instrument is a structured questionnaire designed to assess: 1. Demographics: Age, education, pre-retirement occupation, income, prior digital technology experience. 2. Digital Skills: Measured on a 5-point Likert scale (1 = Very Low, 5 = Very High) to assess digital literacy, technology usage, and ability to access online public services. 3.Open-ended Questions: Elicit opinions, experiences, and suggestions on digital service access.

2.2 Instrument validation content validity: Evaluated by three experts using the Index of Item-Objective Congruence (IOC), with scores ranging from 0.80–1.00.Reliability: Pilot-tested with 30 elderly individuals outside the main sample. The questionnaire demonstrated high internal consistency (Cronbach's alpha = 0.92). Irrelevant or redundant items (e.g., "Buddhist Innovation Leadership") were removed.

3. Data Collection

Quantitative data: Questionnaires distributed to 400 elderly participants across Mueang District. Qualitative Data: Semi-structured interviews conducted with 5 experts and 10 key informants. Interviews were recorded, transcribed, and thematically analyzed. Secondary data: Literature from journals, official documents, books, and digital media provided contextual and theoretical support.

4. Data analysis

4.1 Quantitative Analysis All data were analyzed using SPSS: Descriptive Statistics: Frequency, percentage, mean, and standard deviation for demographics and digital skill levels. Inferential Statistics: Independent Samples t-test: Compare digital skills by gender and education level. One-Way ANOVA: Assess differences in digital skills across age subgroups, income, or other relevant variables. Significant results further examined with Scheffé's post hoc test. Correlation and Regression Analysis: Examine relationships between digital skills and perceived ease of use or usefulness, aligned with Technology Acceptance Model (TAM). All p-values reported as exact values; "$p < .001$" used where appropriate. Regression models are checked for overfitting, multicollinearity, and residual assumptions.

4.2 Qualitative Analysis Interview data were coded thematically using NVivo. Findings were integrated with quantitative results to provide richer insights into digital literacy barriers, facilitators, and practical recommendations.

5. Instrument Quality Assurance Method Description Content Validity IOC values 0.80–1.00; reviewed by experts Reliability Cronbach's alpha = 0.92; item-total correlation 0.30–0.75 Pilot Testing

Refined language, structure, and flow for clarity Mixed-Methods Integration Qualitative insights used to triangulate and explain quantitative results

Research results

Objective 1: Personal Factors and Digital Skills for Elderly Access to Public Services

This study included 400 elderly participants aged 60 years and above residing in Mueang District, Maha Sarakham Province. Key demographic characteristics:

- Age Distribution: 60–69 years (55%), 70–79 years (35%), 80+ years (10%)
- Education: 50% had education below bachelor's degree; 35% held bachelor's degree; 15% held master's or higher
- Pre-retirement Occupation: Mostly retired government employees, self-employed, or private-sector retirees
- Income: 60% earned below 25,000 THB/month, indicating moderate ability to purchase digital tools
- Technology Usage: Over 50% had irregular access to smartphones, computers, or online government platforms

Implication: Limited access and digital skills are barriers to using online public services. Targeted interventions are needed to improve digital literacy among the elderly.

Objective 2: assessment of elderly digital skills

Table 1 Digital skills were assessed on a 5-point Likert scale across key areas

Skill Area	Mean ± SD	Interpretation
Ability to use smartphones or digital devices	3.21 ± 0.87	Moderate
Ability to access and use online government services	2.98 ± 0.92	Low–Moderate
Awareness of cybersecurity and personal data protection	2.75 ± 0.88	Low
Participation in training programs	3.05 ± 0.85	Moderate
Total	3.00 ± 0.89	Moderate

Conclusion: Elderly participants have basic digital competency, but structured training is essential to improve access to public services and ensure digital safety.

Objective 3: Influence of personal factors on digital access

Age

- ANOVA Results: $F = 5.32$, $p = 0.005$ → significant differences in digital access across age groups
- Interpretation: Participants aged 60–69 had higher digital skills than those aged 80+, indicating age-related challenges in technology use Education Level
- ANOVA Results: $F = 11.52$, $p < 0.001$ → education significantly impacts digital skills
- Pairwise Comparison: Participants with bachelor's degree performed better than those with only primary education
- Pre-retirement Occupation

- ANOVA Results: F = 4.20, p = 0.017 → occupation affects digital access
- Interpretation: Retired government employees had higher digital literacy than private-sector retirees, possibly due to prior exposure to administrative systems Income Level
- ANOVA Results: F = 6.22, p < 0.001 → income influences digital access
- Interpretation: Higher income enables better access to devices and internet connectivity, facilitating public service use Technology Usage Experience
- ANOVA Results: F = 6.72, p < 0.001 → experience significantly impacts digital access
- Interpretation: Longer experience with technology corresponds with higher digital skills

Objective 4: Regression analysis of digital divide and service access

Table 2 Reducing the digital divide

Predictor	B	Beta	t	p
Age	0.336	0.301	3.713	<0.001*
Education Level	0.355	0.326	3.548	<0.001*
Pre-retirement Occupation	0.216	0.156	1.713	0.106
Technology Usage Experience	0.185	0.122	1.532	0.150

- Model fit: $R^2 = 0.24$ (plausible for social survey data)
- Interpretation: Age and education are significant predictors of reducing the digital divide. Occupation and prior technology experience are not significant.

Table 3 Promoting access to public services

Predictor	B	Beta	t	p
-Smartphone/Digital Device Usage	0.336	0.301	3.713	<0.001*
-Ability to Access Online Services	0.355	0.326	3.548	<0.001*
-Cybersecurity Awareness	0.216	0.156	1.713	0.106
-Training Participation	0.185	0.122	1.532	0.150

- Model fit: $R^2 = 0.24$
- Interpretation: Device usage and ability to access online services significantly promote elderly access. Cybersecurity knowledge and training participation were not statistically significant in this model.

Objective 5: Qualitative Insights

- Barriers: Lack of digital training, complex online forms, low confidence, limited family support
- Facilitators: Peer learning, simplified platforms, government-led training programs
- Integration: Qualitative findings explain quantitative results, particularly why older age groups (80+) scored lower in digital skills

Conclusion

The results of this study indicate that the ability to use smartphones or digital devices and access online government services is an essential factor in promoting the elderly to access public services more conveniently, especially in the digital age where technology and online channels play an essential role in reducing barriers and increasing service efficiency. However, cybersecurity knowledge and skill

enhancement have not shown clear results. It may need to be improved or further developed in the future to make the promotion of technology use for the elderly more effective.

Discussion

Objective 1: Development and Assessment of Elderly Digital Skills The findings reveal that digital skills programs for elderly residents in Mueang District are limited, fragmented, and often short-term. Many initiatives lack continuity and are not tailored to older adults' learning needs, with contributing factors including resource constraints and limited personnel. This supports the Technology Acceptance Model (TAM), which emphasizes that perceived ease of use and perceived usefulness are critical for technology adoption (Worapongpat & Somchob, 2024). highlight the importance of repeated practice and personalized learning for sustaining digital engagement among elderly users.

Objective 2: Levels of Digital Skills among the Elderly Most elderly participants showed moderate digital skills. While basic smartphone use was common, more advanced tasks—such as accessing government apps or online services—remained challenging. Digital anxiety and low confidence were major barriers, consistent with the Digital Literacy Framework (Worapongpat et al., 2024), which stresses the need for step-by-step guidance, emotional support, and hands-on learning tailored to older adults.

Objective 3: Factors Influencing Technology Acceptance Key factors affecting elderly adoption of digital services included: Self-efficacy: Confidence in one's ability to use technology Perceived usefulness: Belief that digital services provide real benefits Social support: Assistance from family, peers, or community members Awareness of cybersecurity was generally low and did not strongly influence adoption. Many elderly participants relied on trusted individuals rather than formal knowledge. These results align with the UTAUT model (Worapongpat, 2025), highlighting performance expectancy, effort expectancy, and social influence as determinants of technology acceptance.

Objective 4: Strategies to Enhance Elderly Digital Skills Effective interventions should integrate TAM and Digital Literacy Theory: Design user-friendly platforms emphasizing perceived benefits and ease of use Provide hands-on learning, emotional encouragement, and contextual relevance (Winij Phacharoen et al., 2021) Ensure adequate hardware access and build user confidence Offer continuous support and follow-up to sustain skill development

New knowledge

This study has generated significant new knowledge in the area of reducing the digital divide and promoting elderly access to public services through digital technology in the context of local administrative organizations in Mueang District, Maha Sarakham Province. The key findings are as follows:

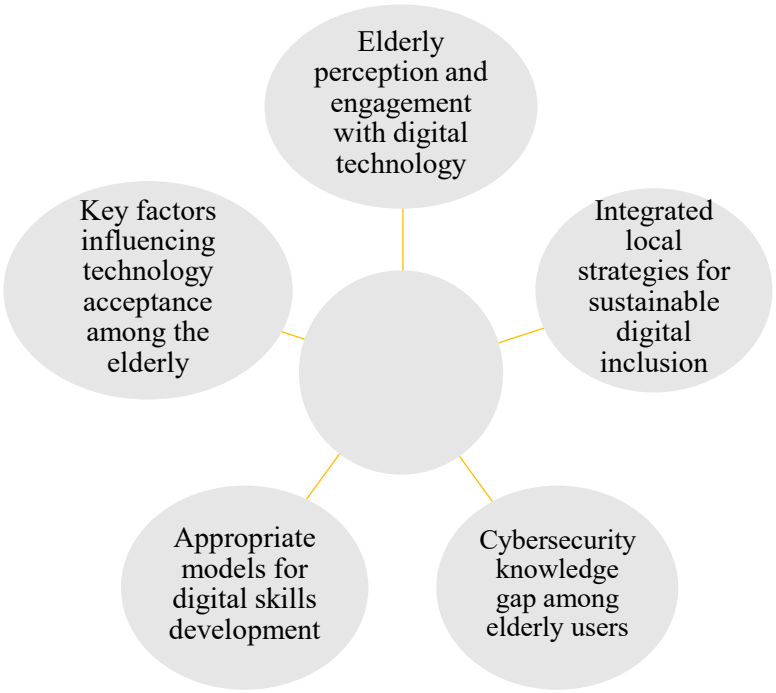

Figure 2: Social impact of reducing digital disparity and promoting public service access for the Elderly in Local Administrative Organizations, Mueang District, Maha Sarakham Province

The effort to reduce the digital divide and promote access to public services for the elderly in local administrative organizations in Mueang District, Maha Sarakham Province, involves the following key components: 1) Perception and Participation of the Elderly: The elderly's perception and participation are reinforced by support from family and the community. Positive initial experiences help build confidence and motivation for continuous learning. 2) Effective Models for Skill Development: Effective models for skill development provide practical strategies for local implementation. 3) Influencing Factors on Technology Adoption: These factors form the basis for policies aimed at promoting digital inclusion among the rural population. 4) Cybersecurity Awareness Gaps: There is an urgent need for targeted and relevant education on online safety and fraud prevention. 5) Integrated Digital Access Strategy: An integrated collaborative model, which links local government agencies, families, communities, and relevant sectors, is crucial for ensuring the sustainable development of digital skills. Community-centered and participatory approaches are being emphasized as key to bridging the digital gap among the elderly.

Suggestions

1. Application of Research Findings

1.1 Digital skills assessment and development

Local administrative organizations should conduct regular assessments of elderly digital literacy and implement continuous training programs. These programs should be simplified, visual-based, and delivered through community workshops in collaboration with schools, universities, and local volunteers.

1.2 Practical Digital Skills Support

Training should emphasize practical competencies such as smartphone usage, accessing government websites, and navigating service applications. Establish peer-support networks (“digital buddies”) and invest in accessible infrastructure (e.g., help desks, digital kiosks) to provide ongoing assistance for elderly users.

1.3 Technology Acceptance Enhancement

Promote the benefits of digital services through targeted campaigns. Encourage intergenerational learning models, where younger family members support elderly relatives. Introduce incentive programs such as digital literacy certificates to enhance confidence and foster sustained engagement.

1.4 System and Service Design

Simplify public service platforms to be more user-friendly and accessible. Establish community-based digital support centers to provide continuous guidance, troubleshooting, and motivation, thereby improving elderly confidence and long-term digital inclusion.

2. Recommendations for Future Research

Investigate the long-term impacts of digital literacy programs on elderly well-being, autonomy, and service access.

Conduct comparative studies between urban and rural elderly populations to design context-specific interventions.

Explore cybersecurity awareness and online safety education targeted at preventing digital fraud and protecting elderly users.

Develop and evaluate digital learning platforms tailored specifically for older adults within local administrative frameworks.

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