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A System Success Evaluation Framework for Digital Pension Platforms in Aging Societies

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Abstract: This study develops and validates a framework for evaluating the success of welfare-oriented digital platforms, with a focus on Thailand's national pension system. The framework integrates the Information Systems Success Moe (ISSM) and the Technology Acceptance Model (TAM) with trust as a socio-technical construct to evaluate stability, usability, and trustworthiness in aging societies. The data was collected using a survey of 400 elderly citizens and analyzed using structural equation modeling (SEM) with the Jamovi software. The findings were further supplemented by a thematic analysis of the open-ended responses, which provided context for anomalies, such as instability in use, fraud risk, and usability issues, among other concerns. System quality increased perceived ease of use but decreased perceived usefulness when instability occurred. Trust increased usefulness but was not a predictor of behavioral intention. Ease of use unexpectedly decreased intention. User satisfaction, rather than actual use, surfaced as the strongest predictor of net benefits. These findings underscore that the anomalies of adoption are a result of structural and institutional barriers rather than user reluctance. The study rethinks adoption constructs as indicators of system success, thereby expanding the ISSM-TAM integration. It provides policymakers and system architects with a means to diagnose problems and develop welfare information systems for aging societies that are more resilient, trustworthy, and accessible.

Keywords: System success framework; TAM model; Welfare IS; Digital pension; Aging society

JEL Classification: I38, O33, J14, H53

1. Introduction

Population aging and digital transformation are two of the most important megatrends of the twenty-first century. The global population aged 65 years and above is estimated to double between 2020 and 2050, continuing to strain welfare and pension systems. Instantaneously, governments (Danila & Abdullah, 2014) are pursuing the digitization of welfare delivery through multipurpose platforms that promise efficient, transparent, and transferable support. The merging of these two megatrends presents a risk: although digital platforms have the potential to streamline service delivery, they can inadvertently exclude older citizens who may have limited digital literacy, experience security concerns, or have trust deficits.

Existing models, such as the Technology Acceptance Model (TAM) and the Information Systems Success Model (ISSM) (Koo & Yang, 2025), have successfully explained adoption in both commercial and e-government (Hung et al., 2013) spaces. These models focus on perceived usefulness, ease of use, and quality (Gefen et al., 2003; Linh & Huyen, 2025; Vaportzis et al., 2017). However, the current state of welfare information systems (welfare IS) designed for older populations cannot be solely understood through these models, as they do not account for the incorporation of relational and institutional factors such as trust, which is especially important in contexts that involve sensitive, personal, and financial information.

Although ISSM, TAM, and trust theory are widely used in information systems (IS) research, how their

constructs interact within welfare information systems designed for older adults is not yet fully understood. Digital pension platforms operate under unique conditions characterized by significant institutional reliance (Zou et al., 2024), increased sensitivity to perceived entitlement, and age-related cognitive limitations, which may influence system quality, evaluative attitudes, and trust differently than in typical information systems. In this context, combining ISSM, TAM, and Trust offers a focused theoretical framework for examining how reliability cues, cognitive evaluations, and assurance perceptions affect adoption. This study does not present a new model but shows how established constructs function differently in welfare-specific, vulnerability-sensitive settings. It provides insights into trust-building and value-creating processes that are often overlooked in mainstream information systems research.

Thailand is a timely case study. The Thai government (Kulrujiphat & Wuttidittachotti, 2024) is working to digitize welfare governance and has introduced a national digital pension platform. While the platform is technically functioning, its uptake by older users remains variable. Some older users found the pension platform helpful and easy to use (Bui & Luong, 2023; Kraiwanit et al., 2025). However, concerns regarding fraud and instability tempered their perception of the platform's usefulness (Frishammar et al., 2023; Wales & Tjøstheim, 2025). Other users expressed concerns about insufficient institutional guarantees, which hindered consistent use (Karnsomdee, 2025) These administrative challenges underscore the complexity of adopting digital platforms and necessitate a reevaluation of the adoption process, encompassing a co-evaluation of success and problem effects across the technical, social, and institutional layers of the area (Chaisiripaibool et al., 2025).

This study makes three contributions. First, we extend the ISSM-TAM by positioning trust as a socio-technical variable and reframing adoption variables into outcome indicators/model success measures (welfare IS). Second, we present empirical evidence based on 400 older persons who used Thailand's pension platform (Cai, 2024; Chanyawudhiwan & Mingsiritham, 2022; International Labour Office, 2022), employing a hybrid SEM-qualitative thematic analysis approach to analyze our results (Chanyawudhiwan & Mingsiritham, 2022). Third, we present a generic framework for evaluating welfare IS that system architects and government policymakers can use to examine welfare IS in other aging societies.

The remainder of this paper is organized as follows. Section 2 reviews the literature and develops the hypotheses. In Section 3, we describe our research methodology. In Section 4, we report our findings, and Section 5 discusses the implications for system design and evaluation. Finally, Section 6 concludes with a discussion of the originality, contributions, and future research directions.

2. Literature Review and Hypothesis Development

2.1 Information Systems Success and Welfare Platforms

The ISSM describes the dimensions of IS success, including system quality, information quality, service quality, user satisfaction, actual system use, and net benefits. The ISSM has been validated in commercial and organizational IS contexts (Gunawan et al., 2025; Petter et al., 2008). However, its explanatory power for welfare IS (welfare oriented IS) (DeLone & McLean, 2003) remains unexplored. It is essential to consider the domains and contexts in which the ISSM has been applied. As welfare IS evaluations involve sensitive data, institutional trust, and additional rights of citizens, they necessitate an evaluation that extends beyond simple usability or efficiency (Fakhimi et al., 2025). This suggests that ISSM constructs have diagnostic capacity and practical applications in welfare settings, which must be evaluated in terms of institutional reliability and system robustness.

2.2 Technology Acceptance and System Usability

The TAM has demonstrated the significance of perceived usefulness (PU) and perceived ease of use (PEOU) as drivers of technology adoption (Davis, 1989). Meta-analyses (Yousafzai et al., 2007) provide validation that PU is the strongest predictor of intention, whereas PEOU tends to be inconsistent as a predictor across contexts. In welfare IS, usability is not synonymous with simplicity. It includes cognitive ergonomics, intentional functions, and resilience. Therefore, usability constructs in welfare IS have a diagnostic purpose: the failure of PEOU to predict intention may highlight instability, redundancy, or lack of institutional support.

2.3 Trust as A Socio-Technical Determinant

Trust has always been a part of TAM extensions. Trust is a consistent predictor of the adoption of commercial e-services. In the case of e-government, the findings are mixed, as trust was the driver of adoption in Germany (Distel et al., 2021), but technical quality took precedence in India (Dash & Mohanty, 2023; Saxena, 2017). Trust is crucial for elderly populations due to the risks associated with fraud, data theft, and identity theft. For the elderly, trust should be framed as a socio-technical construct, that is, not just a psychological belief but an outcome of governance and visible security (Schinagl & Shahim, 2020), as well as perceptions of institutional credibility. In

the case of welfare IS, trust is more a condition for perceived value than a direct driver of behavior.

2.4 Quality Constructs as System Success Indicators

1. Information Quality (IQ) (Machdar, 2019): Accuracy, clarity, and timeliness build user confidence in welfare transactions. Evidence suggests that the IQ is a strong predictor of PU. However, the IQ has been an inconsistent predictor of usability (Mensah & Luo, 2021). For elderly users, transparent pension information reduces cognitive barriers (Rosenberg, 2024).
2. System quality (SQ): Robustness, stability, and responsiveness are core concepts associated with system resilience. Failures (e.g., downtime and crashes) can undermine the perceived usefulness of a system, even when its usability is rated positively.
3. Service quality (ServQ): Responsiveness and support are not as important when dealing with standardized e-service systems, but for vulnerable groups with support needs, service reliability becomes much more important. Fragmented or inaccessible support signals subsystem failure rather than user deficiency.

Despite extensive research applying ISSM, TAM, and Trust to e-government (Zubir & Abdul Latip, 2023) and digital service contexts (Noor, 2022; Al Osaimi et al., 2025; Patrick & Marques, 2024), prior studies have given comparatively limited attention to how these frameworks operate within welfare information systems designed for older adults (Ruiz-Figueroa et al., 2024). Existing literature tends to examine system quality, evaluative beliefs (Fishbein & Ajzen, 1977), and trust in isolation, providing insufficient insight into how these constructs jointly shape adoption when users face institutional dependency, entitlement concerns, and age-related cognitive constraints (Weck & Afanassieva, 2023; Yang et al., 2023; Zhou, 2014). This gap is especially relevant for digital pension platforms, where signals of reliability (Wang et al., 2024b), perceptions of assurance, and usability expectations may interact differently compared to other IS environments. By synthesizing these research strands, this study highlights the need for a more integrated (Li et al., 2021; Liu et al., 2014), welfare-specific understanding of how older adults adopt digital services.

2.5 From Adoption to System Success Evaluation

Traditional adoption studies position a linear pathway (e.g., PEOU to PU to Intention). Welfare IS reveals anomalies: SQ may improve PEOU but reduce PU if instability is present. Trust may improve PU but not intention if fraud risk dominates. Actual use may not generate net benefits if the satisfaction is low (Alkraiji & Ameen, 2021; Christanto et al., 2024). These anomalies reflect systemic rather than behavioral barriers (Dizon & Ebardo, 2025), suggesting that adoption constructs should be reframed as evaluation indicators of welfare IS and complete assessment of sustained system success.

2.6 Hypothesis Development

Based on this framing, the hypotheses were reformulated as diagnostic pathways.

1. IQ
H1: IQ positively influences PEOU.
H4: IQ positively influences PU.
2. SQ
H2: SQ positively influences PEOU.
H5: SQ positively influences PU.
3. ServQ
H3: ServQ positively influences PEOU.
H6: ServQ positively influences PU.
4. Trust
H7: Trust has a positive influence on PU.
H11: Trust has a positive influence on BI.
5. PEOU
H8: PEOU positively influenced PU.
H9: PEOU positively influences user intention (IU).
6. PU
H10: PU positively influences IU.
7. IU
H12: IU has a positive influence on BI.
H13: IU has a positive influence on US.
8. Behavioral intention (BI)
H14: BI positively influences the US.

H15: BI has a positive influence on AU.

9. User satisfaction (US)

H16: The US has a positive influence on the NB.

10. Actual use (AU)

H17: AU has a positive influence on NB.

Together, these hypotheses position ISSM-TAM-Trust not only as an adoption model but also as a framework for evaluating system success, capable of diagnosing where welfare IS succeeds or fails in practice. Figure 1 presents the conceptual framework integrating ISSM, TAM, and Trust for evaluating system success in welfare-oriented digital platforms.

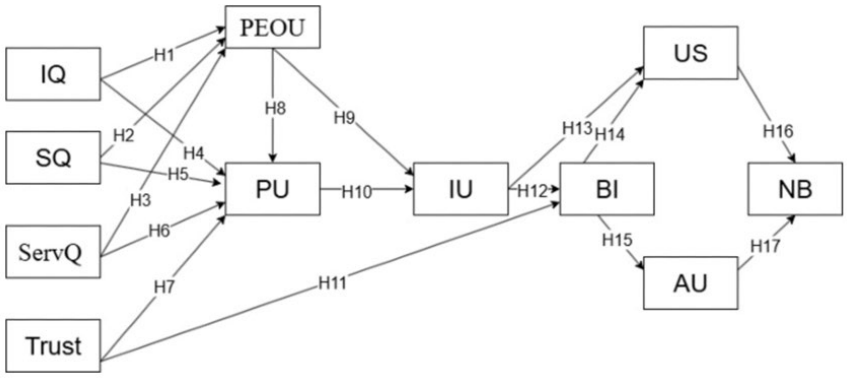

Figure 1. Conceptual framework integrating ISSM, TAM, and Trust constructs for welfare information systems

3. Research Methodology

3.1 Research Design

This study employed a quantitative cross-sectional survey design to investigate the adoption and utilization of Thailand's national digital pension platform by older adults (Falk, 2024; Loipha, 2014; Lomchavakarn, 2024). A cross-sectional design was suitable because the study aimed to understand perceptions, attitudes, and behaviors at a specific point in time rather than tracking changes longitudinally. A quantitative survey-based approach also ensured that many individuals provided standardized responses, which enhanced comparability.

Regarding testing, the research model, which incorporates 17 hypotheses linking constructs from the ISSM, TAM, and trust frameworks, was tested. Structural equation modeling (SEM) was used in the Jamovi software. SEM was considered appropriate because it allows for the simultaneous estimation of latent variables, measurement errors, and complex mediation paths. Compared to regression or path analysis, SEM provides a stronger test of theoretical models of e-government adoption, where evaluative beliefs (usefulness and ease of use) and relationship-based beliefs (trust and satisfaction) are evaluated together (Bentler & Chou, 1987; Hair, 2014; Henseler et al., 2015; Hu & Bentler, 1999). This is consistent with recent global studies on digital inclusion benefit systems.

3.2 Population and Sampling

The population consisted of Thai citizens aged 60 years and above who either used the digital pension platform or were eligible to use the platform. There are two aspects of welfare IS: governments serve vulnerable populations, and vulnerable populations are interested civil groups that need to express trust in bureaucratic governmental systems. Thus, the population and sample focused on older adults who used digital services. The sample was selected through stratified random sampling by age cohorts (60–69, 70–79, 80+), gender, employment type, and digital literacy category. Stratification was important for reducing the probability of sampling bias, as older adults vary in their capabilities.

The sample adequacy was consistent with the SEM recommendation. A model with modest complexity requires 200 cases, while aiming for 300–500 cases is preferable for adequate fit and generalizability. This study targeted 400 respondents, which represented a sufficient sample size that exceeded the threshold for diagnostic checking.

3.3 Instrument Development

The survey instrument operationalized reflective constructs based on validated ISSM, TAM, and trust scales.

The items were measured on a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree) (Koo & Yang, 2025). The key constructs included:

1. SQ, IQ, ServQ: adapted from the ISSM dimensions.
2. PEOU and PU from TAM.
3. Trust: adapted from e-government and e-commerce trust research.
4. BI, US, NB: ISSM-TAM integration.

3.3.1 Content validity

Content validity was assessed using the Index of Item-Objective Congruence (IOC). Three academic experts in the fields of IS and e-governance independently rated each item for clarity, appropriateness, and relevance. Items that received a score of less than 0.50 were modified and/or removed. All final items received an IOC score greater than 0.70, indicating a strong alignment with the objectives of evaluating the system.

3.3.2 Pilot testing

A pilot study with 30 older adults was conducted to test the readability, clarity, and time burden. The feedback indicated the need for simpler wording, particularly for participants with low digital literacy. Adjustments to the wording and response options led to greater inclusiveness and reduced respondent fatigue. Pilot testing confirmed feasibility and demonstrated understanding, an important consideration when conducting welfare IS studies that prioritize accessibility.

3.4 Data Collection Procedures

The hybrid collection strategy provides inclusiveness and reduces bias. Participants with digital literacy were able to complete an online survey. Simultaneously, the data collection team members were trained and assisted less digitally literate respondents by administering the survey face-to-face. Participants with visual impairments received the surveys in large print. This inclusive approach follows welfare IS evaluation principles, where the adoption of systems is based on equitable access and participation.

Informed consent was obtained from all participants, and all signed consent forms were accompanied by assurances of confidentiality, voluntary participation, and the right to withdraw from the study at any time. Ethical approval was granted by the Institutional Review Board (IRB) of Rajamangala University of Technology Phra Nakhon Approval No. IRB -COE-075-2025. All procedures conformed to the principles outlined in the Declaration of Helsinki.

3.5 Data Analysis

The data analysis was conducted in two sequential stages. Measurement model validation.

1. Reliability: Cronbach's $\alpha \geq 0.70$ and composite reliability (CR ≥ 0.80) confirmed construct consistency.
2. Convergent Validity: Average Variance Extracted (AVE) ≥ 0.50 established construct validity.
3. Discriminant Validity: Fornell–Larcker criterion and Heterotrait-Monotrait (HTMT) ratio (< 0.90) verified construct distinctiveness.
4. Structural model evaluation.
5. The SEM tested 17 hypothesized pathways.
6. The model fit indices satisfied conventional thresholds: the chi-square to degrees of freedom ratio (χ^2/df) < 3.0; the Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) ≥ 0.90; the Root Mean Square Error of Approximation (RMSEA) < 0.08; and the Standardized Root Mean Square Residual (SRMR) < 0.08.
7. Path coefficients and significance levels ($p < 0.05$) identified both supported and anomalous relationships, which were reframed as system diagnostic outcomes.

3.6 Methodological Rigor and Novelty

This study demonstrates rigor in fours ways.

1. Validity and reliability: Multiple psychometric tests established a robust evaluation model.
2. Representative sampling: The stratified design captured the heterogeneity among elderly users, which is critical for welfare IS contexts.
3. Analytical strength: SEM offers simultaneous testing of technical and socio-technical constructs, reframing anomalies (e.g., SQ to PU negative) as system design diagnostics.
4. Ethical safeguards: Adherence to IRB standards and accessibility practices ensured inclusivity, dignity, and data integrity.

The novelty of this study lies in reframing adoption constructs (e.g., PEOU, PU, Trust) as evaluation indicators within a hybrid ISSM-TAM-Trust model. This methodology not only confirms psychometric rigor but also situates

welfare IS as a socio-technical infrastructure requiring robust system evaluation.

4. Results

4.1 Respondent's Profile and Characteristics

The survey received responses from individuals across various components of the civil service and pension systems. The highest percentage of respondents were civil servants or employees with permanent positions at 79.25%. Civil service employees comprise the most significant proportion of active government employees (United Nations, 2023; United Nations Department of Economic & Social Affairs, 2022) in the country. This suggests that the study group was representative of most of the active government workforce in the country. Pensioners comprised 15.5% of respondents, university pensioners 3.5%, and those receiving monthly allowances 1.75%. The sample consisted of 74% women and 26% men. This gender distribution aligns with national statistics, which indicate that women tend to live longer than men and, therefore, comprise most of the population that is retired.

4.2 Measurement Model Assessment

Before testing structural relationships, the measurement model was evaluated for reliability and validity. Reliability was examined using both Cronbach's α and CR. Each construct demonstrated the acceptable reliability threshold of 0.70, while the overall Cronbach's alpha scores ranged from a low of 0.762 (AU) to a high of 0.960 (PU). Moreover, all CR also reached the minimum 0.70 threshold, obtaining a range of 0.770 (AG) to 0.959 (NB), providing firm reliability confirmation.

Convergent validity was assessed using AVE. All constructs achieved the cut-off values of 0.50 for AVE (ranging from 0.594 (US) to 0.865 (NB). The confirmatory factor analysis results provided robust evidence ($p < 0.001$) that all factor loadings were statistically significant, as all factor loadings exceeded 0.60, and the majority were above 0.80, thereby fulfilling the minimum requirement for convergent validity. The reliability and convergent validity results are summarized in Table 1.

Table 1. Construct reliability and convergent validity results

Construct	Cronbach's α	CR	AVE
IQ	0.945	0.922	0.695
SQ	0.905	0.860	0.720
SERVQ	0.936	0.959	0.852
TRUST	0.813	0.814	0.687
PU	0.960	0.927	0.705
PEOU	0.867	0.799	0.633
US	0.870	0.802	0.594
NB	0.926	0.928	0.865
IU	0.872	0.873	0.774
AU	0.762	0.770	0.654
BI	0.866	0.820	0.719

Discriminant validity was assessed with the Fornell-Larcker criterion and the Heterotrait-Monotrait ratio (HTMT). None of the HTMT values approached the conservative cut-off value of 0.85, providing strong evidence that none of the constructs overlapped, thereby resolving the issue of discriminant validity. Discriminant validity and model fit indices are presented in Table 2.

Table 2. Discriminant validity and model fit indices

χ^2/df	CFI	TLI	RMSEA	SRMR
2.24	0.959	0.951	0.056	0.033

Finally, the χ^2/df ratio (2.24) and all model fit index scores were extreme (CFI = 0.959, TLI = 0.951, RMSEA = 0.056, SRMR = 0.033), suggesting that the measurement model was adequate for structural analysis while confirming the measurement model as a highly appropriate evaluative for further studies.

4.3 Structural Model Results

After confirming the adequacy of the measurement model, the structural model was examined to test the 17 hypotheses. The structural model results and hypothesis testing outcomes are reported in Figure 2 and Table 3.

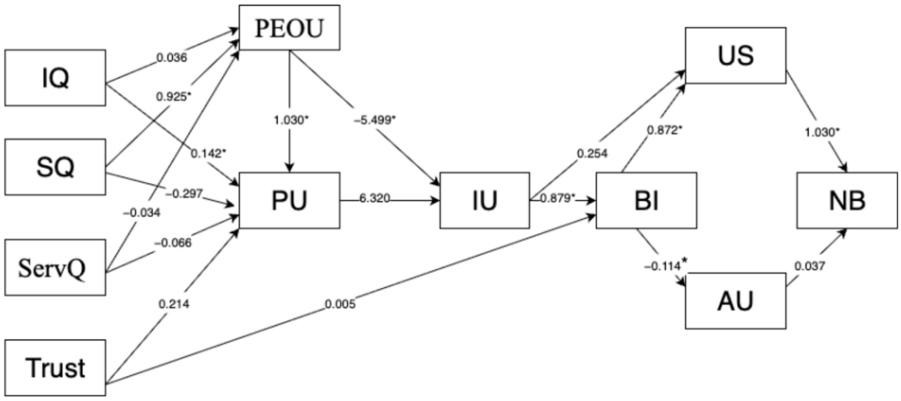

Figure2. The structural model results and hypothesis testing

Table 3. Structural model results and hypothesis testing outcomes

Items	Path Relationship	(β)	*p*-value	Result
H1	IQ → PEOU	0.036	0.704	Not Supported
H2	SQ → PEOU	0.925	< 0.001	Supported
H3	ServQ → PEOU	-0.034	0.562	Not Supported
H4	IQ → PU	0.142	0.012	Supported
H5	SQ → PU	-0.297	0.005	Supported
H6	ServQ → PU	-0.066	0.093	Not Supported
H7	TRUST → PU	0.214	0.008	Supported
H8	PEOU → PU	1.030	< 0.001	Supported
H9	PEOU → IU	-5.499	0.023	Supported
H10	PU → IU	6.320	0.008	Supported
H11	TRUST → BI	0.005	0.959	Not Supported
H12	IU → BI	0.879	< 0.001	Supported
H13	IU → US	0.254	0.098	Not Supported
H14	BI → US	0.872	< 0.001	Supported
H15	BI → AU	-0.114	0.021	Supported
H16	US → NB	1.030	< 0.001	Supported
H17	AU → NB	0.037	0.059	Not Supported

4.4 Qualitative Findings

Open-ended responses enriched the quantitative results by providing the lived experiences of elderly users. Six themes emerged:

1. Trust and security concerns: Users worried about fraud and misuse of government apps. One respondent stated, “Currently, online fraud is rampant, making pensioners lack confidence in online transactions. Even digital pension has fake applications. Government agencies must create more credibility if they want pensioners to conduct online transactions.” Another respondent mentioned that “Not confident in security systems for access because currently there are government apps being used by fraudsters for deception.” These views explain why trust improved in PU but not in BI (H7 supported, H11 not supported).

2. System stability and technical performance: System crashes and instability were significant concerns. A user explained, “The system crashes very frequently and is unstable.” Another respondent stated, “System is not very stable. Should develop for 24/7 usage. Pensioners sometimes cannot retrieve data.” These issues help explain the negative relationship between SQ and PU (H5), despite SQ improving PEOU (H2).

3. Publicity and awareness: Many users were unaware of the platform. As one said, “Personally unfamiliar with this system, never seen any publicity.” Another respondent pointed out, “The system should be publicized more extensively so that the elderly know how to use it and what it can do.” Low awareness helps explain why IU did not improve US (H13).

4. Ethical safeguards: Adherence to IRB standards and accessibility practices ensured inclusivity, dignity, and data integrity.

5. Service support and system integration: Participants described difficulties in accessing assistance. “Registration unsuccessful due to inability to verify registry data. Should have a better help system.” Others stressed confusion from multiple apps: “The Comptroller General’s Department has multiple application systems, causing user confusion.” Lack of clear support explains why SERVQ did not significantly affect PEOU or PU (H3,

H6).

6. Functionality gaps: Users desired more practical features. “Should add a function to view one’s own income and expenses.” Another suggested, “Want to be able to download tax certificates from the program.” These gaps indicate that usefulness is not only about ease of use but is also tied to the meaningful functions provided.

4.5 Integrated Results

By combining quantitative and qualitative findings, a fuller picture of adoption emerged.

1. Convergence: The quantitative evidence indicated that PEOU had a significant effect on PU (H8). The qualitative evidence confirmed this by noting that designs for elders increased perceptions of usefulness.

2. Divergence: Trust affected PU but not BI. User comments on fraud explained this divergence. The system may seem helpful, but concerns about fraud prevented users from acting on their intentions.

3. Extension: IU affected BI (H12), no effect of IU on US (H13). Qualitative comments indicated that limited visibility and knowledge contributed to lower satisfaction levels, regardless of the intention.

4. Negative paths explained: SQ → PU (H5) and BI → AU (H15) was negative. There were comments indicating that technical instability and duplicate systems resulted in a lower perceived value and that using the system sometimes led to frustration.

Overall, the integrated analysis shows that adoption cannot be understood only in terms of system quality or ease of use. Broader contextual factors, such as institutional trust, awareness campaigns, usability for older users, and ongoing services, are also important. For policymakers, this indicates that technical improvements are insufficient. Success will depend on establishing confidence, ease of practice, and visibility, as well as ensuring that the services meet the daily needs of elderly citizens.

5. Discussion

5.1 Overview

This study constructed and validated a framework for evaluating system success in welfare-oriented information systems by integrating constructs from the ISSM, TAM, and trust. The framework was applied to Thailand’s digital pension platform, revealing insights into how system quality, user perception, and institutional trust interact to influence adoption outcomes among elderly users (Nilpong & Thanasopon, 2020; Noiklueb et al., 2022; OECD, 2022). Structural results demonstrated that several expected pathways were identified. System quality was predicted to influence the perceived ease of use (H2). Perceived usefulness predicted the intention to use (H10). Additionally, user satisfaction was found to predict net benefits (H16). However, several anomalies were observed. System quality negatively affected usefulness (H5). Trust was not a significant predictor of behavioral intentions (H11). Moreover, ease of use negatively impacted the intention to use (H9). These anomalies demonstrate the importance of context, viewing adoption not simply as an individual behavioral phenomenon but as a challenge in evaluating socio-technical systems.

In addition to providing evidence to support the application of the theories of ISSM (Alsulami, 2024), TAM, and Trust, the study adds to the existing body of literature on how these theories relate to each other within welfare-oriented digital systems designed to serve the needs of elderly individuals (Al-Rahmi et al., 2021), an area with a significant lack of conceptual development. The institutional reliability, entitlement sensitivity, and perceived vulnerability of users all affect how they interpret signals about the overall quality of the digital system and the services offered through it. The study supports the idea that trust plays a crucial role in translating quality perception into a cognitive belief during high-stakes digital interactions. Our data confirms that trust serves as a precondition influencing how perceived quality leads to cognitive beliefs. ISSM explains how experience with system instability or verification friction increases cognitive load for older adults, while TAM illustrates how these experiences impact perceived usefulness and ease of use. Together, these theories demonstrate how their interdependence explains why some unexpected paths appeared in our model, such as weaker or reverse TAM relationships, which are not contradictions but adaptations of well-established constructs within welfare-specific and institutionally sensitive contexts. A contextualized explanation of this relationship enhances the theoretical contribution to the field by showing how the mechanisms of adoption (Hayat et al., 2024) change when aging populations interact with welfare technology.

5.2 Quality Constructs as System Success Drivers

The asymmetric effects of system quality suggest areas where usability and perceived benefits do not align with user satisfaction. For instance, system stability and interface usability improved perceptions of ease of use, whereas disruptions and crashes diminished perceptions of usefulness. The negative SQ → PU pathway can be explained by system-reliability theory and cognitive load research. Users, especially older adults (Wang et al., 2024a), rate

utility based on perceived stability and predictability, not just functionality. Weak reliability cues or technological instability increase monitoring demands and uncertainty, reducing users' confidence that the system will consistently deliver welfare benefits. Dependability study shows that even modest disruptions can signal system failures, eroding confidence (Choi et al., 2022). Cognitive load theory indicates that crashes, repeated verifications, and delayed system responses negatively impact older persons (Rosenberg, 2024). Thus, system quality issues increase cognitive load, limiting perceived utility despite ease of use. This implies that system resilience (the ability to perform dependably under different conditions) is a greater driver of system success than the simplistic regime of interface usability (Irawan et al., 2025; Petter et al., 2013). From a systems engineer's perspective, stability implies the existence of a failure in backend robustness, despite a positive review of usability performance. Thus, system quality must be reconceptualized in welfare IS as both a technical aspect and a proxy for institutional competence (Choi et al., 2022).

Likewise, information quality was found to strengthen usefulness but not usability. Highlighting how older adult users prefer clarity, accuracy, and transparency over ease of navigation. This finding is consistent with research emphasizing that information design constitutes a critical instrument in determining the perceived value of public-sector systems rather than interface efficiency (Rosenberg, 2024; Seifert & Charness, 2022). Similarly, service quality (Permata & Indrawati, 2024; Pham et al., 2023) did not affect the perceptions of usefulness or ease of use. Qualitative findings suggest that this may be attributed to fragmented support channels for service providers and their limited accessibility. In system terms, this reflects a support subsystem failure, where insufficient service integration prevents ServQ (Parasuraman et al., 1988) from exerting its expected influence.

5.3 Trust as a Socio-Technical Variable

A primary finding of this study is that trust is associated with usefulness but not with behavioral intention. This challenges the traditional TAM view of trust as a direct determinant of adoption behavior. Within the context of welfare IS, trust serves as a boundary condition, allowing users to recognize the value of the system without a commitment to use it. This contrasts with the heightened risk sensitivity among older users, who perceive online fraud, impersonation, and data leakage as systemic risks. From the perspective of system success, trust needs to be conceived not as an individual-level psychological construct but as a socio technical variable that invokes institutional protections, data governance issues, and credibility mechanisms.

This observation has several design implications for turning trust into behavioral intention. Welfare IS needs to incorporate visible features for security, multi-level authentication, and traceable audit trails (Stefánsson et al., 2024). Therefore, trust is less about the system interface and more about governance architecture and institutional assurance.

5.4 Usability for Elderly Users

The finding that ease of use was negatively related to intention to use (H9) creates a paradox. The unexpected negative link between PEOU and IU shows that ease of use alone does not automatically serve as an "adoption-encouraging" factor for older adults in the context of social welfare. A welfare platform that seems too "simple" might undermine older adults' confidence in using it. The simplicity may imply inadequate security, verification procedures, or protection for users' welfare entitlements. Trust in systems and how people judge their reliability are areas in which researchers have found that older adults depend on visible structural features (e.g., multi-step confirmations, audit logs) to determine whether a system is trustworthy (Svärdh et al., 2025). Additionally, cognitive load studies reveal that older adults evaluate how useful a system is based on its support for error recovery and its ability to reduce uncertainty when making high-risk decisions Therefore, if a platform prioritizes "ease of use" over providing clear structural reliability indicators, users might perceive it as less secure or less capable of protecting their pension entitlements. Consequently, ease of use can unintentionally signal lower institutional confidence and lead to lower IU, even if the older adults perceive the platform as usable. Although the elderly participants believed that the system was easy to navigate, they did not intend to use it. Thus, we can conclude that, in systems supporting older users, "ease" cannot be defined solely by the simplification of interfaces but instead applies to age-appropriate usability that involves simplifying while utilizing appropriate functionality and reliability. Previous studies on the elderly's adoption of mobile government services have shown similar patterns, where perceived ease of use failed to drive adoption without complementary perceptions of reliability and support (Zhang et al., 2022).

From a system engineering perspective, this implies that usability evaluation criteria should expand beyond interface simplicity and consider cognitive ergonomics, error tolerance, and recovery (Arief & Fuad, 2023). This would render PEOU a design diagnostic; whenever ease of use fails to engender intention, this will be an indicator of latent vulnerabilities to system stability or institutional support.

5.5 Downstream Pathways: Satisfaction, Use, and Benefits

The empirical findings of this study offer a critical redirection of the tradition IS success paradigm, particular within the context of welfare-oriented platforms. By examining the downstream relationships between satisfaction, usage, and net benefits, this populations.

5.5.1 The primacy

A foundational revelation of this research is that user satisfaction, rather than frequency of use, serves as the primary determinant of net benefits. In commercial IS literature, high usage volume is frequently employed as a proxy for system success. However, in welfare information systems, this study demonstrates that transaction frequency alone cannot capture the realization of social benefits.

Actual usage without accompanying satisfaction results in a failure to realize tangible benefits, suggesting that system design must prioritize experience quality over mere adoption levels. While this finding aligns with the core logic of the ISSM, it extends the framework by demonstrating that in high-stakes environments, features such as trust, reliability, and institutional support take precedence over usage volume. Furthermore, the observed negative relationship between behavioral intention and actual usage (H15) highlights a significant "adoption gap". This suggests that even highly motivated users are often thwarted by technical and institutional barriers. Consistent with the findings of (Nagdev & Rajesh, 2024), these gaps appear to be more structural than attitudinal, implying that evaluative metrics must pivot from usage logs to satisfaction-linked outcomes.

5.5.2 Reframing evaluation and design for vulnerable populations

The empirical anomalies identified in this study provide a roadmap for reframing system evaluation. To ensure digital pension platforms and similar welfare systems effectively serve aging societies, the following design and evaluation imperatives are proposed:

Non-Negotiable Robustness: System stability is the foundational layer of utility. Failures in backend reliability render systems unusable in the eyes of the citizen, regardless of how high the front-end usability scores may be.

Redefining Usability for Older Adults: For aging populations, simplicity is insufficient without reliability. "Ease of use" must be coupled with "certainty of outcome" to foster sustained engagement and reduce digital anxiety.

Systemic Trust Mechanisms: Trust must be viewed as a systemic requirement rather than an individual psychological state. Adoption is predicated on visible governance and data protection mechanisms that extend beyond mere interface-level assurance.

Outcome-Oriented Success Metrics: Evaluation frameworks should be centered on perceived social outcomes and individual benefits rather than the volume of digital traffic.

5.5.3 Theoretical contribution to system success literature

Finally, this study contributes to the broader body of knowledge by reconceptualizing adoption constructs as evaluative indicators of institutional success. By establishing the validity of a hybrid ISSM–TAM–Trust framework, this research furthers the understanding of how welfare-oriented systems must be evaluated for both user intent and institutional robustness.

This contribution is particularly relevant to current debates in information systems engineering regarding how evaluation models must shift when applied to vulnerable populations. It moves the discourse from a purely socio-technical alignment toward a framework of socio-institutional resilience, providing a blueprint for the successful implementation of digital public services in emerging economies.

5.6 Implications for System Evaluation and Design

This research reframes observed adoption anomalies as critical diagnostic signals for system evaluation. The findings offer several pivotal implications for the design implementation of welfare-oriented digital platforms:

1. Non-negotiable: In high-stakes welfare environments, system stability serves as the foundational layer of utility. Technical failures and instability render a platform unusable in the perception of the citizen, regardless of high front-end usability scores. Evaluation models must therefore prioritize backend reliability as a primary success factor.

2. Redefining usability for older adults: For aging populations, simplicity in design does not automatically equate to adoption if it lacks visible reliability. "Ease of use" must be coupled with a "certainty of outcome." A system that appears too simple may unintentionally signal a lack of security, suggesting that usability for seniors must be redefined to include transparency and verification.

3. Systemic trust over individual interface: Adoption in the public sector requires visible governance mechanisms that extend beyond interface-level assurance. Trust should be treated as a systemic requirement rooted in institutional competence and data protection rather than a purely individual psychological trait.

4. Satisfaction as a primary success metric: Success in welfare information systems should be quantified by

perceived social outcomes and individual benefits rather than digital traffic or usage rates. Evaluation frameworks should pivot from tracking usage logs to measuring satisfaction-linked benefits that reflect actual delivery of welfare entitlements.

5.7 Contribution to System Success Evaluation Literature

This research contributes to the information system literature by reconceptualizing adoption constructs as evaluative indicators of institutional and system success. By validating a hybrid framework integrating the ISSM, TAM, and Trust Theory, the study clarifies how welfare platforms operate under distinct socio-technical conditions. The primary theoretical contribution lies in demonstrating that established constructs such as perceived ease of use and system quality behave uniquely within high-stakes, institutionalized welfare contexts. Ultimately, this provides a blueprint for evaluating institutional robustness and socio-technical alignment, moving the discourse toward resilient evaluation models that account for the specific cognitive limitations and structural barriers faced by elderly citizens.

6. Conclusion

This study focused on the implementation of Thailand's system by integrating the ISSM, TAM, and Trust. Overall, the qualitative and quantitative approach SEM provided both statistical confirmation and context. The data confirmed several elements of TAM, such as a strong relationship between PU and IU, as well as other unexpected results, such as the negative influence of system quality on PU and the lack of significance of trust on BI.

Beyond validation in an academic context, these results contribute to broader discussions about digital inclusion in welfare services. Both the ISSM and TAM have been validated in the private sector. This study demonstrates how the explanatory power of adoption models can shift in welfare-oriented digital systems that target older adults. For example, the role of institutional trust, relative system reliability, and campaigns to raise awareness influence the development of existing relationships assumed in adoption models. Thailand's experiences provide boundary conditions to these models that can be referenced for insights into the aging societies of the Global South, where similar tensions exist between technical efficiency and institutional legitimacy.

6.1 Policy Recommendations

Based on our research, we developed an integrated qualitative-quantitative research method. We are now proposing four operational design changes to the digital pension platforms to improve its usability and encourage long-term use among elderly citizens in Thailand**.**

First, redesign the user interface to make it easier for all elderly users to navigate the platform, including features like larger fonts, simplified menus, and fewer menu levels before reaching the desired option. The qualitative analysis showed that many seniors had trouble using the platform due to confusing menus and unclear instructions, indicating that the UI should have been made more senior-friendly.

Secondly, enhance the efficiency of identity verification and user authentication. Many elderly individuals faced problems registering on the platform because their identity verification did not match stored records and/or the system crashed. To address this issue, we recommend that policymakers develop a streamlined, single trusted verification process, implement "fallback" mechanisms (such as alternative forms of identification) if the primary method fails, and clearly inform users how to resolve errors they encounter.

Thirdly, consolidate all the different applications used by the Thai government to manage pensions into a single app. Elderly participants reported feeling confused when trying to find the right app among the many government-provided options. By combining all these apps into one, the policymaker will reduce the complexity of navigating multiple platforms, cut down the time elderly users spend on each task, and enhance the overall user experience.

Table 4. Policy recommendation matrix for improving adoption of digital pension platforms

Dimension	Recommendation	Target Stakeholder
Technical	Senior-friendly interface, Stability protocols	System developers, IT units
Trust & Security	Fraud alerts, third-party data audits	Ministry of finance, independent auditors
Awareness & Support	Outreach campaigns, peer ambassador programs	Local government, senior associations
Governance & Legal	PDPA-aligned data protection, oversight committees, policy integration	Parliament, digital governance bodies

Finally, improve support features on the digital pension platforms to assist users when they encounter issues

with registration, account updates, or viewing their information. Many elderly individuals couldn't resolve problems when registering or accessing their accounts because there were no adequate support tools available. Adding features like in-app guided tours, live chat with a representative, and escalation options to contact a supervisor will provide immediate solutions and increase confidence in the platform's reliability. The synthesized policy recommendations and their target stakeholders are listed in Table 4.

6.2 Originality and Contribution Statement

This study makes original contributions to information systems engineering by repositioning technology adoption constructs within a framework for evaluating the success of welfare-oriented information systems. In contrast, previous research has implemented the ISSM and TAM in commercial and voluntary adoption contexts. This research advances the applicability of trust in high-stakes public welfare systems by embedding it as a sociotechnical variable.

From a theoretical perspective, this study demonstrates that conventional adoption pathways (e.g., system quality leading to usefulness, trust leading to intention) may operate differently in welfare contexts, where institutional reliability and perceived risks dominate user evaluations. This insight advances the literature by clarifying the boundary conditions for ISSM–TAM integration and positioning trust as a mediator of system value rather than a direct driver of behavioral intention.

Methodologically, the study contributes a validated hybrid framework that utilizes SEM and qualitative thematic analysis to test and explain complex socio-technical interdependencies. This dual approach enriches the model evaluation beyond statistical confirmation. Capturing the lived experiences of elderly users and linking anomalies to system design shortcomings.

Practically, this framework provides a means by which designers and policymakers can make informed decisions based on an evaluation of a welfare system that emphasizes the required characteristics of technology adequacy, resilience, stability, security assurances, and directed communication for successful systems. The policy matrix of this study illustrates how evaluation outcomes can directly inform system redesign, fraud prevention mechanisms, and inclusion strategies. Thus, it improves both institutional credibility and user outcomes.

In summary, this study is significant for IS engineering, socio-technical system design, and digital inclusion, as it transforms adoption constructs into a framework for evaluation. This study presents both scholarly advancements and actionable guidance for building trustworthy and sustainable welfare technologies in aging societies.

6.3 Limitations

Several limitations warrant attention, especially regarding the unusual structural paths observed in this study. First, the sample of older adults included individuals with varying levels of confidence in their digital skills and different amounts of prior experience with government systems. These factors likely affected how participants evaluated ease of use and usefulness, leading to unexpected results such as the reverse causal relationship between PEOU and IU. For instance, some older adults viewed simple interface designs as making a system easier to operate. In contrast, others saw these same simple interfaces as signs of insecurity or lack of institutional safeguards, interpreting ease of use as a sign of distrust rather than trust.

Second, there are many context-specific limitations in Thailand's digital pension delivery system, including system instability, inconsistent performance across devices, and fragmentation among the various government systems older adults need to interact with. These systemic issues may have obscured the positive effects on PU and/or PQ that typically accompany high-quality systems and services. Such limitations are plausible explanations for the anomalous pathways, such as the negative relationship between SQ and PU, and the non-significance of SERVQ.

Third, the cross-sectional design of this research only captured older adults' perceptions at a single point in time, specifically when they were using the digital pension application during its early rollout phase, when awareness was limited and performance issues were still being addressed. Therefore, the unusual pathways identified in this research may reflect transitional dynamics rather than long-term behavioral patterns. Using longitudinal or experience-based sampling methods can help determine if these pathways persist after the system has matured and older adults are more familiar with the digital pension application.

These limitations suggest several directions for future studies. Longitudinal studies would capture how perceptions of trust and usefulness change over time, especially as governments implement new safeguards and awareness campaigns. Comparative studies across countries could reveal how policies and cultural contexts influence the adoption of these practices. Methodological innovations are also needed. For example, mixed-method approaches that combine SEM with fsQCA or AI-based sentiment analysis could uncover multiple pathways to adoption or rejection. Finally, expanding theoretical models to include socio-emotional constructs would provide a more holistic view of older adults' digital adoption and align with global debates on digital inclusion in aging societies.

Author Contributions

Conceptualization, R.M. and W.S.; methodology, R.M. and S.T.; data curation, R.M. and W.S.; writing—original draft preparation, R.M.; writing—review and editing, R.M. and D.B; conceptual framework, R.M. and S.T.; data collection, K.S. and W.S.; model analysis, D.B. All authors have read and agreed to the published version of the manuscript.

Data Availability

The data used to support the research findings are available from the corresponding author upon request.

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Conflicts of Interest

The authors declare no conflict of interest.

References

Al Osaimi, M., Nujud, A., & Alkhattabi, M. (2025). Enhancing user experience in e-government services: A study on service quality in Saudi Arabia. *J. Inf. Syst. Eng. Manag.*, *10*(22). https://doi.org/10.52783/jisem.v10i22s.3509.

Alkraiji, A. & Ameen, N. (2021). The impact of service quality, trust and satisfaction on young citizen loyalty towards government e-services. *Inf. Technol. People.*, *35*(4), 1239–1270. https://doi.org/10.1108/itp-04-2020-0229.

Al-Rahmi, A. M., Shamsuddin, A., Alturki, U., Aldraiweesh, A., Yusof, F. M., Al-Rahmi, W. M., & Aljeraiwi, A. A. (2021). The influence of information system success and technology acceptance model on social media factors in education. *Sustainability*, *13*(14), 7770. https://doi.org/10.3390/su13147770.

Alsulami, S. G. (2024). Integration of TAM and ISSM into student satisfaction with AI learning intervention: Empirical evidence from Islamic studies. *Pak. J. Life Soc. Sci.*, *22*(2). https://doi.org/10.57239/pjlss-2024-22.2.00479.

Arief, A. & Fuad, A. (2023). Age-dependent user perception analysis of web application using technology acceptance model approach: A case study. *Technium Rom. J. Appl. Sci. Technol.*, *17*, 95. https://doi.org/10.47577/technium.v17i.10052.

Bentler, P. M. & Chou, C. (1987). Practical issues in structural modeling. *Sociol. Methods Res.*, *16*(1), 78–117. https://doi.org/10.1177/0049124187016001004.

Bui, M. T. & Luong, T. N. O. (2023). Financial inclusion for the elderly in Thailand and the role of information communication technology. *Borsa Istanb. Rev.*, *23*(4), 818–833. https://doi.org/10.1016/j.bir.2023.02.003.

Cai, Y. (2024). Analyzing behavioral changes in the elderly under the influence of social media through the lens of the technology acceptance model. *Adv. Econ. Manag. Polit. Sci.*, *134*(1), 58–67. https://doi.org/10.54254/2754-1169/2024.18685.

Chaisiripaibool, S., Kraiwanit, T., Rafiyya, A., Snongtaweeporn, T., & Yuenyong, N. (2025). Digital asset adoption in developing economy: A study of risk perception and related issues. *Risk Gov. Control Financ. Mark. Inst.*, *15*(1), 37–49. https://doi.org/10.22495/rgcv15i1p4.

Chanyawudhiwan, G. & Mingsiritham, K. (2022). Analysis of elderly use of digital technology in Thailand. *Int. J. Interact. Mob. Technol.*, *16*(7), 173–181. https://doi.org/10.3991/ijim.v16i07.28755.

Choi, K., Chan, S., Ho, C., & Matejak, M. (2022). Development of a healthcare information system for community care of older adults and evaluation of its acceptance and usability. *Digit. Health.*, *8*, 20552076221109083. https://doi.org/10.1177/20552076221109083.

Christanto, H. J., Sutresno, S. A., Singgalen, Y. A., & Dewi, C. (2024). Analyzing benefits of online train ticket reservation app using technology acceptance model. *Ingén. Syst. Inf.*, *29*(1), 107–115. https://doi.org/10.18280/isi.290112.

Creswell, J. W. & Creswell, J. D. (2017). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Sage publications. https://books.google.co.th/books?id=KGNADwAAQBAJ

Danila, R. & Abdullah, A. (2014). User's satisfaction on e-government services: An integrated model. *Procedia Soc. Behav. Sci.*, *164*, 575–582. https://doi.org/10.1016/j.sbspro.2014.11.148.

Dash, A. & Mohanty, S. K. (2023). Technology readiness and the older citizen's acceptance of m-health services in India. *Digit. Policy Regul. Gov.*, *25*(2), 169–183. https://doi.org/10.1108/dprg-11-2022-0126.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Q.*, *13*(3), 319–340. https://doi.org/10.2307/249008.

DeLone, W. H. & McLean, E. R. (2003). The DeLone and McLean model of information systems success: A ten-year update. *J. Manag. Inf. Syst.*, *19*(4), 9–30. https://doi.org/10.1080/07421222.2003.11045748.

Distel, B., Koelmann, H., Schmolke, F., & Becker, J. (2021). The role of trust for citizens' adoption of public e-services. In *Trust and Communication* (pp. 163–184). Springer International Publishing. https://doi.org/10.1007/978-3-030-72945-5_8.

Dizon, G. & Ebardo, R. (2025). Barriers and motivations of older adults in digital banking adoption: Recent findings, gaps, and future directions. *Int. J. Innov. Res. Sci. Stud.*, *8*(3), 1959–1970. https://doi.org/10.53894/ijirss.v8i3.6929.

Fakhimi, M. M., Hughes, A., & Gustavson, A. M. (2025). Evaluating smart home usability and accessibility in early detection and intervention of mental health challenges among older adults: A narrative review and framework. *J. Ageing Longev.*, *5*(1), 3. https://doi.org/10.3390/jal5010003.

Falk, M. A. (2024). Causes and coping strategies for technology anxiety among the elderly in the digital age. *J. Res. Soc. Sci. Humanit.*, *3*(10), 6–11. https://doi.org/10.56397/jrssh.2024.10.02.

Fishbein, M. & Ajzen, I. (1977). *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*.

Frishammar, J., Essén, A., Bergström, F., & Ekman, T. (2023). Digital health platforms for the elderly? Key adoption and usage barriers and ways to address them. *Technol. Forecast. Soc. Change.*, *189*, 122319. https://doi.org/10.1016/j.techfore.2023.122319.

Gefen, D., Karahanna, E., & Straub, D. W. (2003). Trust and TAM in online shopping: An integrated model. *MIS Q.*, *27*(1), 51–90.

Gunawan, S., Tambunan, W. F., & Sundjaja, A. M. (2025). Factors influencing the intention to reuse self-service technology in fast food restaurants: Integration of Delone Mclean and stimulus-organism-response. *Ingén. Syst. Inf.*, *30*(2), 317–327. https://doi.org/10.18280/isi.300203.

Hair, J. F. (2014). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. Sage Publications. https://books.google.co.th/books?id=IFiarYXE1PoC

Hayat, N., Al Mamun, A., Gao, J., Yang, Q., & Hussain, W. M. H. W. (2024). Envisaging the intention and adoption of electronic health applications among middle-aged and older adults: Evidence from an emerging economy. *Digit. Health.*, *10*, 20552076241237499. https://doi.org/10.1177/20552076241237499.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *J. Acad. Mark. Sci.*, *43*(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8.

Hu, L. & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Struct. Equ. Model. Multidiscip. J.*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118.

Hung, S., Chang, C., & Kuo, S. (2013). User acceptance of mobile e-government services: An empirical study. *Gov. Inf. Q.*, *30*(1), 33–44. https://doi.org/10.1016/j.giq.2012.07.008.

International Labour Office. (2022). *Thailand Social Protection Diagnostic Review: Review of the Pension System in Thailand*. https://www.ilo.org/publications/thailand-social-protection-diagnostic-review-review-pension-system-thailand

Irawan, Y., Suryani, F. B., Wanabuliandari, S., & Muzid, S. (2025). System Usability Scale (SUS) model in evaluating internal quality audit systems for accreditation process optimization. *J. Appl. Inform. Comput.*, *9*(2), 511–516. https://doi.org/10.30871/jaic.v9i2.9210.

Karnsomdee, P. (2025). E-government adoption in Thai public sector organizations: Citizens' perspective. *J. Theor. Appl. Electron. Commer. Res.*, *20*(2), 103. https://doi.org/10.3390/jtaer20020103.

Koo, M. & Yang, S. (2025). Likert-type scale. *Encycl.*, *5*(1), 18. https://doi.org/10.3390/encyclopedia5010018.

Kraiwanit, T., Limna, P., & Suradinkura, S. (2025). Digital asset adoption in inheritance planning: Evidence from Thailand. *J. Risk Financ. Manag.*, *18*(6), 330. https://doi.org/10.3390/jrfm18060330.

Kulrujiphat, S. & Wuttidittachotti, P. (2024). A guideline of security and privacy improvement for promoting a Thai government e-service digital trust. In *2024 Research, Invention, and Innovation Congress: Innovative Electricals and Electronics (RI2C)* (pp. 5–8). https://doi.org/10.1109/ri2c64012.2024.10784415.

Li, G., Zeng, Y., Zhang, J., & Zhao, Y. (2021). An integrated strategy to bridge the digital divide among the elderly: A solution based on information system. In *2021 7th International Conference on Information Management (ICIM)* (pp. 77–81). https://doi.org/10.1109/ICIM52229.2021.9417139.

Linh, T. T. & Huyen, N. T. T. (2025). An extension of Trust and TAM model with TPB in the adoption of digital payment: An empirical study in Vietnam. *F1000Research.*, *14*, 127. https://doi.org/10.12688/f1000research.157763.1.

Liu, Y., Li, H., Kostakos, V., Goncalves, J., Hosio, S., & Hu, F. (2014). An empirical investigation of mobile

government adoption in rural China: A case study in Zhejiang province. *Gov. Inf. Q.*, *31*(3), 432–442. https://doi.org/10.1016/j.giq.2014.02.008.
Loipha, S. (2014). Thai elderly behavior of internet use. *Procedia Soc. Behav. Sci.*, *147*, 104–110. https://doi.org/10.1016/j.sbspro.2014.07.125.
Lomchavakarn, P. (2024). Digital tooling with soft power to drive the smart silver economy under the aged society of Thailand. *Edelweiss Appl. Sci. Technol.*, *8*(6), 5979–5987. https://doi.org/10.55214/25768484.v8i6.3294.
Machdar, N. M. (2019). The effect of information quality on perceived usefulness and perceived ease of use. *Bus. Entrep. Rev.*, *15*(2), 131–146. https://doi.org/10.25105/ber.v15i2.4630.
Mensah, I. K. & Luo, C. (2021). Exploring factors determining Chinese college students' satisfaction with e-government services: The technology acceptance model (TAM) approach. *Inf. Resour. Manag. J.*, *34*(3), 1–20. https://doi.org/10.4018/irmj.2021070101.
Nagdev, K. & Rajesh, A. (2024). Extending intention to use toward postadoption behavior—Conceptualizing actual usage for information technology-enabled banking services. *Technol. Mind Behav.*, *5*(2), 1–17. https://doi.org/10.1037/tmb0000132.
Nilpong, R. & Thanasopon, B. (2020). Factors affecting intention to use of government websites in Thai elder: The Webqual model. In *2020 12th International Conference on Information Technology and Electrical Engineering (ICITEE)* (pp. 146–151). https://doi.org/10.1109/icitee49829.2020.9271711.
Noiklueb, C., Boonlue, S., & Srikaew, D. (2022). Development of cyber wellness assessment model for Thai elderly population. In *2022 International Conference on Digital Government Technology and Innovation (DGTi-CON)* (pp. 43–46). https://doi.org/10.1109/dgti-con53875.2022.9849181.
Noor, M. (2022). The effect of e-service quality on user satisfaction and loyalty in accessing e-government information. *Int. J. Data Netw. Sci.*, *6*(3). https://doi.org/10.5267/j.ijdns.2022.2.002.
OECD. (2022). *Open and Connected Government Review of Thailand*. OECD Publishing. https://doi.org/10.1787/e1593a0c-en.
Parasuraman, A. B. L. L., Zeithaml, V. A., & Berry, L. (1988). *SERVQUAL: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality*.
Patrick, L. C. & Marques, J. A. L. (2024). Mini-programs in mobile payment to access eGovernment in China's Greater Bay Area—Exploring the determinants and mechanism from self-determination and motivation theory. *Cogent Soc. Sci.*, *10*(1), 2300515. https://doi.org/10.1080/23311886.2023.2300515.
Permata, S. S. & Indrawati, I. (2024). The effect of perceived ease of use and service quality on customer loyalty with customer satisfaction as an intervening variable: Case study on Tokopedia. *Int. J.*, *7*(8).
Petter, S., DeLone, W., & McLean, E. (2008). Measuring information systems success: Models, dimensions, measures, and interrelationships. *Eur. J. Inf. Syst.*, *17*(3), 236–263. https://doi.org/10.1057/ejis.2008.15.
Petter, S., DeLone, W., & McLean, E. R. (2013). Information systems success: The quest for the independent variables. *J. Manag. Inf. Syst.*, *29*(4), 7–62. https://doi.org/10.2753/mis0742-1222290401.
Pham, L., Limbu, Y. B., Le, M. T. T., & Nguyen, N. L. (2023). E-government service quality, perceived value, satisfaction, and loyalty: Evidence from a newly emerging country. *J. Pub. Pol.*, *43*(4), 812–833. https://doi.org/10.1017/s0143814x23000296.
Rosenberg, D. (2024). Older adults' e-government use for bureaucratic and transactional purposes: The role of website-related perceptions and subjective digital skills. *Transf. Gov. People Process Policy.*, *18*(2), 257–269. https://doi.org/10.1108/tg-08-2023-0116.
Ruiz-Figueroa, I., Minguela, M. Á., & Munuera, P. (2024). A social work analysis of facilitators of and barriers to adopting technology in older adults: A systematic literature review. *J. Gerontol. Soc. Work.*, *67*(5), 639–659. https://doi.org/10.1080/01634372.2024.2339977.
Saxena, S. (2017). Enhancing ICT infrastructure in public services: Factors influencing mobile government (m-government) adoption in India. *Bottom Line.*, *30*(4), 279–296. https://doi.org/10.1108/bl-08-2017-0017.
Schinagl, S. & Shahim, A. (2020). What do we know about information security governance?: "From the basement to the boardroom": Towards digital security governance. *Inf. Comput. Secur.*, *28*(2), 261–292. https://doi.org/10.1108/ics-02-2019-0033.
Seifert, A. & Charness, N. (2022). Digital transformation of everyday lives of older Swiss adults: Use of and attitudes toward current and future digital services. *Eur. J. Ageing.*, *19*(3), 729–739. https://doi.org/10.1007/s10433-021-00677-9.
Stefánsson, B., Helgadóttir, A. G., Nizon-Deladoeuille, M., Neukirchen, H., & Welsh, T. (2024). Understanding trust in authentication methods for Icelandic digital public services. In *2024 11th International Conference on Social Networks Analysis, Management and Security (SNAMS)* (pp. 118–125). https://doi.org/10.1109/snams64316.2024.10883784.
Svärdh, S. A., Lorenzini, G. C., Samuelsson, U., Schmidt, S. M., Iwarsson, S., & Fristedt, S. (2025). "It is very convenient when it works—Successes and challenges with welfare technology"—A qualitative study. *PLOS Digit. Health.*, *4*(4), e0000844. https://doi.org/10.1371/journal.pdig.0000844.
United Nations. (2023). *World Social Report 2023: Leaving No One Behind in an Ageing World*.

https://desapublications.un.org/publications/world-social-report-2023-leaving-no-one-behind-ageing-world
United Nations Department of Economic & Social Affairs. (2022). *E-Government Survey 2022*. https://desapublications.un.org/sites/default/files/publications/2022-09/Web%20version%20E-Government%202022.pdf
Vaportzis, E., Giatsi Clausen, M., & Gow, A. J. (2017). Older adults perceptions of technology and barriers to interacting with tablet computers: A focus group study. *Front. Psychol.*, *8*, 1687. https://doi.org/10.3389/fpsyg.2017.01687.
Wales, C. & Tjøstheim, I. (2025). Digital vulnerabilities and the oldest-old. *Hum. Interact. Emerg. Technol.*, *197*(2025), 119–128. https://doi.org/10.54941/ahfe1006705.
Wang, A., Piao, M., Zhou, Y., Ma, H., Tang, X., Li, S., & Pei, R. (2024a). The acceptance of using large language model among older adults: A study based on TAM. In *Studies in Health Technology and Informatics* (Vol. 315, pp. 316–321). IOS Press. https://doi.org/10.3233/shti240160.
Wang, N., Zhou, S., Liu, Z., & Han, Y. (2024b). Perceptions and satisfaction with the use of digital medical services in urban older adults of China: Mixed methods study. *J. Med. Internet Res.*, *26*, e48654. https://doi.org/10.2196/48654.
Weck, M. & Afanassieva, M. (2023). Toward the adoption of digital assistive technology: Factors affecting older people's initial trust formation. *Telecommun. Policy.*, *47*(2), 102483.
Yang, C., Yang, S., & Chang, Y. (2023). Predicting older adults' mobile payment adoption: An extended TAM model. *Int. J. Environ. Res. Public Health.*, *20*(2), 1391. https://doi.org/10.3390/ijerph20021391.
Yousafzai, S. Y., Foxall, G. R., & Pallister, J. G. (2007). Technology acceptance: A meta-analysis of the TAM: Part 2. *J. Model. Manag.*, *2*(3), 281–304. https://doi.org/10.1108/17465660710834462.
Zhang, B., Tan, R., Sui, J., & Lin, H. (2022). Factors affecting the adoption of mobile government by older people: Empirical evidence from the extended TAM model. *Inf. Resour. Manag. J.*, *35*(1), 1–17. https://doi.org/10.4018/irmj.309928.
Zhou, T. (2014). An empirical examination of initial trust in mobile payment. *Wirel. Pers. Commun.*, *77*(2), 1519–1531. https://doi.org/10.1007/s11277-013-1596-8.
Zou, Y., Sun, K., Afnan, T., Abu-Salma, R., Brewer, R., & Schaub, F. (2024). Cross-contextual examination of older adults' privacy concerns, behaviors, and vulnerabilities. *Proc. Priv. Enhancing Technol.*, *2024*(1), 133–150. https://doi.org/10.56553/popets-2024-0009.
Zubir, M. H. H. & Abdul Latip, M. S. (2023). Factors affecting citizens' intention to use e-government services: Assessing the mediating effect of perceived usefulness and ease of use. *Transf. Gov. People Process Policy.*, *18*(3), 384–399. https://doi.org/10.1108/tg-04-2023-0040.

Appendix

Information Quality (IQ)

The Digital Pension application provides information that is current and up to date.

The information provided by the Digital Pension application meets my needs and supports my decision-making.

The Digital Pension application consistently provides accurate, complete, and reliable information.

The information in the Digital Pension application is comprehensive and covers all essential aspects relevant to my needs.

The information presented in the Digital Pension application is clear and easy to understand.

The Digital Pension application presents information in a variety of formats.

The information presented in the Digital Pension application aligns with my usage needs.

The information provided by the Digital Pension application is of good quality and appropriate for use.

The application provides accurate, precise, and clear results when processing service requests.

The application displays and calculates information correctly.

Perceived Usefulness (PU)

I find the Digital Pension application useful.

I choose to use the Digital Pension application because it is convenient and saves time.

I choose to use the Digital Pension application because it is easy to use.

I use the Digital Pension application because it benefits me personally.

The application makes it more convenient to request services without visiting the office in person.

The application helps me save time.

The application reduces the complexity of service procedures.

I think the Digital Pension application is beneficial.

I feel that the Digital Pension application is useful, and I intend to continue using it.

System Quality (SQ)

The Digital Pension application is easy to access and use, both through the app and the website.

The Digital Pension application operates as a complete and functioning system.

The Digital Pension application responds within an appropriate timeframe.
The Digital Pension application effectively meets my needs.
The application's functions are easy to understand.
The application is quick and easy to access.
The application performs consistently.

Trust (TRUST)

I am confident that my personal information is kept secure and confidential.
I appreciate the convenience, reliability, and security of the Digital Pension application.

Service Quality (SERVQ)

The application provides channels for contacting support when problems occur.
Staff are available to assist when I experience issues using the application.
The service staff are knowledgeable, capable, and ready to assist.

Intention to Use (IU)

I am willing and ready to use the Digital Pension application.
I would like to try using the Digital Pension application.

User Satisfaction (US)

I have expectations regarding successful use of the Digital Pension application before using it.
I often compare my satisfaction with my previous expectations after using the application.
I am consistently able to use the Digital Pension application as I expect.
I am satisfied with the Digital Pension application overall.

Behavioral Intention (BI)

I intend to recommend the Digital Pension application to eligible individuals.

Net Benefits (NB)

I believe the Digital Pension application has satisfactory quality and performance.
I consider the Digital Pension application a good option for requesting services from the agency.

Perceived Ease of Use (PEOU)

I can learn to use the Digital Pension application on my own through various channels.
I feel that using the Digital Pension application does not require much mental effort.
I find the Digital Pension application easy to use and intend to continue using it.