Age and Gender Moderation in PLN Mobile Adoption: Roles of Effort, Social Influence, and Facilitation

Muhammad Shadiq Arifin[1], Raden Roro Yulianti Prihatiningrum[2*], Laila Refiana Said[3], Siti Aliyati Albushairi[4]
[1]Master of Management Program, Lambung Mangkurat University, Indonesia
[2,3,4]Department of Management, Lambung Mangkurat University, Indonesia
shadiq.arifin@gmail.com[1], rryulianti@ulm.ac.id[2*], lrsaid@ulm.ac.id[3], saabushairi@ulm.ac.id[4]

Abstract
This study investigates the factors associated with actual PLN Mobile use among customers of PT PLN (Persero) in South and Central Kalimantan. The proposed model links effort expectancy and social influence to behavioral intention and links facilitating conditions and behavioral intention to use behavior while treating age and gender as moderators. An explanatory quantitative survey was administered to 330 active PLN Mobile users in South and Central Kalimantan. Respondents were selected purposively, and the model was estimated using Partial Least Squares Structural Equation Modeling in SmartPLS 4. Effort expectancy and social influence were significant antecedents of behavioral intention, whereas facilitating conditions and behavioral intention significantly predicted the use behavior. Age and gender significantly changed the strength of the paths from effort expectancy and social influence to intention and from facilitating conditions to the use behavior. The model accounted for 66.4% and 88.6% of the variance in behavioral intention and use behavior, respectively. Actual PLN Mobile use is jointly associated with perceived ease, interpersonal and institutional encouragement, enabling resources, user intention, and demographic variation. This study broadens the application of UTAUT by concurrently assessing age and gender as boundary conditions in a mobile application for an essential public utility. The evidence is based on cross-sectional, self-reported responses from users within the Kalimantan Selatan–Tengah (Kalselteng) service area.

Keywords: *Behavioral Intention, Effort Expectancy, Facilitating Conditions, Social Influence, Use Behavior*

1. INTRODUCTION

Public service transformation increasingly depends on digital channels because citizens expect services to be timely, reachable, transparent, and responsive. Accordingly, the performance of public organizations is judged not only by interactions at physical service counters but also by their ability to remove access barriers through online delivery (Alfiani et al., 2024; Maktub, Handayani, & Sunarso, 2025; Nurjannah, Hasymi, & Putera, 2025). The expansion of Internet access and usage in Indonesia further indicates that digitally mediated services have become an integral element of public sector modernization.

Within the electricity industry, PT PLN (Persero) provides PLN Mobile as an integrated channel for paying bills, purchasing prepaid tokens, filing complaints, applying for new connections or power changes, monitoring service requests, and obtaining electricity-related information. By the end of 2025, PLN recorded 96,174,234 customers and more than 85 million PLN Mobile users. These figures illustrate the increasingly important role of applications in connecting companies with their customers (Susantyo, Yuldinawati, & Sugiat, 2026).

Registration figures alone, however, do not demonstrate that a digital service is being used optimally; adoption is more meaningfully reflected in repeated use for relevant functions (Tamilmani, Rana, Wamba, & Dwivedi, 2021; Umar & Pasaribu, 2024; Venkatesh, Thong, & Xu, 2012). An initial survey conducted among PT PLN (Persero) Kalimantan Selatan–Tengah (Kalselteng) customers produced an average intention/readiness score of 3.85, with 76.67% selecting agree or strongly agreeing. The corresponding average for actual use was only 2.93, and the proportion of respondents selecting these two response categories declined to 36.67%. This contrast points to a substantial intention-use gap.

The Kalselteng service territory offers a relevant setting because customers in South and Central Kalimantan vary in age, gender, educational background, digital experience, and preferences for online versus face-to-face services. Preliminary interviews indicated that several customers continued to visit PLN offices because they regarded direct assistance as more dependable and easier

to follow through. Older customers frequently mentioned the need for help with the application, whereas decisions and tasks related to household electricity were often shared with spouses, children, or other relatives.

The analytical foundation of this study is the Unified Theory of Acceptance and Use of Technology (UTAUT). The theory explains adoption through perceptions of required effort, social expectations, available support, behavioral intention, and realized use (Venkatesh et al., 2012; Wiryawan et al., 2024). This is appropriate for PLN Mobile because access to the application does not ensure adoption; customers must also possess the capability and motivation to complete actual electricity service activities through the platform.

In PLN Mobile, effort expectancy denotes the perceived simplicity of learning and operating the application. Social influence concerns encouragement arising from relatives, peers, PLN personnel, and organizational communications. Facilitating conditions encompass device availability, connectivity, digital competence, and access to technical assistance. Together, these concepts clarify both the formation of customers' intentions and the conversion of those intentions into observable use (Blut, Chong, Tsiga, & Venkatesh, 2022; Hooda, Gupta, Jeyaraj, Giannakis, & Dwivedi, 2022; Venkatesh et al., 2012).

Technology acceptance has been widely investigated in mobile banking, financial technology, government e-services, and other mobile applications (Amnas, Selvam, Raja, Santhoshkumar, & Parayitam, 2023; Jiang, Ma, Huang, Zhou, & Chen, 2024; Rahardhan & Legowo, 2024; Saputri & Noer, 2024). Nevertheless, PLN Mobile differs from ordinary commercial platforms because it mediates access to electricity, an essential public utility. Earlier PLN Mobile studies include Paramita, Pratama, and Wulansari (2022) who applied UTAUT to PLN Mobile users, Saputri and Noer (2024) who examined an extended UTAUT model in PT PLN *Unit Induk Wilayah* (UIW) East Kalimantan and Greater Region, and Umar and Pasaribu (2024) who employed UTAUT2 in the Sulawesi Utara, Tengah, dan Gorontalo area. The present research addresses PT PLN (Persero) Kalselteng and simultaneously evaluates age and gender as moderators of cognitive, social, and resource-based relationships.

Age and gender warrant attention because customers do not encounter digital services under identical conditions (Schmitz, Díaz-Martín, & Guillén, 2022; Terblanche & Kidd, 2022; Venkatesh et al., 2012). Older users may depend more heavily on explicit directions, repeated practice, and technical support, whereas younger users tend to be more accustomed to mobile interfaces (Herzallah et al., 2025; Jiang et al., 2024; Kusairi, Sukmawati, As, & Rahman, 2025; Mensah & Khan, 2024). Gender-related differences may also emerge in digital self-confidence, risk perceptions, household responsibilities, and participation in service decisions (Herzallah et al., 2025; Jiang et al., 2024).

Against this background, this study assessed whether effort expectancy and social influence predict behavioral intention and whether facilitating conditions and behavioral intention predict use behavior. It further determines whether the magnitude of these relationships varies by age and sex. The study contributes theoretically by testing UTAUT within an essential public-service application and managerially by informing interface design, outreach, assistance, and adoption programs tailored to different customer segments.

2. LITERATURE REVIEW

2.1 UTAUT as the Theoretical Lens

The UTAUT model was used to explain PLN Mobile adoption. Rather than treating application availability as sufficient, the framework proposes that usage emerges from a combination of perceived operational effort, normative encouragement, enabling resources, intention, and actual behavior. These dimensions fit the PLN Mobile setting because customers must view the service as manageable, receive adequate encouragement, and have the resources required to transact through the app. In this study, effort expectancy captures the extent to which customers regard PLN Mobile as straightforward to learn and operate. Social influence represents the encouragement conveyed by relatives, peers, PLN employees, and official communication. Facilitating conditions include knowledge, devices, internet connection, compatible technology, and assistance available to users (Damanik, Prasetyo, Alie, & Oktaria, 2025). Behavioral intention represents the readiness to continue

and regularly use the application, whereas use behavior denotes its actual utilization for electricity services. Age and gender were modelled as moderators because UTAUT allows demographic attributes to alter how technology perceptions translate into intention and behavior.

2.2 Effort Expectancy and Perceived Cognitive Effort

Effort expectancy concerns the amount of difficulty customers associate with learning and operating PLN Mobile (Migliore, Wagner, Cechella, & Liébana-Cabanillas, 2022; Tamilmani et al., 2021; Venkatesh et al., 2012). In operational terms, it is reflected in understandable menus and instructions, uncomplicated transaction sequences, and the ease with which users can access electricity service. A lower perceived burden should increase customers' readiness to choose an application for future service needs (Blut et al., 2022; Patil, Tamilmani, Rana, & Raghavan, 2020; Yu et al., 2021).

2.3 Social Influence and Normative Support

Social influence describes the perceived expectations or encouragement of people and organizations that matter to customers (Blut et al., 2022; Xue, Rashid, & Ouyang, 2024). Advice from family, friends, communities, PLN officers, and official PLN messages can strengthen the legitimacy of PLN Mobile and make adoption more likely (Bhimasta, Surya, & Pramudita, 2025; Hooda et al., 2022; Patil et al., 2020). This mechanism is particularly relevant to household electricity services, for which payment and service decisions may involve spouses, children, neighbors, friends, or PLN personnel (Meiranto, Faisal, & Yuyetta, 2024; Orbawati, Nugraha, Azizah, & Ikhtiara, 2025). Consequently, PLN Mobile is more likely to generate behavioral intention when its use is endorsed through interpersonal networks and reinforced by the institution providing the service (Tamilmani et al., 2021; Venkatesh, Morris, Davis, & Davis, 2003; Zeebaree, Agoyi, & Aqel, 2022).

2.4 Facilitating Conditions and Enabling Resources

Facilitating conditions represent customers' assessment of whether the practical requirements for using PLN Mobile are met. These requirements include an appropriate device, stable Internet access, relevant digital knowledge, system compatibility, and technical assistance (Blut et al., 2022; Putro & Sugiat, 2025; Venkatesh et al., 2012). Unlike effort expectancy, this construct emphasizes environmental and resource support. Adequate support can remove operational constraints and enable the intention to develop into actual application use (Hooda et al., 2022; Meiranto et al., 2024; Patil et al., 2020; Tamilmani et al., 2021).

2.5 Behavioral Intention as the Immediate Antecedent of Use

Behavioral intention refers to a customer's conscious readiness to employ PLN Mobile in subsequent service situations (Tamilmani et al., 2021; Venkatesh et al., 2003). This is indicated by plans to continue using the application, use it whenever electricity services are required, and recommend it to others. Because deliberate willingness generally precedes action, intention is expected to be the most immediate psychological antecedent of usage behavior (Blut et al., 2022; Patil et al., 2020; Venkatesh et al., 2012).

2.6 Demographic Moderation by Age and Gender

Age and gender are incorporated to capture the possibility that adoption processes differ among customer groups (Blut et al., 2022; Ilieva et al., 2024; Venkatesh et al., 2003). Within the UTAUT, demographic variation can change the strength with which beliefs about a technology are converted into intention and use (Schmitz et al., 2022; Tamilmani et al., 2021; Terblanche & Kidd, 2022). Older customers may require more explicit guidance, repeated interaction, and accessible support before becoming confident users Mensah and Khan (2024) and Kusairi et al. (2025), whereas younger customers may adapt more readily because mobile routines are already familiar to them (Herzallah et al., 2025; Jiang et al., 2024). Gender may also differentiate adoption through variations in confidence in digital tools, risk judgments, household service roles, and participation in decisions (Herzallah et al., 2025; Jiang et al., 2024). Therefore, age and gender are treated as boundary

conditions that may amplify or attenuate the effects of effort expectancy, social influence, and facilitating conditions among PLN Mobile customers (Blut et al., 2022).

2.7 Hypothesized Research Model

A moderated UTAUT model was specified to explain PLN Mobile use among PT PLN (Persero) Kalselteng customers. Effort expectancy and social influence are proposed as antecedents of behavioral intention, while facilitating conditions and behavioral intention are proposed as antecedents of the realization of use. Age and gender were included as moderators because the same beliefs and resources may not operate with equal force across demographic categories (Blut et al., 2022; Venkatesh et al., 2012; Xue et al., 2024).

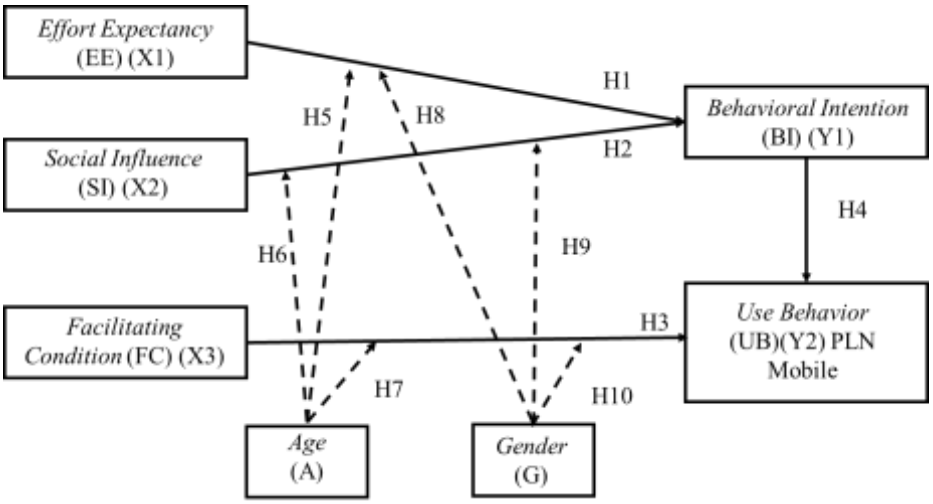

Figure 1. Proposed research model

Figure 1 shows the model adapted from Venkatesh et al. (2003) and Venkatesh et al. (2012). The framework treats effort expectancy and social influence as factors that precede the behavioral intention. Actual PLN Mobile use is predicted directly by facilitating conditions and behavioral intentions. The following propositions were derived from the paths represented in the model and subjected to empirical testing:

- H_1: Greater effort expectancy is associated with stronger behavioral intention to use PLN Mobile among PT PLN (Persero) Kalselteng customers
- H_2: Stronger social influence is associated with higher behavioral intention to use PLN Mobile among PT PLN (Persero) Kalselteng customers
- H_3: More favourable facilitating conditions are associated with higher PLN Mobile use behavior among PT PLN (Persero) Kalselteng customers
- H_4: Stronger behavioral intention is associated with greater PLN Mobile use behavior among PT PLN (Persero) Kalselteng customers
- H_5: The association between effort expectancy and behavioral intention varies according to customer age
- H_6: Customer age changes the strength of the association between social influence and behavioral intention
- H_7: Customer age changes the strength of the association between facilitating conditions and PLN Mobile use behavior
- H_8: The association between effort expectancy and behavioral intention varies according to customer gender
- H_9: Customer gender changes the strength of the association between social influence and behavioral intention
- H_{10}: Customer gender changes the strength of the association between facilitating conditions and PLN Mobile use behavior

3. METHODOLOGY

An explanatory quantitative design was employed to estimate the direct and moderating relationships in the proposed model using SEM. The focal predictors were effort expectancy, social influence, and facilitating conditions, such as the outcomes were behavioral intention and PLN Mobile use behavior, age and gender were specified as moderators (Blut et al., 2022; Hair, Sarstedt, Ringle, Sharma, & Liengaard, 2024; Sarstedt, Ringle, & Hair, 2021; Xue et al., 2024). The target population comprised PLN Mobile users residing in South and Central Kalimantan. Through purposive selection, 330 active users from 27 regencies and cities were included in the final dataset.

Information was obtained through a structured questionnaire adapted from prior technology acceptance research (Kurniasih et al., 2024; Paramita et al., 2022; Tamilmani et al., 2021). Effort expectancy captures the perceived simplicity of learning and operating an application. Social influence captured encouragement from relatives, peers, PLN staff, and official communications. Facilitating conditions assessed resources, knowledge, device compatibility and available help. Behavioral intention measured plans to continue using and recommending PLN Mobile, whereas use behavior recorded the frequency with which respondents used it for electricity services. Perceptual constructs were rated on five-point Likert scales, whereas use behavior was assessed using frequency categories (Hair et al., 2024; Sarstedt et al., 2021).

The hypothesized model was estimated using Partial Least Squares Structural Equation Modeling (PLS-SEM) in SmartPLS 4. PLS-SEM was considered suitable because the analysis involved multiple latent variables, several direct paths, and interaction terms that represent moderation (Hair et al., 2024; Sarstedt et al., 2021). The evaluation proceeded in two sequential phases. The first phase examined the measurement model through outer loadings, internal consistency, convergent validity, discriminant validity, and collinearity. The second phase assessed structural relationships using path estimates, t-statistics, p-values, R-squares, f-squares, Q-squares, and interaction effects. Statistical inference was based on bootstrapping with 5,000 resamples (Franke & Sarstedt, 2019; Hair et al., 2024; Sarstedt et al., 2021).

4. RESULTS AND DISCUSSION

4.1 Empirical Findings

4.1.1 Respondent Profile

The analysis covered PLN Mobile customers within the PT PLN (Persero) Kalselteng service area in South and Central Kalimantan. The final dataset contained 330 individuals who had previously used the application and were located across 27 regencies and cities. Variation in province, age, gender, education, application-use frequency, and visits to PLN offices provided a heterogeneous basis for comparing the use behavior across customer segments.

Table 1. Characteristics of PLN Mobile respondents in Kalselteng (n= 330)

Characteristic	Category	n	%
Province	South Kalimantan	200	60.61
	Central Kalimantan	130	39.39
Gender	Male	174	52.73
	Female	156	47.27
Age Group	17–24 years	79	23.94
	25–30 years	52	15.76
	31–36 years	66	20.00
	37–44 years	70	21.21
	≥45 years	63	19.09
Educational Level	Elementary/Junior High School	69	20.90
	Senior High/Vocational School	137	41.50
	Diploma	40	12.10
	Bachelor's Degree	84	25.50
	1 time	145	43.90

Characteristic	Category	n	%
PLN Mobile Usage in the Last 3 Months	1–3 times	125	37.90
	3–5 times	50	15.20
	>5 times	10	3.00
PLN Office Visit in the Last 3 Months	1 time	105	31.80
	1–3 times	195	59.10
	>5 times	30	9.10

Table 1 shows that of the 330 respondents, the larger share resided in South Kalimantan, and the proportions of men and women were relatively close. Participants were distributed across all age categories, with those aged 17-24 years forming the largest group. Senior high school or vocational education was the most common qualification, followed by a Bachelor's degree. Use remained relatively infrequent: most respondents had opened PLN Mobile once or between one and three times during the preceding three months, and very few reported using it more than five times. Simultaneously, many customers still visited PLN offices, suggesting that digital adoption has advanced without fully replacing face-to-face services.

4.1.2 Measurement Model Evaluation

Assessment of the measurement model considered outer loadings, Cronbach's Alpha (CA), Composite Reliability (CR), Average Variance Extracted (AVE), and the Heterotrait-Monotrait Ratio (HTMT). The benchmarks applied were above 0.70 for loadings and reliability, above 0.50 for AVE, and below 0.90 for HTMT, in line with the commonly used PLS-SEM guidance (Franke & Sarstedt, 2019; Hair et al., 2024; Sarstedt et al., 2021). All indicators satisfied the loading requirement. The Cronbach's alpha values ranged from 0.930 to 0.960, the Composite Reliability ranged from 0.950 to 0.968, and the AVE ranged from 0.827 to 0.865. These statistics provide evidence of adequate internal consistency and convergent validity for effort expectancy, social influence, facilitating conditions, behavioral intention, and use behavior before evaluating the structural model.

Table 2. Measurement indicators and reliability-validity statistics

Construct	Item	Questionnaire Item	Loading	CA	AVE	CR
Effort Expectancy	EE1	Learning to use PLN Mobile was easy for me.	0.929	0.948	0.865	0.963
	EE2	The instructions for PLN Mobile are clear and understandable.	0.944			
	EE3	PLN Mobile is easy to use.	0.93			
	EE4	I can quickly become skilled at using PLN Mobile.	0.918			
Social Influence	SI1	Important people encouraged me to use PLN Mobile.	0.922	0.943	0.855	0.959
	SI2	People who influence my decisions support my use PLN Mobile.	0.931			
	SI3	People whose opinions I value recommend PLN Mobile.	0.911			
	SI4	PLN encourages customers to use PLN Mobile application.	0.935			
Facilitating Conditions	FC1	I have the resources required to use PLN Mobile.	0.917	0.935	0.837	0.953
	FC2	I have sufficient knowledge to use PLN Mobile.	0.919			
	FC3	The PLN Mobile app is compatible with my device.	0.898			

Construct	Item	Questionnaire Item	Loading	CA	AVE	CR
	FC4	Assistance is available when I have difficulty using the PLN Mobile app.	0.925			
Behavioral Intention	BI1	I intend to continue using the PLN Mobile app in the future.	0.923	0.93	0.827	0.95
	BI2	I will try to use PLN Mobile when I need electricity.	0.923			
	BI3	I plan to use the PLN Mobile app regularly.	0.9			
	BI4	I am willing to recommend PLN Mobile to others.	0.89			
Use behavior	UB1	I frequently opened the PLN Mobile application.	0.905	0.96	0.835	0.968
	UB2	I frequently use PLN Mobile to pay my electricity bills.	0.914			
	UB3	I frequently use the PLN Mobile app to purchase electricity tokens.	0.916			
	UB4	I frequently use PLN Mobile to report electricity issues.	0.928			
	UB5	I frequently use the PLN Mobile app to access billing information.	0.912			
	UB6	I frequently use PLN Mobile to request changes in electricity services.	0.908			

Table 2 shows that the HTMT was used to evaluate discriminant validity. The coefficients ranged from 0.019 to 0.833, all remaining below the 0.90 criterion. The largest coefficient was 0.833 for social influence and facilitating conditions, followed by 0.817 for usage behavior and behavioral intention. The findings indicate that the five constructs retained sufficient empirical distinctions. Variance inflation factors were examined for potential collinearity. Most item-level VIF values were below 5.00. EE2 and UB4 were marginally higher at 5.506 and 5.022, respectively, but both remained well below 10.00; thus, serious multicollinearity was not indicated. All interaction terms involving age and sex had VIF values of 1.000, indicating that the moderation specifications did not introduce additional collinearity problems.

4.1.3 Assessment of Common Method Variance

All variables were collected through a self-administered questionnaire, the possibility of common method bias was explicitly considered. Procedural safeguards included theory-grounded indicators, separation of construct sections, assurances of anonymity and neutral wording. As post hoc evidence, every HTMT coefficient was below 0.90, the interaction-term VIF values equalled 1.000, and most indicator VIF values were below 5.00. Taken together, the diagnostics suggest that common method variance is unlikely to dominate the interpretation of the model.

4.1.4 Structural Model Evaluation

Structural performance was examined using the R-square, f-square, Q-square, and goodness-of-fit index. The R-squared quantified the variance explained in each endogenous construct, the Q-square represented predictive relevance, and the f-square indicated the incremental contribution of individual predictors and interaction terms. These indices were used collectively to determine how effectively the proposed model accounted for the intention and actual PLN Mobile use.

Table 3. Explanatory power and predictive relevance

Construct / Model	R-square	R-square Adjusted	Q-square	Interpretation
Behavioral Intention	0.664	0.655	-	Strong explanatory power
Use behavior	0.886	0.884	-	Very strong explanatory power
Overall Model	-	-	0.962	Very strong predictive relevance

Table 3 shows that the behavioral intention produced an R-squared value of 0.664. Thus, effort expectancy, social influence, demographic factors, and their interactions accounted for 66.4% of the variance. For use behavior, the R-squared was 0.886, indicating that facilitating conditions, behavioral intention, age, gender, and interaction effects explained 88.6% of the observed variation. The overall Q-square of 0.962 indicates exceptionally strong predictive relevance.

Table 4. Effect-size estimates for structural paths

Path Relationship	*f-square*	Interpretation
Age → Behavioral Intention	0.041	Small effect
Age → Use behavior	0.177	Medium effect
Behavioral Intention → Use behavior	0.848	Large effect
Effort Expectancy → Behavioral Intention	0.055	Small effect
Facilitating Conditions → Use behavior	0.454	Large effect
Gender → Behavioral Intention	0.048	Small effect
Gender → Use behavior	0.186	Medium effect
Social Influence → Behavioral Intention	0.05	Small effect
Age × Effort Expectancy → Behavioral Intention	0.019	Very small effect
Age × Social Influence → Behavioral Intention	0.02	Small effect
Age × Facilitating Conditions → Use behavior	0.057	Small effect
Gender × Effort Expectancy → Behavioral Intention	0.016	Very small effect
Gender × Social Influence → Behavioral Intention	0.017	Very small effect
Gender × Facilitating Conditions → Use behavior	0.049	Small effect

Table 4 shows that the effect-size analysis identified behavioral intention as the largest contributor to use behavior (f-square= 0.848). Facilitating conditions also had a large contribution (f-square= 0.454). Age and gender showed medium-sized contributions to use behavior, whereas their direct contributions, along with those of effort expectancy and social influence, were small for behavioral intention. Most moderation effect sizes were limited in this study. The interactions between age and gender with effort expectancy were minimal. The remaining interactions-age with social influence, age with facilitating conditions, gender with social influence, and gender with facilitating conditions-fell within a small range. Therefore, demographic moderation was statistically present, although its incremental practical magnitude was generally modest. A Goodness of Fit value of 0.809 indicates that the measurement and structural portions of the model achieved a high degree of joint adequacy in representing PLN Mobile use. The proposed specification can consequently be used to interpret the linked roles of effort expectancy, social influence, facilitating conditions, behavioral intention, use behavior, age, and sex.

4.1.5 Hypothesis Tests

Direct and interaction hypotheses were evaluated using 5,000 bootstrap resamples. Paths were considered statistically significant when the t-statistic exceeded 1.96 and the p-value was below 0.05.

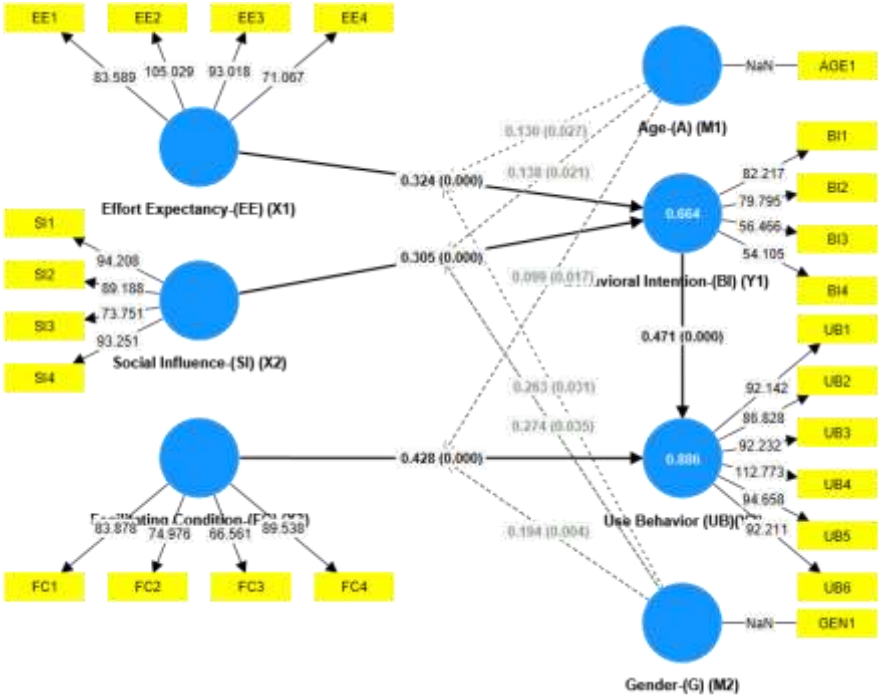

Figure 2. Bootstrapped structural-model estimates

Figure 2 shows the estimated direct and interaction paths. Positive coefficients connect effort expectancy and social influence with behavioral intention and connect facilitating conditions and behavioral intention with the use behavior. The diagram also displays the six age- and gender-based interactions, the numerical test results of which are reported in Table 5.

Table 5. Decisions on Direct and Moderating Hypotheses

Hyp.	Path Relationship	β	T-Stats	P-Values	Result
Direct Effects					
H_1	Effort Expectancy → Behavioral Intention	0.324	3.736	0.000	Supported
H_2	Social Influence → Behavioral Intention	0.305	3.709	0.000	Supported
H_3	Facilitating Conditions → Use behavior	0.428	9.849	0.000	Supported
H_4	Behavioral Intention → Use behavior	0.471	12.447	0.000	Supported
Moderating Effects					
H_5	Age × Effort Expectancy → Behavioral Intention	0.130	2.216	0.027	Supported
H_6	Age × Social Influence → Behavioral Intention	0.138	2.316	0.021	Supported
H_7	Age × Facilitating Conditions → Use behavior	0.099	2.381	0.017	Supported
H_8	Gender × Effort Expectancy → Behavioral Intention	0.263	2.154	0.031	Supported
H_9	Gender × Social Influence → Behavioral Intention	0.274	2.109	0.035	Supported
H_{10}	Gender × Facilitating Conditions → Use behavior	0.194	2.920	0.004	Supported

Table 5 shows that each direct hypothesis received empirical support. Greater effort expectancy and stronger social influence were associated with higher behavioral intentions. More favorable facilitating conditions and stronger intentions were associated with more frequent use behavior. These results imply that adoption is not driven by one factor alone but by the combined

roles of usability perceptions, social endorsement, enabling resources, and the deliberate willingness to use the application. All six interaction coefficients are positive and significant. The effect of effort expectancy on intention increased with age (β= 0.130), as did the effect of social influence (β= 0.138), whereas the relationship between facilitating conditions and use behavior also became stronger at higher ages (β= 0.099). Gender moderated the same three paths, with coefficients of 0.263, 0.274 and 0.194, respectively. Because gender was entered as a coded variable, the positive signs indicated steeper slopes for the category assigned the higher code in the Smart-PLS dataset.

4.2 Discussion

4.2.1 Effort Expectancy and Behavioral Intention

H_1 was supported; effort expectancy exerted a positive and statistically significant effect on behavioral intention. This result accords with the UTAUT, in which a technology that requires less learning and operational effort is more likely to generate an intention to use it (Venkatesh et al., 2012). For PLN Mobile customers, comprehensible menus, concise instructions, and uncomplicated service sequences can increase their readiness to choose the application.

Comparable evidence has been reported in studies on mobile payments, mobile banking, and digital service applications. Across these settings, intention tends to rise when navigation is intelligible, functions are easy to locate, and completing a transaction does not impose excessive cognitive demands (Blut et al., 2022; Candra, Frederica, Putri, & Loang, 2025; Patil et al., 2020). The present findings demonstrate that this usability mechanism also operates in applications used to access essential public utilities.

Managerially, PT PLN (Persero) Kalselteng should reduce unnecessary steps in the PLN Mobile customer journey. Navigation, menu labels, and instructions should be optimized for core activities, such as paying bills, buying tokens, submitting complaints, and tracking requests. An interface that allows these tasks to be completed quickly and with minimal ambiguity is likely to sustain customers' intention to use the application.

4.2.2 Social Influence and Behavioral Intention

H_2 was also supported, showing that social influence positively contributes to behavioral intention. UTAUT anticipates this effect because customers often draw on the opinions of family members, peers, service personnel, and official institutions when deciding whether to adopt a digital channel (Blut et al., 2022; Xue et al., 2024). In this setting, endorsement may reduce uncertainty and signal that PLN Mobile is a legitimate and accepted method for obtaining electricity services.

Empirical work on e-wallets, mobile banking, and digital government similarly indicates that encouragement from trusted actors can strengthen adoption intentions, although its magnitude varies across social and service environments (Herzallah et al., 2025; Orbawati et al., 2025). The current results extend this evidence to everyday electricity services, where recommendations from relatives or PLN personnel may be especially salient.

Therefore, promotion should extend beyond descriptions of technical features. PT PLN (Persero) Kalselteng can mobilize customer service staff, families, community networks, and verified digital campaigns to communicate how and why the application should be used. When PLN Mobile is visibly endorsed within customers' social environments, it is more likely to be perceived as both trustworthy and customary.

4.2.3 Facilitating Conditions and Use Behavior

Support was obtained for *H_3*, confirming that facilitating conditions increase actual-use behavior. Possessing an appropriate device and internet connection, understanding how the application works, and being able to obtain assistance all make it easier to complete service activities through PLN Mobile application. This finding emphasizes that intention alone cannot produce sustained use when the surrounding technical and knowledge resources are inadequate. Prior research on mobile banking and digital public services has likewise found that favorable attitudes do not always become behavior when users encounter connectivity limitations, insufficient competence, or a lack of assistance (Rahardhan & Legowo, 2024) (Rahardhan & Legowo, 2024). This issue is

particularly consequential for PLN Mobile because users depend on the application to accomplish concrete and sometimes urgent electricity-related tasks. Consequently, PLN should strengthen both digital and interpersonal support. Tutorials, accessible help desk services, clear in-application guidance, and assistance at service offices can lower the barriers for customers who are uncertain about a procedure. Such measures may shift use from occasional experimentation to routine reliance on the application.

4.2.4 Behavioral Intention and Use Behavior

H_4 received support, and behavioral intention had the largest effect size among the direct predictors of use behavior. Customers who plan to continue using PLN Mobile, intend to rely on it when service needs arise, and are willing to recommend it are correspondingly more likely to use the application in practice. This pattern is consistent with research on mobile payments, e-government, and mobile banking, where intention repeatedly emerges as a strong antecedent of observed digital behavior (Meiranto et al., 2024; Patil et al., 2020). The results establish behavioral intention as the principal psychological link between customers' evaluations of PLN Mobile and their realized service activity in the Kalselteng region. For management, this implies that downloads and registrations are insufficient performance indicators. PLN should cultivate continued willingness by ensuring that the application is useful, easy to operate, reliable, and trustworthy. A durable intention to rely on PLN Mobile is the mechanism that is most likely to translate platform availability into repeated service use.

4.2.5 Age as a Moderator of Effort Expectancy and Behavioral Intention

The H_5 interaction was also significant. The positive coefficient means that the relationship between effort expectancy and intention becomes stronger as the customer's age increases. Perceived simplicity is therefore particularly consequential for older users, who may be less willing to adopt an application when procedures or instructions appear difficult. Studies on technology acceptance have shown that older users often need clearer guidance, repeated exposure, and interfaces designed for accessibility before a usage intention is established (Herzallah et al., 2025; Jiang et al., 2024). By identifying the same moderating pattern for PLN Mobile, this study shows that age determines how strongly ease-related perceptions shape intention in an essential service context. Therefore, an age-sensitive approach to design and communication is warranted. Older customers may benefit from larger and clearer visual cues, stepwise explanations, demonstrations, and assisted practice. Younger groups can be served through concise digital tutorials, social media content, and efficient self-service functions that match their greater familiarity with mobile routines.

4.2.6 Age as a Moderator of Social Influence and Behavioral Intention

H_6 was supported, indicating that age changes the influence of social encouragement on behavioral intentions. The positive interaction suggests that recommendations and reassurance become more influential at higher ages. Older customers may thus place greater weight on guidance from relatives, community members, or PLN officers before choosing PLN Mobile. This pattern is consistent with studies suggesting that external validation becomes especially important when prospective users are less confident about a digital service. Older users may rely on direct interpersonal reassurance, whereas younger users may be more influenced by peers and online communication (Herzallah et al., 2025; Tamilmani et al., 2021). The results demonstrate that the social pathway to PLN Mobile intention is age-dependent. Consequently, communication programs should be differentiated. For older customers, face-to-face explanations by PLN staff, support from family members, and community-based sessions may be the most effective. For younger users, peer-oriented messages, short-form educational media, and digital campaigns provide a more appropriate source of social reinforcement.

4.2.7 Age as a Moderator of Facilitating Conditions and Use Behavior

H_7 was supported: age also strengthened the relationship between facilitating conditions and use behavior. As customers age, access to assistance, compatible devices, adequate knowledge, and

usable guidance contribute more strongly to actual application use. This pattern suggests that older users are more dependent on visible and accessible support. Previous evidence shows that technical resources and digital-literacy assistance have greater behavioral consequences for groups facing stronger technological barriers (Blut et al., 2022). The present analysis confirms that PLN Mobile users do not experience enabling conditions uniformly; the same resources have a larger behavioral effect on older customers. Therefore, support should be organized in layers. In-person assistance, printed instructions, and guided demonstrations may be necessary for older customers. Younger customers may prefer searchable help content, rapid-response technical channels, automated notifications, and integrated troubleshooting that enables independent problem-solving.

4.2.8 Gender as a Moderator of Effort Expectancy and Behavioral Intention

H_8 was supported, demonstrating that gender changes the effect of effort expectancy on behavioral intention. The interaction coefficient was positive; therefore, the ease-intention slope was steeper for the gender category assigned the higher numerical code in the SmartPLS analysis. The results should be interpreted according to the coding scheme rather than as an inherent advantage of one gender. Research on mobile banking and digital payments has similarly reported that men and women may evaluate ease, usefulness, and perceived risk differently, although the direction and size of these differences depend on the setting (Herzallah et al., 2025; Jiang et al., 2024). PLN Mobile adds a household service dimension, which may cause usability perceptions to interact with how electricity-related responsibilities are distributed. Consequently, the application and its supporting communication should be inclusive rather than based on assumptions of identical digital capabilities. Clear labels, understandable explanations, and simple task sequences should be available to all customers. Targeted education may also be used to close the confidence gaps observed between gender groups without reinforcing stereotypes.

4.2.9 Gender as a Moderator of Social Influence and Behavioral Intention

H_9 shows that gender also conditions the relationship between social influence and behavioral intention. Encouragement from family, peers, PLN personnel, or official messages did not have the same strength in both coded groups. A positive coefficient again signifies a steeper relationship for the category represented by a higher code. Gender-related differences in household roles, trust formation, exposure to recommendations, and participation in service decisions have been identified as possible explanations for variations in digital adoption (Jiang et al., 2024; Tamilmani et al., 2021). Current evidence indicates that these social processes are also relevant when customers decide whether to rely on PLN Mobile. Therefore, PLN communication should combine broad inclusiveness with segment-sensitive delivery. Messages can emphasize concrete household benefits, such as bill payments, token purchases, complaint resolution, and reliable service information, while being distributed through channels used by different customer groups. Campaign design should be informed by actual decision patterns rather than by the assumption that electricity service responsibilities are identical across genders.

4.2.10 Gender as a Moderator of Facilitating Conditions and Use Behavior

H_{10} was supported, establishing gender as a moderator of the facilitating conditions-use behavior pathway. Resources, device compatibility, user knowledge, and access to assistance generated a stronger behavioral response in the gender category assigned a higher code. This result points to group differences in digital readiness or the responsibilities attached to electricity service transactions. Prior studies have associated gender variation with unequal access to digital resources, confidence in resolving technical problems, and differences in service-related decision-making (Blut et al., 2022; Herzallah et al., 2025). The PLN Mobile findings extend this literature by showing that enabling conditions do not translate into actual use with identical strength across coded gender categories. Customer assistance should therefore be easy to access, non-discriminatory, and adaptable to different levels of confidence and experience. Support channels must reduce hesitation and ensure that both women and men can complete all PLN Mobile functions. Such an inclusive

support structure can convert the technical availability of an application into equitable and regular use.

5. CONCLUSIONS

5.1 Conclusion

The results indicate that PLN Mobile use among PT PLN (Persero) Kalselteng customers is explained by a combination of usability perceptions, social endorsement, enabling resources, behavioral intention, age, and sex. Effort expectancy and social influence significantly predicted intention, whereas facilitating conditions and intention significantly predicted the realization of use. Age and gender also altered the strength of the three focal UTAUT relationships in this study. The effects of perceived ease, social encouragement, and facilitating support increased with age, suggesting greater sensitivity among older customers to these factors. Gender-based interactions were also significant, although their direction must be read in accordance with the numerical coding used in the dataset. Behavioral intention was the dominant direct predictor of use behavior, with facilitating conditions providing substantial structural contributions.

5.2 Reseacrh Limitations

Several limitations should be considered when interpreting the findings. The sample consisted exclusively of users in the PT PLN (Persero) Kalselteng service area; therefore, extrapolation to other regions requires caution. In addition, the cross-sectional design captured perceptions and behaviors at a single point in time. Longitudinal studies or mixed-method inquiries could assess whether adoption patterns and moderating effects change over time. The model was also restricted to the selected UTAUT constructs. Subsequent research could incorporate performance expectancy, digital literacy, trust, satisfaction, habits, and perceived risks. Combining self-reported responses with objective records, such as login frequency, completed transactions, and feature-level activity, would provide a more robust account of continued PLN Mobile use.

5.3 Suggestions and Directions for Future Research

Four operational priorities emerge from these findings. First, PLN should streamline the steps required for bill payments, token purchases, complaints, and request tracking. Second, first-time users should receive concise tutorials, brief videos and clear visual instructions. Third, customer service personnel should be prepared to guide visitors through application-based procedures. Fourth, PLN should combine community outreach with verified digital communication that demonstrates the practical value of applications. The delivery of these measures should account for demographic variations. Older users are likely to benefit from repeated demonstrations, printed step sequences, and direct assistance, whereas younger users can be engaged through push notifications, digital campaigns, and the promotion of self-service functions. Communication should also reflect the distribution of household electricity responsibilities and highlight relevant functions, such as payment, token purchasing, complaint submission, and service reliability.

AUTHOR CONTRIBUTIONS

MSA conceived and designed the study, collected the data, performed statistical analysis using PLS-SEM, interpreted the findings, and prepared the original manuscript draft. RRYP contributed to the conceptual framework, research methodology, supervision, and critical revision of this manuscript. LRS contributed to the literature review, data interpretation, validation of research findings, and manuscript editing. SAA contributed to the methodological refinement, validation, supervision, and critical review of the manuscript. All authors contributed substantially to the development of the study, reviewed and approved the final version of the manuscript, and agreed to be accountable for all aspects of the work.

REFERENCES

Alfiani, H., Aditya, S. K., Lusa, S., Sensuse, D. I., Putro, P. A. W., & Indriasari, S. (2024). E-government issues in developing countries using TOE and UTAUT frameworks: A

systematic review. *Policy & Governance Review, 8*(2), 169-191. doi:https://doi.org/10.30589/pgr.v8i2.932

Amnas, M. B., Selvam, M., Raja, M., Santhoshkumar, S., & Parayitam, S. (2023). Understanding the determinants of FinTech adoption: Integrating UTAUT2 with trust theoretic model. *Journal of Risk and Financial Management, 16*(12), 505. doi:https://doi.org/10.3390/jrfm16120505

Bhimasta, R. A., Surya, R. A., & Pramudita, D. P. D. (2025). Integrating Marketing, HRM, and Accounting Systems for Customer Value Sustainability. *Jurnal Relevansi: Ekonomi, Manajemen dan Bisnis, 9*(2), 149-162. doi:https://doi.org/10.61401/relevansi.v9i2.307

Blut, M., Chong, A. Y. L., Tsiga, Z., & Venkatesh, V. (2022). Meta-analysis of the Unified Theory of Acceptance and Use of Technology (UTAUT): challenging its validity and charting a research agenda in the red ocean. *Journal of the Association for Information Systems, 23*(1), 13–95. doi:https://doi.org/10.17705/1jais.00719

Candra, S., Frederica, E., Putri, H. A., & Loang, O. K. (2025). The UTAUT approach to Indonesia's behavioral intention to use mobile health apps. *Journal of Science and Technology Policy Management, 16*(5), 892-911. doi:https://doi.org/10.1108/JSTPM-10-2022-0175

Damanik, S. D., Prasetyo, G., Alie, M. S., & Oktaria, E. T. (2025). MSME Financial Management: Cash Flow Management Strategies to Enhance Business Sustainability. *Jurnal Relevansi: Ekonomi, Manajemen dan Bisnis, 9*(1), 115-125. doi:https://doi.org/10.61401/relevansi.v9i1.271

Franke, G., & Sarstedt, M. (2019). Heuristics versus statistics in discriminant validity testing: A comparison of four procedures. *Internet Research, 29*(3), 430-447. doi:https://doi.org/10.1108/IntR-12-2017-0515

Hair, J. F., Sarstedt, M., Ringle, C. M., Sharma, P. N., & Liengaard, B. D. (2024). Going beyond the untold facts in PLS–SEM and moving forward. *European Journal of Marketing, 58*(13), 81-106. doi:https://doi.org/10.1108/EJM-08-2023-0645

Herzallah, F., Abosamaha, A. J., Abu-Siam, Y., Amer, M., Sajjad, U., & Hamid, K. (2025). Determinants of mobile wallet usage among Gen Z: Extending the UTAUT2 model with moderating effects of personal innovativeness and gender. *International Journal of Information Management Data Insights, 5*(1), 100336. doi:https://doi.org/10.1016/j.jjimei.2025.100336

Hooda, A., Gupta, P., Jeyaraj, A., Giannakis, M., & Dwivedi, Y. K. (2022). The effects of trust on behavioral intention and use behavior within e-government contexts. *International Journal of Information Management, 67*, 102553. doi:https://doi.org/10.1016/j.ijinfomgt.2022.102553

Ilieva, G., Yankova, T., Ruseva, M., Dzhabarova, Y., Zhekova, V., Klisarova-Belcheva, S., Dimitrov, A. (2024). Factors influencing user perception and adoption of e-government services. *Administrative Sciences, 14*(3), 54. doi:https://doi.org/10.3390/admsci14030054

Jiang, J., Ma, J., Huang, X., Zhou, J., & Chen, T. (2024). Extend UTAUT2 model to analyze user behavior of China Construction Bank Mobile App. *Sage Open, 14*(4), 21582440241287070. doi:https://doi.org/10.1177/21582440241287070

Kurniasih, D., Setyoko, P. I., & Huda, M. N. (2024). Insights into Mobile government adoption factors: A comprehensive analysis of peduli lindungi application in Indonesia. *CommIT (Communication and Information Technology) Journal, 18*(1), 53-65. doi:https://doi.org/10.21512/commit.v18i1.9024

Kusairi, K., Sukmawati, A., As, N., & Rahman, M. S. (2025). Predicting M-banking adoption: The moderating role of age in technology acceptance. *Cogent Business & Management, 12*(1), 2547964. doi:https://doi.org/10.1080/23311975.2025.2547964

Maktub, M. A. K., Handayani, P. W., & Sunarso, F. P. (2025). Citizen acceptance and use of the Jakarta Kini (JAKI) e-government: Extended unified model for electronic government adoption. *Heliyon, 11*(2), e42078. doi:https://doi.org/10.1016/j.heliyon.2025.e42078

Meiranto, W., Faisal, F., & Yuyetta, E. N. A. (2024). The mediating role of effort expectation on digital banking behavior intention in the Indonesian bank industry: An integration of UGT-

UTAUT2. *International Journal of Data and Network Science, 8*(4), 2547-2562. doi:https://doi.org/10.5267/j.ijdns.2024.5.003

Mensah, I. K., & Khan, M. K. (2024). Unified Theory of Acceptance and Use of Technology (UTAUT) model: Factors influencing mobile banking services' adoption in China. *Sage Open, 14*(1), 21582440241234230. doi:https://doi.org/10.1177/21582440241234230

Migliore, G., Wagner, R., Cechella, F. S., & Liébana-Cabanillas, F. (2022). Antecedents to the adoption of mobile payment in China and Italy: an integration of UTAUT2 and innovation resistance theory. *Information Systems Frontiers, 24*(6), 2099-2122. doi:https://doi.org/10.1007/s10796-021-10237-2

Nurjannah, U., Hasymi, E., & Putera, R. E. (2025). Information technology-based public service innovation management strategy: A case study of mobile application usage in government agencies. *Jurnal Ilmiah Ekotrans & Erudisi, 5*(1), 33-49. doi:https://doi.org/10.69989/fwfxnn22

Orbawati, E., Nugraha, J. T., Azizah, M., & Ikhtiara, S. (2025). Analyzing determinants of e-government use among students: An integrated UTAUT and e-government adoption model. *JITSI: Jurnal Ilmiah Teknologi Sistem Informasi, 6*(3), 258-266. doi:https://doi.org/10.62527/jitsi.6.3.490

Paramita, A., Pratama, A., & Wulansari, A. (2022). Behavior analysis on PLN mobile users using utaut method. *Jurnal Riset Informatika, 5*(1), 155-164. doi:https://doi.org/10.34288/jri.v5i1.486

Patil, P., Tamilmani, K., Rana, N. P., & Raghavan, V. (2020). Understanding consumer adoption of mobile payment in India: Extending Meta-UTAUT model with personal innovativeness, anxiety, trust, and grievance redressal. *International Journal of Information Management, 54*, 102144. doi:https://doi.org/10.1016/j.ijinfomgt.2020.102144

Putro, C. B. R., & Sugiat, M. A. (2025). The use of UTAUT model to understand user intention and user behavior of mobile banking BIMA PT Bank Jateng. *Journal of Multidisciplinary Academic Business Studies, 2*(4), 239-255. doi:https://doi.org/10.35912/jomabs.v2i4.3191

Rahardhan, R., & Legowo, N. (2024). Examining the adoption of digital banking: Extending the UTAUT2 model with perceived security and promotion. *Journal of System and Management Sciences, 14*(9), 36-54. doi:https://doi.org/10.33168/jsms.2024.0903

Saputri, N. F., & Noer, B. A. (2024). Analysis of costumer behavior to achieve target users of the new PLN mobile application using extended UTAUT model (Case study: PT PLN UIW KALTIMRA). *Eduvest-Journal of Universal Studies, 4*(7), 6321-6329. doi:https://doi.org/10.59188/eduvest.v4i7.1594

Sarstedt, M., Ringle, C. M., & Hair, J. F. (2021). Partial least squares structural equation modeling *Handbook of market research* (pp. 587-632): Springer.

Schmitz, A., Díaz-Martín, A. M., & Guillén, M. J. Y. (2022). Modifying UTAUT2 for a cross-country comparison of telemedicine adoption. *Computers in Human Behavior, 130*, 107183. doi:https://doi.org/10.1016/j.chb.2022.107183

Susantyo, I. A., Yuldinawati, L., & Sugiat, M. A. (2026). Analyzing digital utility app adoption: A UTAUT approach on PLN mobile with technological literacy as a moderator. *Advance Sustainable Science Engineering and Technology, 8*(1), 02601039. doi:https://doi.org/10.26877/asset.v8i1.2367

Tamilmani, K., Rana, N. P., Wamba, S. F., & Dwivedi, R. (2021). The extended Unified Theory of Acceptance and Use of Technology (UTAUT2): A systematic literature review and theory evaluation. *International Journal of Information Management, 57*, 102269. doi:https://doi.org/10.1016/j.ijinfomgt.2020.102269

Terblanche, N., & Kidd, M. (2022). Adoption factors and moderating effects of age and gender that influence the intention to use a non-directive reflective coaching chatbot. *Sage Open, 12*(2), 21582440221096136. doi:https://doi.org/10.1177/21582440221096136

Umar, A., & Pasaribu, R. D. (2024). Study on the usage behavior of PLN mobile application using UTAUT 2 model among PLN customers in North Sulawesi, Central Sulawesi, and

Gorontalo. *International Journal of Social Science And Human Research, 7*(03), 1814-1828. doi:https://doi.org/10.47191/ijsshr/v7-i03-41

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*(3), 425-478. doi:https://doi.org/10.2307/30036540

Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS Quarterly, 36*(1), 157-178. doi:https://doi.org/10.2307/41410412

Wiryawan, Y. F., Tricahyono, D., & Awaluddin, M. (2024). Analysis of factors influencing the adoption of MyTens application with the unified theory of acceptance and use of technology 2 (UTAUT 2) model on account managers at Telkom Indonesia. *International Journal of Accounting and Management Information Systems, 2*(2), 131-142. doi:https://doi.org/10.35912/ijamis.v2i2.3229

Xue, L., Rashid, A. M., & Ouyang, S. (2024). The Unified Theory of Acceptance and Use of Technology (UTAUT) in higher education: A systematic review. *Sage Open, 14*(1), 21582440241229570. doi:https://doi.org/10.1177/21582440241229570

Yu, C.-W., Chao, C.-M., Chang, C.-F., Chen, R.-J., Chen, P.-C., & Liu, Y.-X. (2021). Exploring behavioral intention to use a mobile health education website: an extension of the UTAUT 2 model. *Sage Open, 11*(4), 21582440211055721. doi:https://doi.org/10.1177/21582440211055721

Zeebaree, M., Agoyi, M., & Aqel, M. (2022). Sustainable adoption of E-government from the UTAUT perspective. *Sustainability, 14*(9), 5370. doi:https://doi.org/10.3390/su14095370