

# DIGITAL LITERACY, DATA SECURITY PERCEPTION, AND BEHAVIORAL INTENTION TO USE INDONESIA'S DIGITAL IDENTITY CARD (IKD): THE MEDIATING ROLE OF PERCEIVED EASE OF USE

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## Abstract

One of the important aspects of the digital transformation agenda of Electronic-Based Government System (SPBE) in Indonesia is the Digital Identity Card (Identitas Kependudukan Digital/IKD). The distribution of its use is uneven because the urban areas are more digitally literate and the problem of personal data security remains although its use is slowly increasing in the urban areas. The research is based on the Technology Acceptance Model (TAM), and omission of the Perceived Usefulness as the mandatory and standardized usefulness of IKD, the study examines the effect of digital literacy and perception of data security on the behavioral intention of citizens to use IKD and how the perceived ease of use may mediate the relationship. A cross-sectional survey of 83 registered IKD users in DKI Jakarta, West Java and Banten was used as the data collection method and analyzed by PLS-SEM using SmartPLS 4. The common method bias was assessed by application of the single factor test and the marker-variable analysis and was found to be value of VIF which indicated no multicollinearity, SRMR = 0.071 was acceptably raised. A post-hoc power analysis provided further support of a sufficient statistical power (0.88). The results indicate that perception of data security is the most powerful predictor of the perceived ease of use ( $\beta = 0.550$ ,  $p < 0.001$ ,  $f^2 = 0.546$ ) and behavioral intention ( $\beta = 0.351$ ,  $p = 0.006$ ). Moreover, the data security perception and behavioral intention are significantly (indirect = 0.177,  $p = 0.032$ ), mediated by the perceived ease of use, but not by the digital literacy, which demonstrates a negative pattern of mediation, suggesting that the mediating process postulated by TAM is not equally effective between different antecedents. The implications of the findings on user experience design, data governance visibility, and the digital literacy policy in Indonesia and other developing economies which are undergoing digital transformation of the public services are enormous.

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1. INTRODUCTION

One of the most noticeable digital government initiatives in Indonesia that was launched as part of the Presidential Regulation No. 95 of 2018 on Electronic-Based Government Systems (*Sistem Pemerintahan Berbasis Elektronik*) is the Digital Identity Card, or the *Identitas Kependudukan Digital* (IKD). The Directorate General of Population and Civil Registration (*Ditjen Dukcapil*) has been gradually implementing IKD since 2022, which includes National Identity Number (NIK) verification, facial recognition with biometrics, and access to civil registration documents into one mobile application, which does not require the use of physical identity documents at any of the points of interaction with various government agencies (Kementerian Dalam Negeri, 2022; Yulianto et al., 2025). Although the number of citizens who have already activated IKD by 2024 reaches more than 12 million, it is lower than the rate of its uptake suggested by the government, which is a sign of a considerable gap between the availability of digital infrastructure and the willingness to use it (Ditjen Dukcapil, 2023).

The results of past studies on e-government adoption always suggest that both the digital literacy (Duan and Dong, 2025; AbdulKareem and Oladimeji, 2024; Kim et al., 2025) and data security perception (Gui et al., 2024; Gupta et al., 2025; Julius et al., 2025) can be considered the major predictors of behavioral intention in various technological settings. However, little has been focused on the analysis of these factors at once in the framework of digital identity systems, which are not like traditional e-government portals and mobile apps in that they not only require initial biometric registration but also sharing of sensitive personal data. The role of digital literacy and security perceptions as a determinant of digital literacy and security decision-making (particularly, the mediating role of perceived ease of use) has also not been sufficiently investigated in this field.

The following are three areas in which this paper will fill the gaps. To begin with, it is one of the first empirical attempts to explore the mediating effect of the perceived ease of use between digital literacy and data security perception and behavioral intention to use a government-issued digital identity platform. Second, the findings reveal a disproportionate trend of mediation in which the perception of data security and behavior intention is mediated by the perceived ease of use and not by the digital literacy and behavior intention. The outcome offers more information about the Technology Acceptance Model (TAM) as it indicates that mediation mechanisms might not have the same effect on antecedent variables. Third, the research adds an empirical evidence based on an emerging-economy digital identity program through the PLS-SEM approach thus adding to a body of literature that has mostly concentrated on developed countries and more general types of digital public services

2. LITERATURE REVIEW

2.1 Theoretical Foundation: TAM and the Exclusion of Perceived Usefulness

Technology Acceptance Model (TAM) by Davis (1989) characterizes behavioral intention as having two key aspects, which are perceived usefulness (PU) and perceived ease of use (PEOU). In voluntary technology adoption contexts, PU has a key role to play since users usually determine whether a system has benefits, which outweigh the available options. IKD is very different in its environment as compared to such discretionary environments. Being the government-imposed digital version of the national identity card, IKD is supposed to be a crucial tool of receiving the state-provided services instead of a technological option. This makes it to be heavily dependent on the institutional requirements and dictates of the public policies in terms of its usefulness.

In situations with the utility of a system known and accepted by many users, PU may be only able to forecast changes in the user motivation to a lesser degree (Venkatesh and Davis, 2000; Tirpan and Bakirtaas, 2024). In such cases, construct relevance might be an issue when PU is introduced into the model and will add complexity, but is not substantively theoretically relevant. In this way, the current study aligns with the previous studies on the impact of government-imposed digital platforms (Zubir and Abdul Latip, 2024; Persadha et al., 2024) and assumes the perceived ease of use as the primary TAM construct and adds the influence of digital literacy and data security perception as context-specific antecedents of digital identity adoption.

2.2 Research Gap Analysis

The ten most related empirical studies are mapped in Table 1 showing the theoretical and contextual gaps that inspire the present work.

| Table 1. Research Gap Analysis |                            |                          |              |                                |
|--------------------------------|----------------------------|--------------------------|--------------|--------------------------------|
| Study                          | Context                    | Key Variables            | Method       | Gap Addressed                  |
| Duan & Dong (2025)             | Rural China e-gov          | Digital Literacy → Usage | SEM          | No security/PEOU mediation     |
| Handajani et al. (2025)        | Indonesia e-gov            | Literacy, Trust, Quality | Regression   | No mediation model; no IKD     |
| Kaur & Sharma (2022)           | Digital finance            | Security → BI            | TAM          | Non-government; no literacy    |
| Gui et al. (2024)              | Digital gov services       | Security → Continuance   | Quant.       | No literacy; no mediation      |
| Persadha et al. (2024)         | Indonesia digital services | PEOU → BI                | Extended TAM | No security antecedent; no IKD |

|                                           |                        |                 |                               |              |                                            |
|-------------------------------------------|------------------------|-----------------|-------------------------------|--------------|--------------------------------------------|
| <b>Gesmundo &amp; Medallon (2025)</b>     | Digital (Philippines)  | gov             | PEOU → BI                     | SEM          | No literacy/security; no IKD               |
| <b>Yulianto et al. (2025)</b>             | Digital gov Indonesia  |                 | BI antecedents                | Syst. Review | No primary data; no IKD-specific test      |
| <b>AbdulKareem &amp; Oladimeji (2024)</b> | W. Africa e-gov        |                 | Literacy, Trust → Adoption    | Quant.       | Non-Indonesian; no PEOU mediation          |
| <b>Gupta et al. (2025)</b>                | E-gov (meta-analysis)  | (meta-analysis) | Trust, Risk, Security → Use   | Meta         | No literacy; no mediation path             |
| <b>Present study</b>                      | Indonesia (digital ID) | IKD             | Literacy, Security, PEOU → BI | PLS-SEM      | Asymmetric mediation in digital-ID context |

Source: Authors (2026)

### 2.3 Digital Literacy and Behavioral Intention

Digital literacy may be considered as a combination of technical, cognitive, and evaluative skills, without which it becomes impossible to interact with digital technologies (Lee-Geiller, 2024). A higher level of digital literacy will provide a benefit in navigating complex interfaces, troubleshooting, and assessing the risk of using digital public services and its potential (Kim et al., 2025). Past studies carried out in the context of developing-country e-government indicate that a more robust digital literacy level is always associated with an increased adoption and use of technology (AbdulKareem and Oladimeji, 2024; Duan and Dong, 2025; Handajani et al., 2025). Theoretically, the existing digital competencies decrease the cognitive load of learning and utilizing a technology, which is extremely comparable to the dimension of perceived ease of use of TAM. Following this argument, the following hypotheses have been put forward:

**H1:** *Digital literacy positively influences perceived ease of use of IKD.*

**H3:** *Digital literacy positively influences behavioral intention to use IKD*

### 2.4 Data Security Perception and Behavioral Intention

Data security perception means how users believe that a digital system will be capable of providing reasonable assurance to the confidentiality, integrity, and availability of their personal data (Taherdoost, 2017). The theory of privacy calculus suggests that the risks of data breach, unauthorized access, or misuse of personal information may be an enormous impediment to implementation in the digital identity systems that use biometric data and civil registration history (Gui et al., 2024). Besides affecting the trust directly, perceived security can also influence the experiences of the users in their interactions. When users are assured that a system secures them with adequate protection, the anxieties about the risk are likely to reduce and more focus can be given towards assessing the usability and functionality of a system (Julius et al., 2025; Kaur and Sharma, 2022). This question is especially applicable to IKD as according to reports by Ditjen Dukcapil (2023), data protection concerns are one of the most common reasons to delay the implementation of the application. Thus, the hypotheses presented below are proposed:

**H2:** *Data security perception positively influences perceived ease of use of IKD.*

**H4:** *Data security perception positively influences behavioral intention to use IKD.*

### 2.5 Perceived Ease of Use and Mediation Hypotheses

The perceived ease of use (PEOU) in the Technology Acceptance Model is a measure applied to denote the way individuals perceive that they can make use of a system with the least amount of effort and without making the system too difficult (Davis, 1989). There is a long history of empirical research indicating that PEOU has a positive impact on behavioral intention in a diverse range of digital service settings (Or, 2024; Zubir and Abdul Latip, 2024; Gesmundo and Medallon, 2025). Besides its direct influence, PEOU is often theorized as a mediating variable where antecedent variables have an impact on technology adoption intentions. However, this mediating function has not been under investigation directly in the previous research related to IKD, but overall interest in digital identity systems is growing. This gives rise to the hypotheses:

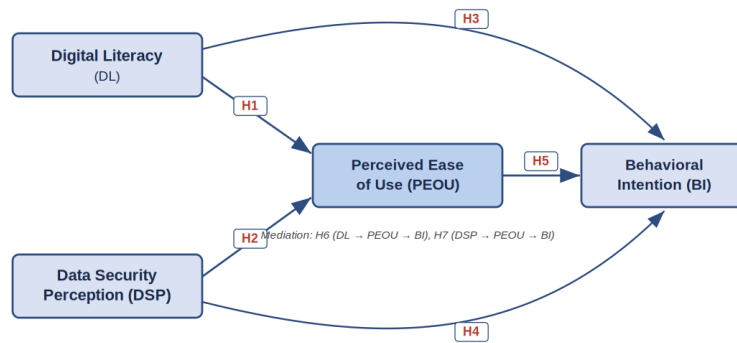
**H5:** *Perceived ease of use positively influences behavioral intention to use IKD.*

**H6:** *Perceived ease of use mediates the effect of digital literacy on behavioral intention to use IKD.*

**H7:** *Perceived ease of use mediates the effect of data security perception on behavioral intention to use IKD.*

### 2.6 Conceptual Framework

The conceptual framework that combines the seven hypotheses into a modified TAM framework is illustrated in Figure 1.



**Figure 1. Conceptual Framework**  
Source: Authors (2026)

### 3. RESEARCH METHODOLOGY

#### 3.1 Research Design and Sample

This study employed a quantitative approach using a cross-sectional survey design. The population of It was a cross-sectional survey study design which was quantitative in nature. The sample size was formed by the Indonesian citizens who had successfully used IKD using the official Dukcapil mobile application. Purposive sampling was used to get 83 valid responses out of the total population of participants who were residing in DKI Jakarta (72.3%), West Java (21.7%), and Banten (6.0%). Most of the respondents fell within the productive age of 21-40 years (75.9%), 80.7% with an undergraduate degree and 57.8% were women. The data was collected between October and December 2024 with the help of local Population and Civil Registration Offices (Disdukcapil) and other digital community networks.

#### 3.2 Power Analysis

The power analysis was performed to assess adequacy of the sample a priori and was performed with G\*Power 3.1. The analysis was based on the medium effect size of ( $f^2 = 0.15$ ) suggested by Hair et al. (2022), level of significance of 0.05, and the number of included predictors (at most three) in a single structural equation. The calculation indicated that the minimal number of respondents that was needed was 77. The study had a statistical power of 0.88 (the ultimate number of 83 participants) which exceeds the generally accepted value of 0.80 (Cohen, 1988) and has adequate power to detect medium-sized effects in the proposed structural model.

#### 3.3 Measurement Instruments

The reflective indicators measured all the variables in the study on a five-point Likert scale between 1 (strongly disagree) and 5 (strongly agree). Digital Literacy (DL) is a question based on 4 items that evaluate respondents as independent users of smartphones, those who understand digital information, follow digital instructions, and independent users of services publicly available. The other scale, Data Security Perception (DSP) which is also measured using four items, assesses the confidence the users have on the safety of personal data, reliability of system security, resistance to data misuse as well as the perceived risk of data violations. The Perceived Ease of Use (PEOU) is a questionnaire that contains six questions which gauge the perceptions of usability, interface simplicity, and feature simplicity and to what extent the system can be used without much technical effort. Behavioral Intention (BI) is a scale that has four indicators used to define the interest of the respondents in using IKD, intention to continue using the application, willingness to abandon physical identity and adopt digital identity, and willingness to use IKD in multiple service scenarios. The measurement items were anchored on the established and validated scales in the literature of TAM and e-government and narrowed down by conducting a pilot study of 15 IKD users. In particular, Davis (1989) and Venkatesh and Davis (2000) were used to adapt Digital Literacy items, Taherdoost (2017), Kaur and Sharma (2022), and Zhang et al. (2019) to adapt Data Security Perception items, and Davis (1989), Venkatesh and Davis (2000), and Persadha et al. (2024) to adapt Behavioral Intention items. All the instruments were modified to the needs of the IKD digital identity landscape. The measurement items are listed in the Appendix.

#### 3.4 Common Method Bias Assessment

The fact that the study involved self-report data and that these data were self-measured, resulted in two complementary ways of addressing the common method bias (CMB) problem. Firstly, a single-factor test of Harman was carried out by putting all indicators into an exploratory factor analysis, which was limited to a single factor. The given factor explained 38.7 percent of the overall variance, which is lower than the generally accepted mark of 50 percent, which means that CMB is not a serious issue (Podsakoff et al., 2003). Second, the method bias, as a marker-variable process was introduced by the theoretically unrelated measure of awareness of the SPBE roadmap of the government. The correlations between the marker variable and substantive constructs were less than 0.10, which also indicates the fact that the method-related variance did not affect the structural relations that were found in the model.

### 3.5 Analytical Procedure

Partial Least Squares Structural Equation Modeling (PLS-SEM) was used to assess the proposed model with SmartPLS 4 (Ringle et al., 2024). This method has been chosen due to its appropriateness in rather small sample sizes and its soundness in case the data do not entirely meet the normality criteria (Hair et al., 2022). The assessment was done in two phases whereby the measurement model was assessed initially and the structural model assessed later. The Variance Inflation Factor (VIF) was used to investigate the presence of multicollinearity with threshold values of  $VIF < 3.3$  indicating the presence of a structural relationship and  $VIF < 5.0$  indicating the presence of a measurement indicator (Hair et al., 2022). The model fit was evaluated with the help of the Standardized Root Mean Square Residual (SRMR), and the quantity less than 0.08 was considered as the indicator of the acceptable model fit (Henseler et al., 2015). Mediation effects were tested by a bootstrapping test of 5,000 resamples. Hypothesis testing ( $t > 1.65$ ) was done at  $\alpha = 0.05$  and the test was one tailed. It was mentioned that the one-tailed approach was the right approach to use since all hypotheses proposed were in terms of positive directional relationships using established theoretical arguments and previous empirical evidence. In line with the suggestions of the PLS-SEM literature, when the direction of the expected effects is known in advance, it is appropriate to use one-tailed testing (Hair et al., 2022; Kock, 2015).

## 4. RESULT AND DISCUSSION

### 4.1 Measurement Model Evaluation

#### 4.1.1 Indicator Reliability and Outer Loadings

The validity of each indicator was measured by the value of their outer loading, as shown in Table 2. The results show that all the indicators were below the recommended threshold value of 0.708 (Hair et al., 2022), with the exception of PEOU4 that had a 0.613 loading. Although it is lower than the desired cutoff, the indicator was accepted since its loading is above the desired minimum acceptable level of 0.40 and its removal on the construct would not lead to significant increase in Average Variance Extracted (AVE). Also, the outer Variance Inflation Factor (VIF) was 1.481-3.108 which was much less than the maximum of 5.0. These findings indicate that there was not any worry about multicollinearity among indicators and measurement items were found to be good to be further analyzed.

**Table 2.** Outer Loadings and Indicator VIF

| Construct                      | Item  | Outer Loading | Outer VIF | Status                   |
|--------------------------------|-------|---------------|-----------|--------------------------|
| Digital Literacy (DL)          | DL1   | 0.841         | 1.981     | Accepted                 |
|                                | DL2   | 0.838         | 1.944     | Accepted                 |
|                                | DL3   | 0.825         | 1.847     | Accepted                 |
|                                | DL4   | 0.782         | 1.481     | Accepted                 |
| Data Security Perception (DSP) | DSP1  | 0.907         | 2.841     | Accepted                 |
|                                | DSP2  | 0.894         | 2.652     | Accepted                 |
|                                | DSP3  | 0.877         | 2.314     | Accepted                 |
|                                | DSP4  | 0.762         | 1.703     | Accepted                 |
| Perceived Ease of Use (PEOU)   | PEOU1 | 0.825         | 2.108     | Accepted                 |
|                                | PEOU2 | 0.882         | 2.771     | Accepted                 |
|                                | PEOU3 | 0.857         | 2.519     | Accepted                 |
|                                | PEOU4 | 0.613         | 1.622     | Accepted ( $\geq 0.40$ ) |
|                                | PEOU5 | 0.886         | 2.884     | Accepted                 |
|                                | PEOU6 | 0.789         | 2.093     | Accepted                 |
| Behavioral Intention (BI)      | BI1   | 0.898         | 2.947     | Accepted                 |
|                                | BI2   | 0.890         | 2.814     | Accepted                 |
|                                | BI3   | 0.821         | 2.109     | Accepted                 |
|                                | BI4   | 0.825         | 2.173     | Accepted                 |

Source: Authors (2026)

#### 4.1.2 Construct Reliability and Convergent Validity

Table 3 shows the findings of construct-level reliability and validity. The coefficients of Cronbach Alpha were between 0.840 to 0.894 and Composite Reliability (CR) was between 0.893 and 0.921. The values are in the

recommended range of 0.70 to 0.95 proposed by Hair et al. (2022) indicating high internal consistency, and it does not mean that the indicators are highly redundant. Moreover, the Average Variance Extracted (AVE) of the constructs was greater than the most acceptable level of 0.50 which shows that the constructs are sufficient to explain the variance of the respective indicators and hence meets the threshold of convergent validity.

**Table 3.** Construct Reliability and Convergent Validity

| Construct                      | Cronbach's $\alpha$ | CR    | AVE   |
|--------------------------------|---------------------|-------|-------|
| Digital Literacy (DL)          | 0.840               | 0.893 | 0.676 |
| Data Security Perception (DSP) | 0.883               | 0.920 | 0.743 |
| Perceived Ease of Use (PEOU)   | 0.894               | 0.921 | 0.663 |
| Behavioral Intention (BI)      | 0.881               | 0.918 | 0.738 |

Source: Authors (2026)

#### 4.1.3 Discriminant Validity

To assess the discriminant validity, both Fornell-Larcker criterion and Heterotrait-Monotrait (HTMT) ratio were used. Table 4 results show that the square root of the AVE of each construct (DL = 0.822, BI = 0.859, DSP = 0.862 and PEOU = 0.814) was higher than the corresponding correlations between these constructs and others, thus satisfying the Fornell-Larcker criterion. Further, as shown in Table 5, the values of all the HTMT were below the recommended range of 0.85 with the highest one recorded between PEOU and BI (0.711). When considered in combination, these results are good arguments that the constructs are empirically differentiated and have sufficient discriminant validity.

**Table 4.** Fornell-Larcker Criterion

|      | DL           | BI           | DSP          | PEOU         |
|------|--------------|--------------|--------------|--------------|
| DL   | <b>0.822</b> |              |              |              |
| BI   | 0.435        | <b>0.859</b> |              |              |
| DSP  | 0.221        | 0.598        | <b>0.862</b> |              |
| PEOU | 0.430        | 0.633        | 0.618        | <b>0.814</b> |

Source: Authors (2026)

Note: Diagonal elements (bold) are the square roots of the average variance extracted (AVE); off-diagonal elements are the inter-construct correlations. Discriminant validity holds because each diagonal value exceeds the correlations in its corresponding row and column.

**Table 5.** Heterotrait-Monotrait Ratio (HTMT)

|      | DL    | BI    | DSP   | PEOU |
|------|-------|-------|-------|------|
| DL   |       |       |       |      |
| BI   | 0.505 |       |       |      |
| DSP  | 0.257 | 0.676 |       |      |
| PEOU | 0.490 | 0.711 | 0.695 |      |

Source: Authors (2026)

Note: All HTMT values are below the 0.85 threshold for conceptually distinct constructs (Henseler et al., 2015), confirming discriminant validity. The highest ratio is PEOU–BI = 0.711.

## 4.2 Structural Model Evaluation

### 4.2.1 Multicollinearity, Model Fit, and Predictive Accuracy

The original test which was done using the structural model was to test the existence of multicollinearity. The inner-model VIFs of any relationship between predictors ranged between 1.141 and 1.638 which is far less than the conservative value of 3.3 recommended by Kock (2015). These results imply that the model did not have any lateral collinearity. The test of the model fit was then done by the Standardized Root Mean Square Residual (SRMR) and the value was 0.071. As it is not higher than the recommended cutoff of 0.08 (Henseler et al., 2015), the provided model can be considered to have a good level of fit. The adjusted R<sup>2</sup> of Perceived Ease of Use (PEOU) and Behavioral Intention (BI) were 0.459 and 0.491 respectively, consistent with the findings of other studies that have conducted TAM-related research. Moreover, predictive relevance test revealed that both endogenous constructs (PEOU = 0.289; BI = 0.351) had Q<sup>2</sup> above zero, which implies that the model could predict enough.

**Table 6.** Inner Model VIF and Model Fit Statistics

| Path / Statistic | Value | Threshold | Assessment      |
|------------------|-------|-----------|-----------------|
| VIF: DL → PEOU   | 1.141 | < 3.3     | No collinearity |
| VIF: DSP → PEOU  | 1.141 | < 3.3     | No collinearity |

| Path / Statistic           | Value | Threshold | Assessment           |
|----------------------------|-------|-----------|----------------------|
| VIF: DL → BI               | 1.638 | < 3.3     | No collinearity      |
| VIF: DSP → BI              | 1.638 | < 3.3     | No collinearity      |
| VIF: PEOU → BI             | 1.598 | < 3.3     | No collinearity      |
| SRMR                       | 0.071 | < 0.080   | Acceptable fit       |
| R <sup>2</sup> Adj. (PEOU) | 0.459 | —         | Moderate             |
| R <sup>2</sup> Adj. (BI)   | 0.491 | —         | Moderate             |
| Q <sup>2</sup> (PEOU)      | 0.289 | > 0.00    | Predictive relevance |
| Q <sup>2</sup> (BI)        | 0.351 | > 0.00    | Predictive relevance |

Source: Authors (2026)

## 2.2 Hypothesis Testing

Table 7. Hypothesis Testing Results (Bootstrap n = 5,000)

| Hyp. | Path            | $\beta$ | T-Stat. | p-Value | f <sup>2</sup> | 90% CI [5%; 95%] | Decision      |
|------|-----------------|---------|---------|---------|----------------|------------------|---------------|
| H1   | DL → PEOU       | 0.308   | 3.035   | 0.001   | 0.171          | [0.142; 0.470]   | Supported     |
| H2   | DSP → PEOU      | 0.550   | 6.956   | <0.001  | 0.546          | [0.416; 0.679]   | Supported     |
| H3   | DL → BI         | 0.219   | 1.906   | 0.028   | 0.080          | [0.040; 0.423]   | Supported     |
| H4   | DSP → BI        | 0.351   | 2.495   | 0.006   | 0.154          | [0.106; 0.569]   | Supported     |
| H5   | PEOU → BI       | 0.322   | 2.046   | 0.020   | 0.111          | [0.070; 0.581]   | Supported     |
| H6   | DL → PEOU → BI  | 0.099   | 1.619   | 0.053   | —              | [0.015; 0.211]   | Not Supported |
| H7   | DSP → PEOU → BI | 0.177   | 1.849   | 0.032   | —              | [0.036; 0.347]   | Supported     |

Source: Authors (2026)

Note: Confidence intervals are bootstrap percentile intervals (5,000 subsamples); the 5%–95% bounds correspond to the one-tailed test adopted in this study. H1–H5 are direct effects and H6–H7 are specific indirect (mediation) effects. The indirect effect in H6 is borderline: although its percentile interval marginally excludes zero, the decision to reject H6 follows the significance criteria specified a priori for this study ( $t > 1.65$ ;  $p < 0.05$ ). Because the t-statistic (1.619) falls just below the 1.65 threshold and  $p = 0.053$  narrowly exceeds 0.05, H6 is treated as not supported. Given that  $p = 0.053$  lies very close to the threshold, this result should be regarded as tentative and re-examined in larger, adequately powered samples.

## 4.3 Discussion

The most remarkable results of this study are that the perception of data security plays the biggest role in determining both the perceived ease of use ( $\beta = 0.550$ ,  $f^2 = 0.546$ , large effect) and behavioral intention ( $\beta = 0.351$ ,  $f^2 = 0.154$ , medium effect). This observation is based on the previous studies that incline towards the belief that security is just one of the other influential factors that influence the adoption of technology (Kaur and Sharma, 2022; Gupta et al., 2025). The current results indicate that there is a duality of impact in the digital identity systems, in which the perceptions of security can have an impact on the willingness of the citizens to use the technology as well as their experience with the technology. This fact aligns with the theory of anxiety reduction, which presupposes that the perception of the safety of the stored personal and biometric data can contribute to the reduction of psychological and cognitive concerns and load in the context of using the system that allows users to pay more attention to the aspects of the usability (Julius et al., 2025). The given mechanism appears to be particularly applicable to the case of IKD, as the sensitivity of the stored data, including the facial biometric data and the National Identity Numbers, is much higher than in many mobile payment applications or in the traditional e-government portal. This explanation is also confirmed by reports by Ditjen Dukcapil (2023), who has also mentioned data protection concerns to be one of the primary reasons why citizens do not activate IKD.

The other remarkable result is linked to the asymmetric mediation pattern which is observed in the model. Even though the past research on applying TAM usually assumes that the perceived ease of use is an intermediate variable between antecedent variables and behavioral intention (Gesmundo and Medallon, 2025; Persadha et al., 2024), the current results do not fully conform to the hypothesis. Specifically, the indirect effect of digital literacy on the intention to behave it was not statistically significant according to the one-tailed criterion that was used (H6 not supported; indirect  $\beta = 0.099$ ,  $p = 0.053$ ), although the result was close to the significance level and, therefore, should be approached with caution. The reason could be because the individuals with greater digital competencies may apply the experience and cognitive frames to evaluate new technologies. As a result, they will develop intentions to use IKD without being overly dependent on the perceptions of interface simplicity, a mediating factor. This interpretation aligns with information processing views based on expertise (Lee-Geiller, 2024), and may allow understanding differences with results obtained in higher-digital exposure groups (Duan and Dong, 2025; AbdulKareem and Oladimeji, 2024), where the role of the ease of use is likely to be more significant. However, due to the marginality of the statistical finding, this explanation can be considered as tentative, but not definitive.

The different results that H6 and H7 have also bring more understanding on the value of perceived ease of use in obligatory digital service settings. In case of IKD, the user has to think about security of the system and the effort that the system would require to use. These assessments are based on various cognitive factors: one of them is the confidence in security of sensitive personal data, the other has to do with user-friendliness and ease of operation. In people with less digital skills, both assessments might be quite pertinent, and that might be the reason why the perceptions of security have an impact on behavioural intention via perceived ease of use (H7 supported). However, in contrast to users with low levels of digital skills, usability issues might have been already addressed with the background of previous technological use, and thus the mediating factor of perceived ease of use between literacy and intention might be insignificant to the relationship between literacy and intention. This result indicates that the mediating effect of PEOU might not have a consistent impact on all groups of users but rather might be conditional upon the variation in user knowledge and prior exposure to digital technology.

#### **4.4 Theoretical Implications**

The findings have several implications in the Technology Acceptance Model (TAM) particularly in relation to the systems of digital identity that are offered by the government. First, the results indicate that the exclusion of perceived usefulness (PU) in TAM may be theoretically appropriate in mandatory-utility setting where institutional needs largely define the usefulness of a system. The users of such situations often make assumptions about the utility which undermines the significance of PU as a differentiating variable in explaining adoption behaviour. This result can be used to explain when the traditional two-belief framework of TAM needs to be changed.

Second, the perception of data security is also identified as the most important antecedent in the proposed model of adoption in comparison with the role of digital literacy. This is contrary to many studies on generic digital services whereby user capability has been observed to prevail. The conclusion shows that in a situation where technologies are involved in very sensitive data, such as biometric data and civil registration databases, the perceptions of security can be more influential to the decision of adoption of technologies, rather than technical competence

Third, it is the pattern of asymmetric mediation that offers more information on the role of the perceived ease of use (PEOU) in the TAM. Traditional applications of TAM tend to assume that PEEU mediates the relationship between antecedent variables and behavioral intention at all times. Nevertheless, the current results indicate that such an intermediary position can be different based on the characteristics of users and their previous experience. Even though, PEOU plays a major mediating role in the data security perception and behavioral intention, it does not have a major role in the digital literacy and behavioral intention relationship. This pattern may indicate that the users who have a greater digital competency may create adoption intentions without the high intensive use of usability evaluations as the mediating factor. The future study of the government technology adoption will therefore be enhanced by including perceptions that relate to security as well as the differences in user competence instead of assuming that there is only one and consistent way through the perceived ease of use. As the study is cross-sectional, and the sample is confined by the geographical locality of the study, these implications can only be thought of as initial theoretical hypotheses, which are to be verified in bigger empirical settings.

#### **4.5 Practical Implications**

The results have a number of practical implications to the Directorate General of Population and Civil Registration (Ditjen Dukcapil) and local Disdukcapil offices in their endeavors to make IKD more popular. The findings also suggest that enhancing usability is not likely to be effective enough, but instead, more focus should be directed towards reinforcing the views of citizens towards the security of their data. Since data security perception was identified as the most powerful predictor of perceived ease of use and behavioral intention, the program focused on increasing trust in data security is sure to have the most significant effect on adoption. Practical steps can involve having routine security audits of the IKD platform independently and publicly reporting a summary of the results to enhance transparency and credibility. Furthermore, the application may offer a convenient privacy dashboard that will notify users on the type of personal and biometric data stored, its usage, and privacy choices. The second important measure is to place transparent data-access logs that will allow citizens to view when, how and by whom their records were accessed and have a definite procedure of reporting a suspected abuse or unauthorized access.

These measures can be additionally supported by the implementation of a well-known data-breach notification policy, an easily manageable consent management, and an apparent compliance with the developed information security and personal data protection principles according to the Personal Data Protection Law (UU PDP) of Indonesia. Also, as the digital literacy was found to directly affect the behavioral intention, the interventions targeting the promotion of security should be supported by the interventions directly tackling the problem of digital literacy, particularly in older citizens and less educated ones, as well as those residing in the smaller urban areas. They can be guided activation assistance at disdukcapil service centers, outreach programs in the community, and step-by-step multilingual instructional materials that can assist in making IKD more inclusive among various population groups (Kementerian Dalam Negeri, 2022; Ditjen Dukcapil, 2023).

#### **4.6 Limitations and Future Research**

There are a number of limitations that should be taken into consideration in the findings of this study. Firstly, the sample was not chosen randomly, but primarily in the metropolitan area of Greater Jakarta (Jabodetabek) which

has a comparatively well-developed digital infrastructure and is more technologically exposed. Consequently, the results might be more reflective of the urban IKD users, compared to the general Indonesian population, especially the ones living in rural and eastern areas where the digital access is not evenly distributed. In addition to this, the sample size ( $n=83$ ) was relatively small and thus might have limited the ability to detect smaller effect sizes like the marginally non-significant mediation effect in the digital literacy pathway. Second, the cross-sectional design does not allow conclusively determining cause-effect relationships among the study variables. Third, the model did not incorporate all the potentially significant determinants of technology adoption (perceived usefulness in non-mandatory service situations, institutional trust, social influence, and facilitating conditions) and a large proportion of reaction to behavioral intention could not be accounted. Finally, although the common method bias assessment revealed satisfactory results, the fact that the information was self-reported, and only a single source was used is a methodological weakness.

It is recommended that future research should be conducted to confirm and expand the current model with bigger and more geographically diverse samples throughout Indonesia. Multigroup or moderated-mediation designs can also be used in the future studies to investigate digital literacy or other competency-based moderators of mediation paths of perceived ease of use. It is possible that the incorporation of other constructs such as institutional trust, social influence, and facilitating conditions could be a more holistic view of IKD adoption behavior. Time-based research designs would also be beneficial in terms of dynamics capturing the dynamics of user perceptions and adoption patterns as IKD is rolled out towards the objectives of mandatory coverage by the government. Moreover, it would be advantageous to re-evaluate the borderline mediation effect of digital literacy with bigger and more statistically significant samples to determine whether the asymmetric mediation effect observed in this study would not be similar in other settings and groups.

## 5. CONCLUSION

This study will offer one of the first empirical examinations of the interaction effect between digital literacy and data security perception on the behavior intention to use the Digital Identity Card in Indonesia (IKD) among the citizens and examine the mediating role of the perceived ease of use. With the help of the PLS-SEM analysis, six hypotheses out of seven that were put forward were confirmed. The most significant is that an asymmetric pattern of mediation was observed where the perception of ease of use is a strong mediator between the perception of data security and the behavioral intention but not a significant mediator between the digital literacy and behavioral intention. Instead of implying that ease of use does not matter when digital capable users are involved, the result is that the mediating effect of ease of use may vary based on the competencies existing and past experience with digital among the users. Overall, the findings suggest that there may not be a single mechanism that can influence the perceived ease of use of adopting digital identity by the government. The study, therefore, highlights the importance of complementing more solid data governance transparency with more detailed digital literacy interventions as the two complementary initiatives to improve IKD adoption and the digital transformation of the public services in general.

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## APPENDIX A. SURVEY INSTRUMENT

All measurement items were assessed using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire was originally developed and distributed in Bahasa Indonesia, while the English version presented below is provided solely for reference purposes. The measurement items were adapted from previously validated instruments reported in the literature and subsequently tailored to the context of Indonesia's Digital Identity Card (IKD) system. To ensure clarity, relevance, and contextual appropriateness, the adapted items were further refined through a pilot test involving 15 registered IKD users before the full-scale survey was conducted.

| Construct & Source                                                      | Code         | Measurement Item                                                                            | Adapted From                                                            |
|-------------------------------------------------------------------------|--------------|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| <b>Digital Literacy (DL) /<br/>Literasi Digital</b>                     | <b>DL1</b>   | I am able to operate a smartphone independently to access digital applications such as IKD. | Lee-Geiller (2024);<br>AbdulKareem &<br>Oladimeji (2024)                |
|                                                                         | <b>DL2</b>   | I am able to understand the digital information presented within the IKD application.       |                                                                         |
|                                                                         | <b>DL3</b>   | I am able to follow the on-screen instructions required to use the IKD application.         |                                                                         |
|                                                                         | <b>DL4</b>   | I am able to access public services through the IKD application on my own.                  |                                                                         |
| <b>Data Security Perception (DSP) /<br/>Persepsi Keamanan Data</b>      | <b>DSP1</b>  | I trust that my personal data stored in IKD is well protected.                              | Taherdoost (2017); Kaur &<br>Sharma (2022);<br>Zhang et al. (2019)      |
|                                                                         | <b>DSP2</b>  | I believe the IKD system maintains a high level of security integrity.                      |                                                                         |
|                                                                         | <b>DSP3</b>  | I perceive the risk of my personal data being breached through IKD to be low.               |                                                                         |
|                                                                         | <b>DSP4</b>  | I am confident that my personal data in IKD will not be misused by unauthorized parties.    |                                                                         |
| <b>Perceived Ease of Use (PEOU) /<br/>Persepsi Kemudahan Penggunaan</b> | <b>PEOU1</b> | The IKD application is easy for me to use.                                                  | Davis (1989);<br>Venkatesh &<br>Davis (2000)                            |
|                                                                         | <b>PEOU2</b> | The interface of the IKD application is clear and understandable.                           |                                                                         |
|                                                                         | <b>PEOU3</b> | The features of the IKD application are simple to operate.                                  |                                                                         |
|                                                                         | <b>PEOU4</b> | I do not need special technical expertise to use the IKD application.                       |                                                                         |
|                                                                         | <b>PEOU5</b> | Learning to operate the IKD application is easy for me.                                     |                                                                         |
|                                                                         | <b>PEOU6</b> | Overall, I find the IKD application easy to interact with.                                  |                                                                         |
| <b>Behavioral Intention (BI) /<br/>Minat Penggunaan</b>                 | <b>BI1</b>   | I am interested in using the IKD application.                                               | Davis (1989);<br>Venkatesh &<br>Davis (2000);<br>Persadha et al. (2024) |
|                                                                         | <b>BI2</b>   | I intend to continue using IKD in the future.                                               |                                                                         |
|                                                                         | <b>BI3</b>   | I am willing to switch from a physical identity card to IKD.                                |                                                                         |
|                                                                         | <b>BI4</b>   | I intend to use IKD across a variety of public-service contexts.                            |                                                                         |

**Source:** Authors (2026)