

# Implementing an Extention to The Technology Acceptance Model (TAM) to Evaluate User Acceptance of Identitas Kependudukan Digital (IKD)

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**Abstract**—*The objective of this study is to assess user acceptance and the factors that impact the adoption and usage of the Identitas Kependudukan Digital (IKD) application. Several significant technological obstacles arose during the implementation of IKD. Additional investigation is required to ascertain user satisfaction with applications that employ the technology acceptance model (TAM) technique. This technique combines an important aspect, specifically security. The research sample consisted of 100 participants from Bengkulu City who had used the IKD application. The data was analyzed using the Structural Equation Modeling-Partial Least Squares (SEM-PLS) methodology. The study's findings indicate that the acceptance status of IKD application users in Bengkulu city is 4.42, which corresponds to the level of agree. This suggests that the citizens of Bengkulu city have effectively adopted the IKD application. The SEM-PLS approach produced analytical data that demonstrate five factors that influence users' use of the IKD application: perceived usefulness, perceived ease of use, security, attitude towards usage, and behavioral intention to use.*

**Keywords**— TAM, Identitas Kependudukan Digital, IKD, SEM-PLS.

## I. INTRODUCTION

Presently, the advantages of the advancement of information technology have been experienced in varied domains. Information technology has been extensively utilized in both the government and private sectors to optimize corporate operations and accomplish organizational objectives.

The Identitas Kependudukan Digital (IKD) is an electronic government application developed by the Indonesian government. IKD is a repository of electronic data that provides information about the people of Indonesia, which is then shown on the user's device. According to our investigation of the comments section in the Google Playstore for the IKD application, there are several complaints expressing consumer dissatisfaction with this application. In addition, the IKD application (smartphone version) achieved a rating of 3.1 out of 5 on Google Playstore respectively. Meanwhile, the tablet version receives a rating of 3.8 out of 5. Additionally, numerous users provided one-star ratings for the IKD application. Although the IKD application provides convenience to its users, it is undeniable that there is a significant number of users that express dissatisfaction and lodge complaints about the service. Hence, additional investigation is required to evaluate the degree of user acceptability of the IKD application.

The technology acceptance model (TAM) is a mechanism that may be utilized to assess the level of adoption of an information technology product. The TAM technique offers the benefit of providing a comprehensive understanding of

information technology acceptance and user behavior [1]. Davis (1989) developed the "TAM" as a derivative of the Theory of Reasoned Action (TRA), which was originally proposed by Ajzen and Fishbein in 1980. Davis' concept was to provide greater insight on the issue of human behavior, particularly in regards to the adoption of technology by people. The model consists of four primary factors: "perceived usefulness, perceived ease of use, attitude towards using, and behavioral intention to use." In the domain of Information Science (IS), the characteristics that have the greatest impact on a user's acceptance of technology, and subsequently the adoption of that technology, are the perceived ease of use and perceived utility [2][3][4].

The study completed by Prasetyo and Tri titled "Analysis of the Benefits of Google Task User Ease in the Academic Environment" The TAM Method employs three variables: perceived utility, perceived ease of use, and attitude toward using [5]. In addition, Kelly and Palaniappan did a study titled "Using a technology acceptance model to determine factors influencing continued usage of mobile money service transactions in Ghana." This study incorporated four additional factors, specifically perceived trust, perceived cost, perceived risk, and social influence [2]. Alshurideh and Kurdi conducted a study named "Factors influencing social networks acceptance: An extension to the technology acceptance model using PLS-SEM and Machine Learning Approach." This study used the variable of perceived playfulness in order to evaluate the acceptability factor among users of social networks [6].

According to the literature review, the main difference between this research and other studies is the utilization of the TAM variable. This study incorporates five primary factors derived from the Technology Acceptance Model (TAM), specifically Perceived Usefulness, Perceived Ease of Use, Attitude Toward Using, Behavioral Intention to Use, and Actual System Usage. Additionally, it includes variables related to the research topic, particularly security. Hence, this study aims to evaluate the user's acceptance to adopt the IKD application and identify the factors that impact their adoption and usage of the software.

## II. RESEARCH METHODOLOGY

### A. Research Model and Hypothesis

This study tries to assess the user's motivation to use the IKD application and determine the factors that influence their adoption and utilization of the software. This study employs five Technology Acceptance Model (TAM) variables together with an additional variable, namely perceived usefulness (PU), Perceived Ease of Use (PEOU), Attitude Toward Using (ATU).

Behavioral Intention to Use (BIU), Actual System Usage (ASU) and security (S). The research model is depicted in figure 1. The research model has been utilized to generate six hypotheses, which are investigated in the study.

1. *Perceived of Usefulness (PU)*

Perceived usefulness (PU) is the extent to which an individual believes that utilizing a specific system would improve their job performance [7]. Users perceive the IKD application as advantageous and beneficial.

2. *Perceived Ease of Use (PEOU)*

Perceived ease of use (PEOU) refers to the extent to which an individual believes that using a specific system would require minimal physical and mental strain [7]. Users perceive the IKD application as user-friendly and understandable.

3. *Attitude Toward Using (ATU)*

Perceived usefulness (PU) is the extent to which an individual believes that utilizing a specific system would improve their job performance [7]. Users perceive the IKD application as advantageous and beneficial.

4. *Behavioral Intention to Use (BIU)*

Behavioral Intention to Use (BIU) refers to the desire or reluctance of individuals to adopt technology in their job activities [7]. The inclination of user behavior to persist in utilizing the IKD program.

5. *Actual System Usage (ASU)*

Actual System Usage (ASU) is the extent to which an observable physical reaction that may be quantified in a person during practical use [7]. This variable is conceptualized by quantifying the frequency and duration of application usage. Users will find the IKD application satisfactory if they perceive it as both beneficial and user-friendly.

6. *Security (S)*

Security is the extent to which an individual perceived the IKD application as having robust security measures to safeguard their private data.

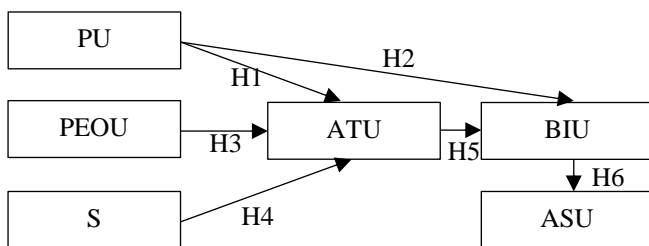


FIGURE 1. THE PROPOSED MODEL

**H1:** *Perceived of Usefulness (PU) positively impacts on Attitude Toward Using (ATU).*

**H2:** *Perceived of Usefulness (PU) positively impacts on Behavioral Intention to Use (BIU)*

**H3:** *Perceived Ease of Use (PEOU) positively impacts on Attitude Toward Using (ATU)*

**H4:** *Security (S) positively impacts on Attitude Toward Using (ATU).*

**H5:** *Attitude Toward Using (ATU) positively impacts on Behavioral Intention to Use (BIU)*

**H6:** *Behavioral Intention to Use (BIU) positively impacts on Actual System Usage (ASU)*

B. *Research Methodology*

1. *Research Approach*

This study offers a comprehensive investigation of the user acceptance of the IKD application. The study employed a quantitative methodology, which ensured the employment of appropriate strategies for data gathering and analysis to enhance its trustworthiness [2]. This study also aims to identify the factors that impact the acceptance and usage of the IKD application. Furthermore, questionnaires were disseminated to a more extensive group of users in order to gather quantitative data pertaining to user acceptability. The data was analyzed using descriptive and inferential statistical methods to draw findings.

2. *Target Population*

The study focused on the population of Bengkulu City inhabitants who have utilized the IKD application. Based on data acquired from the Bengkulu City Dukcapil office on July 25, 2023, the registration process for the IKD had reached a total of 7,486 individuals who had registered for electronic identity cards. The sample in this study consisted of 100 respondents, determined using the Slovin formula with a 10% error rate [8].

$$n = \frac{N}{(1 + Ne^2)}$$

$$n = \frac{7.486}{(1 + 7.486(0.1)^2)}$$

$$n = \frac{7.486}{75,86}$$

$$n = 98,68$$

3. *Data Collection Methods*

Data from IKD users in the research locations was collected randomly via a survey. The data were analyzed to test hypotheses and assess user acceptance of IKD in order to identify the elements that impact the adoption and utilization of IKD.

The questionnaire was designed using indicators that align with the study variables. It will be administered to a group of respondents and the data will be analyzed to get accurate and reliable information. This study used a Likert scale as a metric to gauge the attitudes and opinions of the participants. The Likert scale consists of statements presented in research, where respondents indicate their level of agreement in relation to hypothetical circumstances [9].

TABLE I. LIKERT SCALE

Answer	Weight
Strongly Agree (SA)	5
Agree (A)	4
Quite Agree (QA)	3
Disagree (D)	2
Strongly Disagree (SD)	1

The acceptance scale for each indicator is determined by calculating the mean of the scores obtained from the data . The final result scores will be categorized using range score calculation formulae as indicators:

$$Range = \frac{Highest\ score - Lowest\ score}{Class}$$

$$Range = \frac{5 - 1}{5}$$

$$Range = 0,8$$

The acceptance scale is derived from the calculated range score values, as shown in the table below.

TABLE II. RANGE SCORE OF USER ACCEPTANCE

No	Score	Result
1	$1 \leq x \leq 1,8$	Strongly Disagree
2	$1,9 \leq x \leq 2,7$	Disagree
3	$2,8 \leq x \leq 3,6$	Quite Agree
4	$3,7 \leq x \leq 4,5$	Agree
5	$4,6 \leq x \leq 5$	Strongly Agree

#### 4. Data Analysis

This study assesses the constructed theoretical model using partial least squares-structural equation modeling (PLS-SEM) with the assistance of the SmartPLS tool. The selection of PLS-SEM was based on its reputation for producing accurate results, due to its ability to simultaneously evaluate both measurement and structural models [10] [11]. The study drew conclusions from the data by conducting tests to determine significant variations between the construction and visualization of the data. This was done to generate a pictorial overview and enhance understanding of the data and study outcomes.

### III. RESULT AND DISCUSSION

The demographic characteristics of the data respondents were summarized, and the internal consistency of the data connected with the study model was assessed for reliability and validity.

#### 1. Demography

The data collecting results indicate that the female respondents represented the majority, representing 52%, whereas the male respondents contributed 48%. According to the respondents' occupation, 22% of them were students, 58% were employed, and the remaining 20% were unemployed. According to the duration of their usage of the IKD application, 71% of the participants have used it for less than six months, 2% have used it for six months to one year, and the remaining 27% have used it for over one year. Table 3 shows the data collected from respondents, which is essential for the research.

TABLE III. STUDY DEMOGRAPHY

Variable (n=100)		Frequency	Percentage
Gender	Male	42	42%
	Female	58	58%
Occupation	Student	22	22%
	Employee	58	58%
	Unemployment	20	20%
IKD Usage Duration	$\leq 6$ months	71	71%
	$>6$ months and $\leq 1$ year	2	2%
	$>1$ year	27	27%

#### 2. Measurement of User Acceptance

At this point, we conducted an analysis of the data distribution by computing the average (mean) for each indicator within each study variable based on the answers provided by the respondents. The subsequent data presents the outcomes of the respondents' answers distributed according to each research variable.

##### a. Perceived Usefulness (PU)

TABLE IV. PU VARIABLE ANSWER DISTRIBUTION

Indicator	Frequency					Mean
	SD	D	QA	A	SA	
PU1	0	0	2	56	42	4.40
PU2	0	0	1	52	47	4.46
PU3	0	0	2	47	51	4.49
PU4	0	0	2	49	49	4.47
PU5	0	0	2	45	53	4.51
<b>Average</b>						4.47

Table 4 shows that the perceived usefulness (PU) variable contains five indicators, with an average value of 4.47 out of 5. This demonstrates the consensus among respondents regarding the utility of the IKD application. The purpose of the IKD application is to facilitate access to users' personal data during the public service process, eliminating the need for physical identification.

##### b. Perceived Ease of Use (PEOU)

TABLE V. PEOU VARIABLE ANSWER DISTRIBUTION

Indicator	Frequency					Mean
	SD	D	QA	A	SA	
PEOU1	0	0	3	52	45	4.42
PEOU2	0	0	1	54	45	4.44
PEOU3	0	0	3	46	51	4.48
PEOU4	0	0	2	46	52	4.50
PEOU5	0	0	3	40	56	4.51
<b>Average</b>						4.47

Table 5 indicates that the perceived ease of use (PEOU) variable contains five indicators, with an average value of 4.47 out of 5. Respondents concur that the IKD application offers convenience for users, as evidenced by this. The purpose of building the IKD application is to offer users numerous advantages, allowing them to utilize it anywhere, therefore providing them with flexibility.

c. Security (S)

TABLE VI. S VARIABLE ANSWER DISTRIBUTION

Indicator	Frequency					Mean
	SD	D	QA	A	SA	
SC1	0	0	4	55	41	4.37
SC2	0	0	4	49	47	4.43
SC3	0	0	3	54	43	4.40
<b>Average</b>						4.40

Table 6 shows that the security (S) variable contains three indicators, with an average value of 4.40 out of 5. This demonstrates the consensus among the participants that the IKD application is deemed secure for utilization. In addition, the respondents express confidence in the security of recorded data saved in the IKD application due to the presence of security elements that ensure the protection of user data.

d. Attitude Toward Using (ATU)

TABLE VII. ATU VARIABLE ANSWER DISTRIBUTION

Indicator	Frequency					Mean
	SD	D	QA	A	SA	
ATU1	0	1	5	58	36	4.29
ATU2	0	0	5	51	44	4.39
ATU3	1	0	2	57	40	4.35
<b>Average</b>						4.34

Table 7 displays that the attitude toward using (ATU) variable consists three indicators, with an average value of 4.34 out of 5. This indicates that the participants responded positively to the IKD application. This phenomenon occurs because users have encountered the advantages, ease, and sense of safety they enjoy while utilizing the IKD program.

e. Behavioral Intention to Use (BIU)

TABLE VIII. BIU VARIABLE ANSWER DISTRIBUTION

Indicator	Frequency					Mean
	SD	D	QA	A	SA	
BIU1	0	0	4	59	37	4.33
BIU2	0	0	2	53	45	4.43
BIU	0	1	2	44	53	4.49
<b>Average</b>						4.42

Table 8 shows that the variable of behavioral intention to use (BIU) is made up of three indications with an average value of 4.42 out of 5. This indicates that the participants plan to consistently utilize the IKD application whenever it is required in the public service procedure. In addition, the respondent also plans to endorse the usage of the IKD application to those in his immediate circle.

f. Actual System Usage (ASU)

TABLE IX. ASU VARIABLE ANSWER DISTRIBUTION

Indicator	Frequency					Mean
	SD	D	QA	A	SA	
ASU1	1	0	1	51	47	4.43
ASU2	1	0	3	48	48	4.42
<b>Average</b>						4.43

According to Table 9, the variable of behavioral intention to use (BIU) consists of two indicators, with an average value of 4.43 out of 5. This demonstrates that survey participants frequently utilize the IKD application in their daily lives due to the multitude of advantages it offers to its users. This occurs due to the consumers' contentment with the efficacy of the IKD application.

The user acceptability measurements from tables 4, 5, 6, 7, 8, and 9 suggest that respondents who are citizens of the city of Bengkulu generally "agree" with the IKD application. The average value obtained is 4.42. The perceived usefulness (PU) and perceived ease of use (PEOU) variables had the highest score, with an average value of 4.47. This demonstrates the utility and convenience offered by the IKD application.

3. Measurement of Model Assessment

The assessment of the measurement model entails verifying its reliability and validity [12]. Cronbach's alpha measurements are used to assess reliability. The measure must have a value that is equal to or greater than 0.70 [12]. The results shown in Table 10 demonstrate sufficient reliability and validity, since the measured variables exhibited satisfactory values. Hair suggested assessing the validity of a measurement by measuring the levels of convergent and discriminant validities [12]. Convergent validity was assessed by calculating the average variance extracted (AVE). The valid range for AVE is equal to or greater than 0.50, as stated by Fornell and Larcker [13]. Table 10 unambiguously demonstrates that the values of the AVE measure align with the permissible values, hence verifying the convergent validity.

TABLE X. CONVERGENT VALIDITY

Constructs	Items	CA	AVE
ASU	ASU1	0.932	0.871
	ASU2	0.934	
	ATU1	0.859	
ATU	ATU2	0.841	0.852
	ATU3	0.852	
	BIU	0.832	
BIU2	0.864		

	BIU3	0.856	
PEOU	PEOU1	0.798	0.650
	PEOU2	0.860	
	PEOU3	0.859	
	PEOU4	0.761	
	PEOU5	0.748	
PU	PU1	0.784	0.667
	PU2	0.842	
	PU3	0.805	
	PU4	0.827	
	PU5	0.824	
S	S1	0.839	0.746
	S2	0.877	
	S3	0.875	

Subsequently, the discriminant validity of each variable was assessed by employing the Fornell-Lacker value criteria. The validity of the computation results is confirmed in Table 11, since all variables exhibit higher values than the correlation values between variables [14]. Therefore, this confirms the acceptance of discriminant validity.

TABLE XI. DISCRIMINANT VALIDITY

	ASU	ATU	BIU	PEOU	PU	S
ASU	<b>0.933</b>					
ATU	0.614	<b>0.851</b>				
BIU	0.775	0.654	<b>0.850</b>			
PEOU	0.702	0.716	0.743	<b>0.806</b>		
PU	0.627	0.670	0.632	0.768	<b>0.816</b>	
S	0.605	0.717	0.623	0.646	0.587	<b>0.864</b>

#### 4. Hypothesis Testing

The six hypotheses mentioned above have been collectively tested using the structural equation modeling (SEM) approach, as proposed by Davis, Bagozzi, and Warshaw [15]. The significance of the paths is presented in table 12.

In general, the evidence substantiated six hypotheses. After conducting data analysis, it was found that all assumptions were corroborated by the empirical data.

The findings indicate that perceived usefulness (PU) had significant impacts on behavioral intention to use (BIU) ( $\beta=0.350, P<0.05$ ), while perceived ease of use (PEOU) had a significant influence on attitude toward using (ATU) ( $\beta=0.297, P<0.05$ ), thus supporting hypotheses H2 and H3, respectively. Security (S) has a substantial impact on attitude toward using (ATU) ( $\beta=0.404, P<0.05$ ). Additionally, attitude toward using (ATU) strongly influences behavioral intention to use (BIU) ( $\beta=0.420, P<0.05$ ), and behavioral intention to use (BIU) has a significant effect on actual system usage (ASU) ( $\beta=0.775, P<0.05$ ). Therefore, H4, H5, and H6 are acceptable. However, there was no evidence to support the relationship between perceived usefulness (PU) and attitude toward using (ATU) on H1 ( $\beta=0.205, P>0.05$ ).

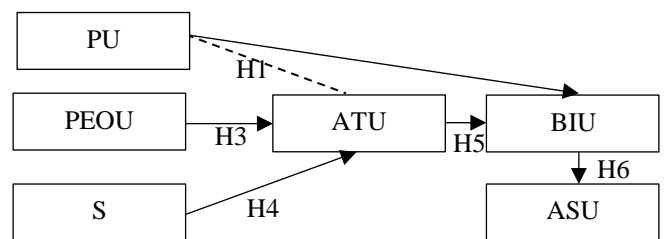


FIGURE 2. THE STUDY HYPOTHESIS OUTCOME

TABLE XII. THE RESULT OF STRUCTURAL MODELING ANALYSIS

H	Relationship	Path	t-value	p-value	Direction	Decision
H1	PU -> ATU	0.205	1.956	0.051	Positive	Not Supported
H2	PU -> BIU	0.350	3.291	0.001	Positive	Supported
H3	PEOU -> ATU	0.297	2.574	0.010	Positive	Supported
H4	S -> ATU	0.404	3.374	0.001	Positive	Supported
H5	ATU -> BIU	0.420	3.287	0.001	Positive	Supported
H6	BIU -> ASU	0.775	14.857	0.000	Positive	Supported

The analysis using the PLS-SEM approach revealed that the user acceptance of the IKD application is influenced by four TAM variables and one additional variable, namely Perceived Usefulness, Perceived Ease of Use, Attitude Toward Using, Behavioral Intention to Use, Actual System Usage, and Security. The t-test values for each variable are greater than 1.96, indicating that the research variables significantly impact the acceptance of the IKD application.

#### IV. CONCLUSION

The primary aim of this study was to comprehend the current state and factors that impact the acceptance and use of IKD by the citizens of Bengkulu City. The data analysis of 100 respondents indicates that the average score for user acceptability of the IKD application is 4.43, placing inside the "agree" category. The residents of Bengkulu have warmly embraced the IKD application as a tool for enhancing public service in Bengkulu. The study's findings also reveal that four TAM method variables, as well as one additional variable, influence users' use of the IKD application, including perceived usefulness, perceived ease of use, security, attitude toward using, and behavioral intention.

The author presents recommendations for future study development based on the conducted research. The recommendations provided are to integrate several models, employ or contrast models, researchers may also incorporate additional indicators and conduct research in other areas while utilizing the same model, in order to yield variations in the research process. In addition, when filling out a research questionnaire, researchers must create a questionnaire that is clearly comprehensible to the research crew. Subsequent researchers have the ability to augment the quantity of responses in order to acquire more precise outcomes.

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