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ANALYSIS OF DIGITAL TERRESTRIAL TELEVISION TECHNOLOGY ACCEPTANCE USING THE UTAUT2 MODEL

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Abstract
Indonesia is currently in a transition period from analog to digital television broadcasting. This paper investigates the factors that influence public acceptance of digital terrestrial television (DTT) technology in Indonesia using the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) model. A survey of users was conducted to collect data on the factors of performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, and habit. The results of the study showed that Age, Habit, Hedonic Motivation, Gender, Facilitation Condition, Salary, Behavioral Intention and Use Behaviour are having an effect to people use Terrestial Television for their activity with fun, enjoyable and use for long term.

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1. INTRODUCTION

The GE06 of the Geneva Convention, which was approved by 119 member countries of the International Telecommunication Union (ITU) in 2006, recognized the necessity of transitioning to Digital Terrestrial Television (DTT) broadcasting [1]. Digital Terrestrial Television (DTT) broadcasting employs advanced digital compression and processing techniques, resulting in a more efficient utilization of network capacity. By utilizing DTT, viewers gain access to a diverse array of channel options, leading to improved picture and sound quality. Moreover, DTT has the potential to foster market competition and drive innovation among new service providers, including those involved in transmitter network infrastructure, antenna technology, and receiver/set top box development [2].

The ASEAN countries, including Indonesia, made a commitment to complete the process of Analog Switch-Off (ASO) by 2020. ASO involves a gradual transition from analog to digital television broadcasting [1]. As a result of the COVID-19 pandemic, Indonesia postponed the Analog Switch-Off (ASO) originally planned for 2020. The process commenced in 2022 and is now scheduled to be completed on August 17, 2023. [3].

The ASO is a major undertaking that will require the cooperation of the government, broadcasters, and the public. The government has been providing subsidies to help low-income households purchase DVB-T2 digital television sets or set-top box (STB) [4]. A DVB-T2 set-top box is a device that allows you to watch digital terrestrial television (DTT) broadcasts [5]. Broadcasters have been working to upgrade their infrastructure to support digital broadcasting. And the public has been encouraged to switch to digital television so that they can continue to enjoy their favorite programs.

Numerous studies have emphasized the advantages of Digital Terrestrial Television (DTT). However, it is important to examine the public's intention to adopt this technology in Indonesia. The purpose of this study is to address the following research objectives:

1. To investigate whether the UTAUT2 exogeneous construct (PE, EE, SI, FC, HM, PV, and HT) affect public Behavioural Intentions (BI) to accept DTT set-top box
2. To examine the nature and the strength of the relationship amongst the UTAUT2 exogenous construct

II. LITERATURE

2.1. DVB-T2

DVB-T2 is a modern broadcast transmission standard that has gained prominence. Initially, the DVB Project developed commercial guidelines to assess the integration of the latest technological

advancements into the new DVB-T specification. The DVB-T2 standard draws upon the experience gained from the implementation of the original DVB-T, which was first introduced in the United Kingdom [6].

DVB-T2 has the capability to enhance transmission capacity by a minimum of 30% compared to the existing standard, without compromising the TV coverage. Additionally, it enables the transport of Internet Protocol (IP) data.

The resulting standard surpasses the capacity increase target, achieving a notable increase of 40-50% and, in certain scenarios, exceeding 65%. [7]. The development of the DVB-T2 standard was primarily driven by the need to enhance the spectral efficiency of digital terrestrial systems operating in the UHF/VHF frequency bands [8].

2.2. Extended Unified Theory of Acceptance and Use of Technology (UTAUT2)

The UTAUT (Unified Theory of Acceptance and Use of Technology) framework was developed by Venkatesh et al. as a comprehensive synthesis of prior research on technology acceptance. UTAUT comprises four key factors: performance expectancy, effort expectancy, social influence, and facilitating conditions. These elements collectively influence individuals' intention to use a technology and their subsequent actual utilization of it [9].

Considering its initial development in the organizational context, the original UTAUT may not fully capture the factors influencing the adoption and usage of consumer IT. To address this limitation, Venkatesh proposed UTAUT2, which incorporates additional constructs and causal relationships, as shown in Figure 1. Hedonic motivation refers to the fun or pleasure derived from using a technology. Price value is defined as consumers' cognitive tradeoff between the perceived benefits of the applications and the monetary cost associated with using them. Habit refers to a perceptual construct reflecting the results of prior experiences [9].

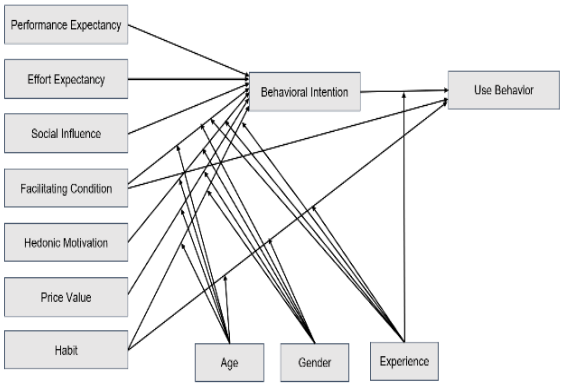

Figure 1 UTAUT2 Model

In addition to the construct relationships proposed in the original UTAUT, the following relationships were added: first, hedonic motivation and price value can determine behavioral intention. Second, habit can influence both behavioral intention and usage behavior. Third, facilitating conditions can influence behavioral intention. The UTAUT2 model introduced several moderators, such as age, gender, and experience, to consider their potential influence on the relationships within the framework.

The main aim of extending the UTAUT to UTAUT2 was to tailor the model to better fit the consumer perspective when adopting new technological innovations. The inclusion of the hedonic motivation construct in the UTAUT2 framework has shifted the focus from an organizational standpoint to a consumer-centric viewpoint. Moreover, recent literature has shown that UTAUT2 has demonstrated predictive relevance across various IT domains and contexts.

UTAUT2 is considered a comprehensive theory as it incorporates seven influential determinants that significantly impact users' intention to adopt and utilize IT products and services. The introduction of new determining parameters in the UTAUT2 extension has contributed to an enhanced ability to explain the variance in intentional behavior towards embracing newly introduced innovations [10].

III. CONCEPTUAL MODEL DEVELOPMENT

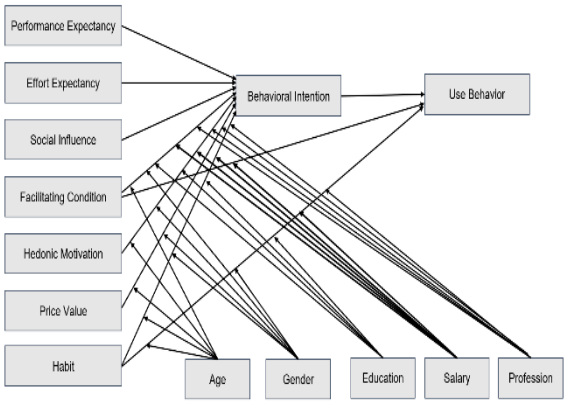

Figure 2 Proposed Model

This study are incorporating elements from the widely recognized "Unified Theory of Acceptance and Use of Technology (UTAUT2)" [9]. UTAUT2 identifies seven predictors of technology usage and intention to use, such as:

1. Performance Expectancy
2. Effort Expectancy
3. Social Influence
4. Facilitating Conditions
5. Hedonic Motivation
6. Price Value
7. Habit

The survey questions were compiled and listed in Table 1.

Table 1 Survey Questions

No	Question	Code
1	I find that Digital Terrestrial Televison is useful in my daily work	PE1
2	Using Digital Terrestrial Televison increases my chances to get information that are important to me	PE2
3	Using Digital Terrestrial Televison helps me get information faster	PE3
4	Using Digital Terrestrial Televison increases my productivity	PE4
5	Learning how to use Digital Terrestrial Televison is easy for me	EE1
6	My interaction with Digital Terrestrial Televison is clear and understandable	EE2
7	I find Digital Terrestrial Televison easy to use	EE3
8	It is easy for me to become skilled at using Digital Terrestrial Televison	EE4
9	People who are important to me think I should use Digital Terrestrial Televison	SI1
10	People who influence my behavior believe that I should use Digital Terrestrial Televison	SI2
11	People whose opinions I value prefer me to use Digital Terrestrial Televison	SI3
12	I have the resources necessary to use Digital Terrestrial Televison	FC1
13	I have the knowledge necessary to use Digital Terrestrial Televison	FC2
14	Digital Terrestrial Televison is compatible with other technologies I use	FC3
15	I can get help from others when I have difficulties using Digital Terrestrial Televison	FC4
16	Using Digital Terrestrial Televison is fun	HM1
17	Using Digital Terrestrial Televison is enjoyable	HM2
18	Using Digital Terrestrial Televison is very entertaining	HM3
19	Digital Terrestrial Televison is reasonably priced	PV1
20	Digital Terrestrial Televison is a good value for the money	PV2
21	At the current price, Digital Terrestrial Televison provides a good value	PV3
22	The use of Digital Terrestrial Televison has become a habit for me	HT1
23	I am addicted to using Digital Terrestrial Televison	HT2
24	I must use Digital Terrestrial Televison	HT3
25	Using Digital Terrestrial Televison has become natural for me	HT4
26	I intend to continue using Digital Terrestrial Televison in the future	BI1
27	I will always try to use Digital Terrestrial Televison in my work	BI2
28	I plan to continue to use Digital Terrestrial Televison frequently	BI3
29	Please choose your usage frequency for Digital Terrestrial Televison: Never; Once a month; Several times a month; Once a week; Several times a week; Once a day; Several times a day	U1

III. RESEARCH METHODS

This research utilizes the PLS algorithm and uses these items:

1. Path coefficient value between each Exogenous Variable to Endogenous Variable
2. Outer Loading as an indicator the variables' validity
3. Direct effect, Indirect effect, and total effect
4. R Square and R Square Adjusted to determine the percentage of Exogenous Variables that influence the Endogenous Variable
5. F Square to calculate variables influence of Effect Size
6. Construct Reliability and Validity to do reliability and validity tests. This test generates Cronbach's Alpha, Composite Reliability and Corvergent Validity
7. Discriminant Validity that generates The Fornell Larcker Criterion Table
8. Multicollinearity Tests using VIF values (Variance Inflation Factor)

The next step is to do bootstrapping calculations to assess the level of significance or probability of direct effects, indirect effects, and total effects. The calculation generates R Square, Adjusted R Square, F Square, Outer Loading and Outer Weight.

The research continued to formulate these analyses:

1. The t statistic value is then compared with the t table value to test the effect significance of Exogenous Variable on The Endogenous Variable.
2. The p value is assesed based on the determined significance level. If the value is greater than 0.05 then the null hypothesis or alternative hypothesis is accepted. Otherwise, it is rejected
3. Original Sample, used as the value of the regression coefficient, to complete the regression equation.

The last step is a Blindfolding test. The test assesses the relevance level of the model predictions construct. It uses Q Square value. If the Q Square value is greater than 0.05 then the construct model is relevant. We can conclude that the Exogenous Variables used to predict Endogenous Variables are correct.

IV. RESULTS

Convergent validity can be accepted if the loading factor value is greater than or equal to 0.5 [11]. The EE1, EE3, FC2, FC4, and H2 indicator is removed from the model, as depicted in Figure 3.

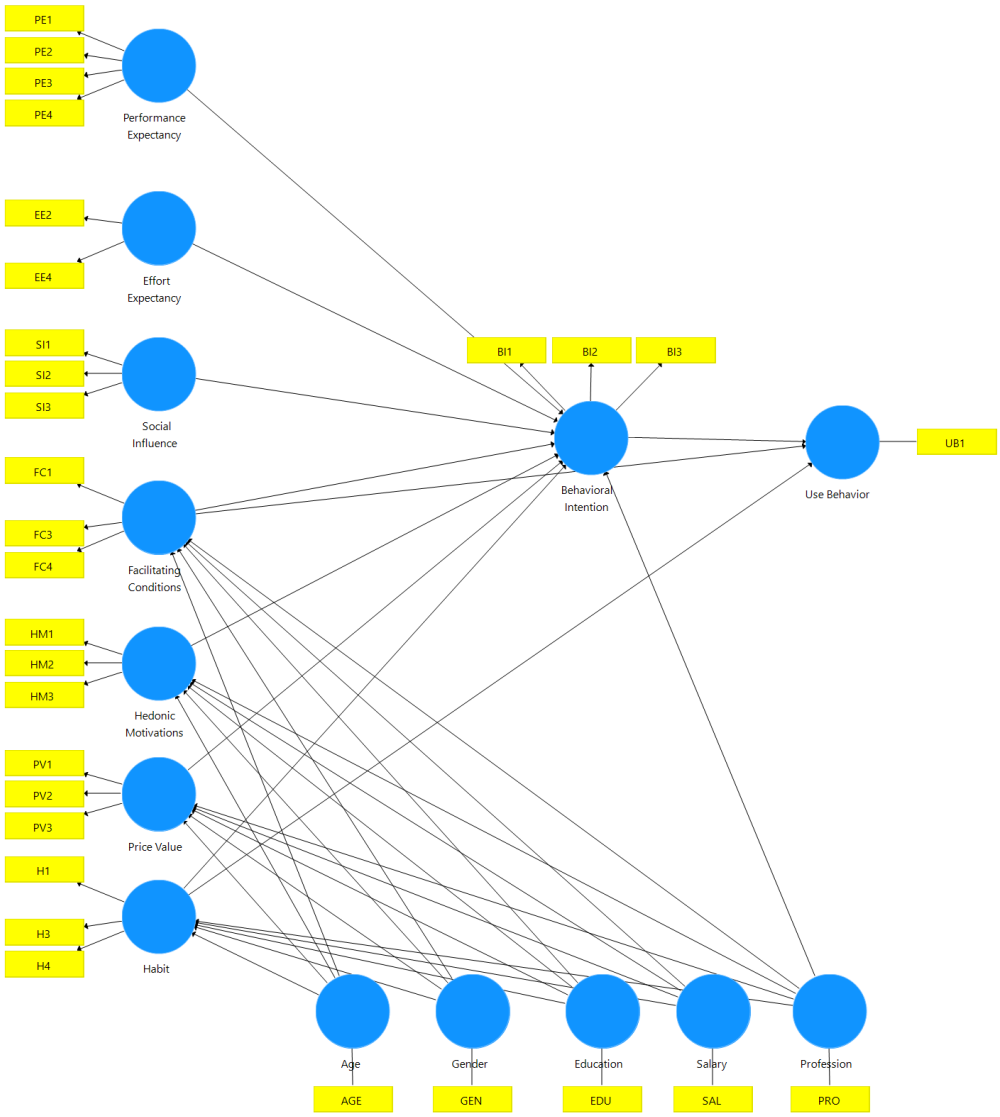

Figure 3 Proposed Model on SmartPLS

1) Outer Model Test Result
   a. Discriminant Validity

Discriminant Validity is achieved when the generated average variance's Average Variance Extracted (AVE) is greater than the correlation involving the latent variable [12]. The AVE result to fulfill the requirement is shown in Table 2.

Table 2 Discriminant Validity Results

	AGE	BI	EDU	EE	FC	GEN	HT	HM	PE	PV	PRO	SAL	SI
AGE	1												
BI	-0,2	0,952											
EDU	0,133	0,175	1										
EE	-0,379	0,365	-0,128	0,851									
FC	-0,381	0,423	-0,162	-0,041	1								
GEN	-0,035	0,097	-0,017	-0,244	0,239	1							
HT	-0,355	0,8	-0,001	0,593	0,413	0,128	0,89						
HM	-0,341	0,844	0,012	0,585	0,284	-0,11	0,843	0,973					
PE	-0,16	0,647	-0,117	0,339	0,336	-0,028	0,713	0,819	0,829				
PV	-0,412	0,431	-0,046	0,651	0,384	-0,06	0,485	0,458	0,308	0,873			
PRO	-0,404	0,185	0,226	0,271	0,207	-0,145	0,067	0,088	-0,062	0,473	1		
SAL	0,261	-0,129	-0,078	0,178	-0,621	0,043	-0,033	0,012	-0,119	-0,1	-0,085	1	
SI	-0,382	0,444	-0,033	0,237	0,601	0,054	0,322	0,304	0,313	0,595	0,502	-0,408	0,941

b. Cronbach's Alpha & Composite Reliability

A research construct reliability test is required to verify whether the research instrument items will offer relatively consistent data when used twice to quantify the symptoms connected with the study [13]. The Cronbach Alpha scale is divided into four categories: highly unreliable, unreliable, moderately reliable, reliable, and very reliable. The value in the Chronbach Alpha column ranges from 0.64 to 1.00, indicating that it is reliable. On the other hand, the value of Composite Realibilty ≥ 0.7, so the result of this research is considered reliable. The test results are shown in Table 3.

Table 3 Chronbach's Alpha Composite Realibility Results

Variable	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Age	1	1	1	1
Behavioral Intention	0,948	0,95	0,966	0,905
Education	1	1	1	1
Effort Expectancy	0,64	0,774	0,838	0,723
Facilitating Conditions	1	1	1	1
Gender	1	1	1	1
Habit	0,869	0,871	0,92	0,793
Hedonic Motivations	0,971	0,972	0,981	0,946
Performance Expectancy	0,848	0,86	0,898	0,688
Price Value	0,841	0,903	0,904	0,762
Profession	1	1	1	1
Salary	1	1	1	1
Social Influence	0,936	0,936	0,959	0,886
Use Behavior	1	1	1	1

2) Inner Model Test Results

a. R- Square

The proportion of variation in the value of the affected variable (endogenous) that can be explained by the variable that influences it (exogenous) is measured by the R-Square. This can be used to forecast if the model is favourable or unfavorable [14]. This calculation refers to R2 or R-adjusted

- If the value of R2 = 0.75, the model is substantial (strong).
- If the value of R2 = 0.50, the model is moderate (moderate).
- If the value of R2 = 0.25, the model is weak (bad).

Table 4 R-Square Test Results

Variable	R Square	R Square Adjusted	Remark
Behavioral Intention	0,859	0,8	strong
Facilitating Conditions	0,566	0,468	moderate
Habit	0,153	-0,04	weak
Hedonic Motivations	0,16	-0,031	weak
Price Value	0,292	0,131	weak
Use Behavior	0,549	0,492	moderate

b. F-square

F-Square is a measurement used to assess the relative impact of an influencing variable (exogenous) on the affected variable (endogenous). Changes in R2 or R-adjusted when specific exogenous variables are removed from the model can be used to determine whether a lack of factors has a significant impact on the endogenous construct. F-square criteria based on [15]:

- If the value of f2 = 0.02, The exogenous variable has a small effect on the endogenous variable
- If the value of f2 = 0.15, The exogenous variable has a moderate effect on the endogenous variable
- If the value of f2 = 0.35, The exogenous variable has a big effect on the endogenous variable

Table 5 F-Square Test Results

Variable			f2	Effect
Age	→	Facilitating Conditions	0,014	small
Age	→	Habit	0,151	moderate
Age	→	Hedonic Motivations	0,169	moderate
Age	→	Price Value	0,055	small

Behavioral Intention	→	Use Behavior	0,059	small
Education	→	Facilitating Conditions	0,116	moderate
Education	→	Habit	0,007	small
Education	→	Hedonic Motivations	0,012	small
Education	→	Price Value	0,014	small
Effort Expectancy	→	Behavioral Intention	0,401	big
Facilitating Conditions	→	Behavioral Intention	0,034	small
Facilitating Conditions	→	Use Behavior	0,008	small
Gender_	→	Facilitating Conditions	0,185	moderate
Gender_	→	Habit	0,011	small
Gender_	→	Hedonic Motivations	0,025	small
Gender_	→	Price Value	0	small
Habit	→	Behavioral Intention	0,341	moderate
Habit	→	Use Behavior	0,22	moderate
Hedonic Motivations	→	Behavioral Intention	0,948	big
Performance Expectancy	→	Behavioral Intention	0,211	moderate
Price Value	→	Behavioral Intention	0,008	small
Profession	→	Behavioral Intention	0,013	small
Profession	→	Facilitating Conditions	0,076	small
Profession	→	Habit	0,009	small
Profession	→	Hedonic Motivations	0,014	small
Profession	→	Price Value	0,165	moderate
Salary	→	Facilitating Conditions	0,781	big
Salary	→	Habit	0,005	small
Salary	→	Hedonic Motivations	0,019	small
Salary	→	Price Value	0	small
Social Influence	→	Behavioral Intention	0,15	moderate

c. Direct Effect

Direct Effect analysis is utilized to test the hypothesis of the direct influence of a variable that affects (exogenous) the affected variable (endogenous). This method has several criteria as below:
Path Coefficient:

- If the value of the path coefficient (path coefficient) is positive, then the influence of a variable is unidirectional. If the value of an exogenous variable increases/increases, then the value of the endogenous variable also increases/rises
- If the value of the path coefficient (path coefficient) is negative, then the effect of a variable is in the opposite direction, if the value of a variable is exogenous and increases or rises, then the value of the endogenous variable decreases.

Probability/Significance Value (P-Value):

- If the P-Values <0.05, then it is significant
- If the P-Values>0.05, then it is not significant

Table 6 Direct Effect Test Results

Variable Relation	Original Sample (O)	P Values	Information
Age → Facilitating Conditions	-0,094	0,66	negative & not significant
Age → Habit	-0,423	0,047	negative & significant
Age → Hedonic Motivations	-0,446	0,021	negative & significant
Age → Price Value	-0,232	0,414	negative & not significant
Behavioral Intention → Use Behavior	0,275	0,226	positive & not significat
Education → Facilitating Conditions	-0,24	0,161	negative & not significant
Education → Habit	0,085	0,713	positive & not significat
Education → Hedonic Motivations	0,108	0,651	positive & not significat
Education → Price Value	-0,107	0,455	negative & not significant
Effort Expectancy → Behavioral Intention	-0,449	0,062	negative & not significant
Facilitating Conditions → Behavioral Intention	-0,111	0,455	negative & not significant
Facilitating Conditions → Use Behavior	-0,066	0,616	negative & not significant

Gender → Facilitating Conditions	0,289	0,016	positive & significant
Gender → Habit	0,097	0,423	positive & not significant
Gender → Hedonic Motivations	-0,147	0,126	negative & not significant
Gender → Price Value	-0,012	0,936	negative & not significant
Habit → Behavioral Intention	0,482	0,054	positive & not significant
Habit → Use Behavior	0,53	0,009	positive & significant
Hedonic Motivations → Behavioral Intention	0,904	0,002	positive & significant
Performance Expectancy → Behavioral Intention	-0,334	0,084	negative & not significant
Price Value → Behavioral Intention	0,059	0,812	positive & not significant
Profession → Behavioral Intention	0,055	0,751	positive & not significant
Profession → Facilitating Conditions	0,213	0,227	positive & not significant
Profession → Habit	-0,103	0,617	negative & not significant
Profession → Hedonic Motivations	-0,127	0,466	negative & not significant
Profession → Price Value	0,4	0,087	positive & not significant
Salary → Facilitating Conditions	-0,61	0,001	negative & significant
Salary → Habit	0,071	0,803	positive & not significant
Salary → Hedonic Motivations	0,132	0,566	positive & not significant
Salary → Price Value	-0,013	0,955	negative & not significant
Social Influence → Behavioral Intention	0,23	0,449	positive & not significant

3) Hypothesis

The analysis of hypotheses shown in the Table 7 presents the status and relation of each variable.

Table 7 Hypotheses Analysis

No	Variable	Status	Relation
H1	Age → Facilitating Conditions	rejected	negative & insignificant
H2	Age → Habit	accepted	negative & significant
H3	Age → Hedonic Motivations	accepted	negative & significant
H4	Age → Price Value	rejected	negative & insignificant
H5	Behavioral Intention → Use Behavior	rejected	positive & not significant
H6	Education → Facilitating Conditions	rejected	negative & insignificant
H7	Education → Habit	rejected	positive & not significant
H8	Education → Hedonic Motivations	rejected	positive & not significant
H9	Education → Price Value	rejected	negative & insignificant
H10	Effort Expectancy → Behavioral Intention	rejected	negative & insignificant
H11	Facilitating Conditions → Behavioral Intention	rejected	negative & insignificant
H12	Facilitating Conditions → Use Behavior	rejected	negative & insignificant
H13	Gender → Facilitating Conditions	accepted	positive & significant
H14	Gender → Habit	rejected	positive & not significant
H15	Gender → Hedonic Motivations	rejected	negative & insignificant
H16	Gender → Price Value	rejected	negative & insignificant
H17	Habit → Behavioral Intention	accepted	positive & insignificant
H18	Habit → Use Behavior	accepted	positive & significant
H19	Hedonic Motivations → Behavioral Intention	accepted	positive & significant
H20	Performance Expectancy → Behavioral Intention	rejected	negative & insignificant
H21	Price Value → Behavioral Intention	rejected	positive & insignificant
H22	Profession → Behavioral Intention	rejected	positive & insignificant
H23	Profession → Facilitating Conditions	rejected	positive & insignificant
H24	Profession → Habit	rejected	negative & insignificant
H25	Profession → Hedonic Motivations	rejected	negative & insignificant
H26	Profession → Price Value	rejected	positive & insignificant
H27	Salary → Facilitating Conditions	accepted	negative & significant
H28	Salary → Habit	rejected	positive & insignificant
H29	Salary → Hedonic Motivations	rejected	positive & insignificant
H30	Salary → Price Value	rejected	negative & insignificant
H31	Social Influence → Behavioral Intention	rejected	positive & insignificant

V. CONCLUSION

The analysis of Digital Terrestrial Television technology using UTAUT2 concluded with several accepted hypotheses. Some model relationship hypotheses that are acceptable are Age, Habit, Hedonic Motivation, Gender, Facilitation Condition, Salary, Behavioral Intention and Use Behaviour are having an effect to people use Terrestial Television for their activity with fun, enjoyable and use for long term. Several models-hypotheses are rejected such as Price Value, Education, Profession, Social Influence.

Price Value, Education, Profession, Social Influence could be improved to make Digital Terrestrial Television technology easy to understand, and has influence to other people to use this technology.

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