

THE APPLICATION OF UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY IN MUSICAL METAVERSE

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ABSTRACT

This research study observes the musical Metaverse and applies the theories of UTAUT (Unified Theory of Acceptance and Use of Technology) and IDT (Innovation Diffusion Theory). It aims to examine the acceptance of the musical Metaverse toward the behavior intention to use (BI), which is influenced by performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC), moderated by personal innovativeness (PI). The Google form data was collected from 250 Ciputra University students who familiarized themselves with the musical Metaverse, and the data was later processed using SmartPLS 4. The results showed that PE has a significant effect on BI, EE has no significant effect on BI, and SI has no significant effect on BI. FC has a significant effect on BI; PI has not been able to strengthen other factors to have the intention to use the musical Metaverse. Thus, performance expectancy and facilitating conditions influence the intention to use the musical Metaverse. Meanwhile, personal innovativeness cannot significantly moderate the relationship between PE, EE, SI, and FC.

Keywords: Musical Metaverse, Performance Expectancy, Effort Expectancy, Social Influence, Personal Innovation.

INTRODUCTION

Technological progress has reached the stage where humans can create new worlds in virtual form. This new world of the future that is already present is known as the Metaverse (Susilawati et al., 2022). Metaverse is a post-reality universe, an eternal

and enduring multi-use environment that creates 3-D digital virtual and physical reality (Mystakidis, 2022). In Indonesia, the Metaverse has enormous potential in the Creative Economy sector, which can improve the economy in Indonesia (Sabari et al., 2022). Concerts are a sub-sector of the creative economy used by music industry players to gain economic benefits from their creations by holding a live performance in front of an audience (Silfiani, 2023). Concerts significantly impact promoting Indonesia to the broader community, so this sector is a crucial factor in driving the revival of the national economy in the future (Ministry of Tourism and Creative Economy, 2021).

The music industry has different grown since COVID-19 appeared (Alima & Ramadhanty, 2022). The cancellation of thousands of concerts due to COVID-19 caused huge losses that prevented the music industry from developing (Condon, 2020). Based on data from the Indonesian Art Coalition (IAC) in 2020, 113 concerts, tours, and music festivals were delayed due to the Covid-19 pandemic. Luckily, through the digitalization of artistic activities such as concerts during a pandemic, this problem has a solution (Alima & Ramadhanty, 2022). Artists and musicians responded quickly to changes in government policies regarding social distancing during the COVID-19 pandemic by implementing Virtual Concerts (Swarbrick et al., 2021).

It does not stop at Virtual Concerts. The development continues and brings the latest technological advancements, including the Musical Metaverse (MM) (Turchet, 2023). Musical Metaverse is a combined concept of musical activities and Metaverse dedicated to the world of music, where users can perform various kinds of musical activities and interact with fellow users (Turchet, 2023). MM is expected to create musical interactions and euphoria between performers and the audience, like in the real world, which cannot be realized in virtual concerts (Turchet, 2023).

The metaverse trend itself is welcomed by the people of Indonesia. In which Indonesia reached the fifth position in the usage of Metaverse, with a user percentage of 35%. It indicates that as much as 35% of Indonesians are interested in using Metaverse daily. Furthermore, a Databoks survey (Annur, 2022) regarding "Activities People Want to Do in the Metaverse World" shows that out of 1,000 people, as many as 48% are interested in watching arts and entertainment while in the Metaverse world. According to Statista (2023), Musical Metaverse's revenue in Indonesia alone is expected to reach US\$2.44 million by the end of 2023. They also estimate an increase in market volume growth of 9.57%. It shows a positive trend towards accepting the Musical Metaverse in Indonesia.

The emergence of the Musical Metaverse in the music industry using various technologies requires users to have a deeper understanding of how to use and enjoy it (Turchet, 2023). The leading theory used in this research is UTAUT (Unified Theory of Acceptance and Use of Technology). The theory discusses the acceptance of technology from the perspective of Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC). Based on the level of validation of UTAUT, it is better than its predecessor theory (TAM & TAM 2) (Blut et al., 2022). Not only that, but the level of individual innovation is also an essential factor in technological acceptance (Akour et al., 2022). This research was in line with Asare et al. (2016) concluded that personal innovativeness strengthens technology acceptance in adopting E-learning in Higher Education, the UTAUT study case theory. Another study describes the acceptance of the Metaverse Platform construct through the UTAUT theory, showing that factors significantly affected technological acceptance. The limited

previous research related to UTAUT, Metaverse, and music made researchers want to examine the combination of these three significant themes so that the development of UTAUT theory finds expansion in its application. Based on the phenomenon and background, the author will focus on conduct research related to "Application of UTAUT (Unified Theory of Acceptance and Use of Technology) in the Musical Metaverse moderated by Personal Innovativeness."

UTAUT is a theory that studies the effects on users' use and technological acceptance. This theory integrates four technology acceptance theories: the Theory of Reasoned Action, the Technology Acceptance Model, the Theory of Planned Behavior, and the Social Cognitive Theory. UTAUT itself occurred by four independent variables that influence the user's intention to use, including Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Condition (FC), with four moderating factors including Gender, Age, Experience, and Voluntariness of Use (Abbad, 2021). This relationship development of UTAUT may be observed in Figure 1.

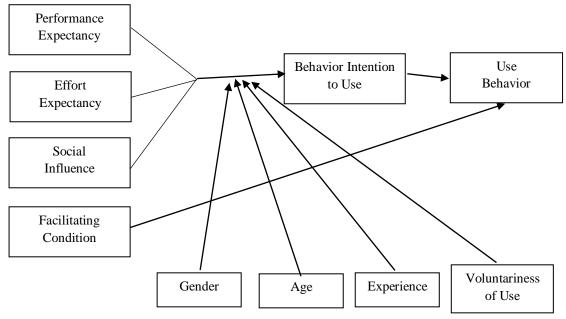


Figure 1. UTAUT Framework

Source: Primary Data, 2023

Innovation Diffusion Theory (IDT) is a theory that explains the reason an individual chooses to adopt or reject an innovation based on their level of innovation (Yuen et al., 2021). IDT is divided into five categories: Innovators, Early Adopters, Early Majority, Late Majority, and Laggards. Personal Innovativeness (PI) is a diffusion of these five categories and part of IDT, which supports defining one's intention to adopt innovation (Guttentag & Smith, 2022).

Performance Expectancy (PE) is defined as a parameter indicating that technology provides benefits and advantages for its users (Ammenwerth, 2019). PE shows how users expect benefits when using a system or technology. The high PE indicates that users believe their technology will help improve work performance (Teng et al., 2022).

Effort Expectancy (EE) is defined as the degree of ease associated with consumers in terms of using technology (Ammenwerth, 2019). EE shows how a

technology or information system is easy to use (Amaral & Watu, 2021). EE can influence individual acceptance and use of technology (Teng et al., 2022).

Social Influence (SI) is defined as encouragement in the use of technology through the willingness of others to use it (e.g., family, friends, or colleagues) (Ammenwerth, 2019). SI is a parameter where users assess social interest as one of the determining factors in using technology through observation of use (Verma & Sinha, 2018).

Facilitating Condition (FC) is a consumer's perception of encouragement and resources that support behavior (Ammenwerth, 2019). The availability of technology infrastructure will support users in using technology (Gupta et al., 2021). The availability of adequate FC can make it easier and accelerate technology acceptance. Not only in terms of infrastructure, but communities such as online forums and social media are conditional factors that facilitate users in supporting technology or information systems (Alomari & Abdullah, 2023).

Behavior Intention to Use (BI) is the user's desire to use technology or information systems. BI is also the user's intention to take action (Naufaldi & Tjokrosaputro, 2020). BI shows the influence of its variable on the user in terms of intention to use. BI plays an essential role in seeing user behavior towards something. BI is very useful in predicting user behavior in response to something or action, according to Teng et al. (2022).

The first research was conducted by (Asare et al., 2016), who examined the adoption of e-learning in higher education. This study uses descriptive statistics analysis methods, correlation, and regression using statistical software. The population in the study were students from universities and polytechnics who used e-learning systems in the Accra region, Ghana. It is concluded that all hypotheses are accepted except for academic specialty and study mode. The research results show that personal innovativeness is the most significant factor that explains the intention to accept and use e-learning. The research model is linked with this research, which uses PI as a moderating factor in applying the UTAUT theory.

The second research was conducted by (Teng et al., 2022), who examined the educational metaverse platform. The research used SEM (Structural Equation Modeling) analysis method with statistical software Amos and validity analysis using SPSS. The students from a university in China who ever used holographic projectors became this study's population. It is concluded that all hypotheses were accepted, where EE, PE, FC, and SI positively influenced learner satisfaction and intention to use in the eduverse. In contrast, perceived risk is confirmed as a factor that did not affect behavior intention to use on the diverse. The link with this research is the use of UTAUT on the research object, namely the eduverse (educational Metaverse), one of the platforms on the Metaverse.

The other research who examined UTAUT in Metaverse: An "Ifland" Case. This study uses the PLS Algorithm method using the SmartPLS software. The population in this research is students who can use the Metaverse platform but have yet to use the Metaverse at all. The findings of this research showed that all hypotheses were accepted except FC. The research results show that SI is the most significant factor that positively influences behavior satisfaction in the use (BI) of the Metaverse. At the same time, PE is the most significant factor affecting BI.

The fourth research was conducted by (Handoko, 2019), who examined the Application of the UTAUT Theory in Higher Education Online Learning. This study used the Feasibility Test method (Validity and Reliability test) and Path Analysis (ordinary least squares). The students who are active in participating in long-distance learning and online learning programs at the university where the author works were used as the population of this study.

When an individual feels the usefulness of a technology that facilitates his activities or work, this will have a positive influence on the intention to use the technology. (Blut et al., 2022). Based on the literature review above, the hypotheses plotted in this study are:

 H_1 : PE has a positive effect on BI.

When an individual feels a perception of convenience followed by an output that benefits the individual, this will affect the user's intention to use technology. (Yang et al., 2022). It is the same with Musical Metaverse, when someone can enjoy concerts or music virtually, with convenience and a more exciting experience than conventional methods. It will lead to user intentions in using Musical Metaverse. Based on the literature review above, the hypothesis proposed in this study is:

H₂: EE has a positive effect on BI.

When an individual gets a stimulus or encouragement, this might create an intention to use technology (Zacharis & Nikolopoulou, 2022). It is the same withMusical Metaverse. When an individual's environment is surrounded by people who use Musical Metaverse, then this will encourage the individual to adapt to the social norms that surround him so that it creates an intention to use Musical Metaverse. Based on the literature review above, the hypothesis proposed in this study is:

H₃: SI has a positive effect on BI.

When an individual has conditions that support facilities, this will create an intention to use technology. (Setiyani et al., 2023). As with Musical Metaverse, when the availability of devices to access Musical Metaverse is easy to obtain, this will make it easier for intentions to arise. Individuals in using Musical Metaverse. Based on the literature review above, the hypothesis proposed in this study is:

H₄: FC has a positive effect on BI.

When an individual has a high level of innovation within himself, it will make it easier for the person to think that technology will positively impact his activities or work (Blut et al., 2022). Similarly, when the individual knows the Musical Metaverse when the individual has a high level of innovation, this will strengthen the individual's reasons for using the Musical Metaverse. Based on the literature review above, the hypotheses proposed in this study are:

H₅: PI significantly moderates the relationship between PE and BI.

H₆: PI significantly moderates the relationship between EE and BI.

H₇: PI significantly moderates the relationship between SI and BI.

H₈: PI significantly moderates the relationship between FC and BI.

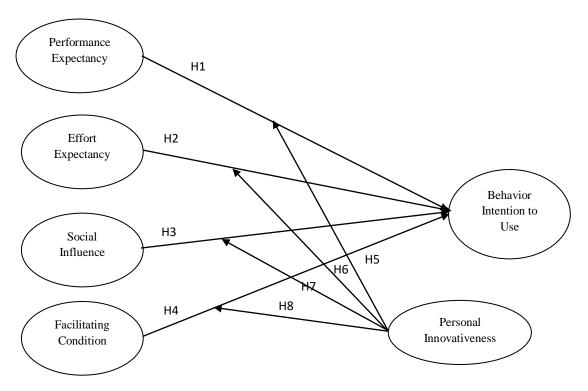


Figure 2. Research MethodsSource: Primary Data, 2023

RESEARCH METHODS

This study type is quantitative research that aims to examine the acceptance of the musical Metaverse through the intention to use, which is influenced by EE, PE, FC, and SI, predicted to be strengthened by PI. The data processing involves hypothesis testing analysis, using data collection of the Google Form from 250 Ciputra University students who know the musical Metaverse and processed using SmartPLS 4. The number of samples to be used will be calculated using the Hair et al. (2019) method with the formula (total indicators + latent variables) x (5 to 10 times). The Hair et al. (2019) formula is based on an unknown population size. Based on these guidelines, the number of samples to be taken is $(19 + 6) \times 10 = 250$ respondents. A Likert scale is used as the measurement scale to transform the respondents' experiential data into quantitative data. Respondents are asked to choose from 7 answer alternatives. The suggested measurement scale for the number of response points is seven because respondents prefer it, and it has better criteria of validity, reliability, stability, and power of discrimination (Pranatawijaya et al., 2019). To help ease the understanding of this research study, the latent variables, including the dimensions and indicators based on previous research studies, that are investigated in this project are depicted in Table 1:

Table 1. Variable Operational Definitions

Variable	Dimension	Indicators	Reference
		1. Perceived Usefulness	
Performance	Dimension from	2. Extrinsic Motivation	Teng et al.
Expectancy	UTAUT	3. Relative Advantage	(2022)
		4. Outcome Expectation	

Table 1. Variable Operational Definitions (continuation)

Variable	Dimension	Indicators	Reference
Effort Expectation	Dimension from UTAUT	 Complexity Perceived Ease of Use Actual Ease of Using 	Teng et al. (2022)
Social Influence	Dimension from UTAUT	 Subjective Norm Image Social Factor Celebrity Endorsement 	Teng et al. (2022)
Facilitating Condirion	Dimension from UTAUT	 Facilitating Condition Perceived Behavioral Control Compatibility with Technology 	Teng et al. (2022)
Behavior Intention to Use	Dimension From UTAUT	 Planning to Use Willingness to Use Expecting to Use 	Teng et al. (2022)
Personal Innovativeness	Adoptive	 Innate Innovation Actual Innovation 	Handoko (2019)

Source: Data Processed, 2023

RESULTS AND DISCUSSION

From the outer model, the validity and reliability test results show the measurement of various dimensions that can create or produce a factor. The outer model represents hypotheses that have previously existed, namely the relationship between indicators and factors, and is evaluated using Confirmatory Factor Analysis (CFA).

Convergent Validity functions as a measure contained in a construct that measures the connectedness of indicators as items that can explain a variable. The Results show that the loading factor of each indicator is > 0.7. It indicated that each indicator can represent each variable and has met convergent validity so that it can be used for hypothesis testing.

Discriminant validity can be seen by observing the AVE value. The discriminant validity requirements are met if the AVE value is > 0.5. So, each variable has good discriminant validity.

Research variables can be said to meet composite reliability if the results of composite reliability are> 0.7 and can be strengthened by looking at the results of Cronbach alpha > 0.7 (Hair et al., 2019). The calculation results show that all variables have a composite reliability value and Cronbach's alpha is more than 0.7, so it can be stated that the variables have good reconsiderations that can be relied on.

Inner model testing could be seen through the R-square, Q-square, and F-square tests. The inner model test will also explain the results of the path coefficient test and the goodness of fit test. The result stated that the adjusted R-Square results on the Behavior Intention to Use variable show a value of 0.91. It shows that the exogenous variables of the model have an influence of 91% on the endogenous variables (Behavior Intention to Use).

Table 2. F-Square Test

Relationship Between Variable	F Value	
PE→BI	0.074	
EE→BI	0.020	
SI→BI	0.013	
FC→BI	0.070	
PI→BI	0.134	
PE→BI x PI	0.005	
EE→BI x PI	0.002	
SI→BI x PI	0.003	
FC→BI x PI	0.000	

Source: Data Processed, 2023

In the table above, it can be shown that the significance value of F-Square > 0.05 is only indicated by the relationship PE toward Behavior Intention to Use (0.074), FC toward Behavior Intention to Use (0.070), and PI toward Behavior Intention to Use (0.134). It shows that only three of the exogenous variables can influence the endogenous variables simultaneously in this study.

Table 3. Q-Square Test

Endogen Variable	Q^2	Detail Explanation
Behavior Intention to Use	0.899	Containing <i>predictive</i> relevance Value.

Source: Data Processed, 2023

The result showed that the Q-Square value on the endogenous variable, Behavior Intention to Use, is 0.899. If the Q-square value > 0, it can show that the model has a predictive relevance value. The Q^2 results show a result of 0.899. It indicates that the model in this study has a predictive relevance value and can be used to explain the information available at 89.9%. Hypothesis testing can be done by looking at t-statistics and P-values. The hypothesis can be accepted if the P-values < 0.05 and the t-statistics > 1.96. Below is a summary table of the test results using Smart PLS 4.

Table 4. Hypothesis Test Result Summary

Hypothesis	t-statistics	p-values	Result
$PE \rightarrow BI (H_1)$	3.299	0.001	ACCEPTED
$EE \rightarrow BI (H_2)$	1.833	0.068	REJECTED
$SI \rightarrow BI (H_3)$	1.504	0.134	REJECTED
FC→BI (H ₄)	4.249	0.000	ACCEPTED
$PI \rightarrow BI (H_5)$	4.074	0.000	ACCEPTED
$PE \rightarrow BI \times PI (H_6)$	0.608	0.544	REJECTED
EE→BI x PI (H ₇)	0.400	0.689	REJECTED

Table 4. Hypothesis Test Result Summary (continuation)

Hypothesis	t-statistics	p-values	Result
$SI \rightarrow BI \times PI (H_8)$	0.538	0.591	REJECTED
FC→BI x PI (H ₉)	0.171	0.864	REJECTED

Source: Data Processed, 2023

The result summary shows a connection between PE and Behavioral intention to use. It could be seen from the t-statistic value of 3.299 > 1.96 and P-values of 0.001 <0.05. This hypothesis is supported by Turchet et al.'s (2021) previous research, in which he found that Performance Expectancy in the context of the musical Metaverse can refer to user expectations for the musical experience provided by the platform. In other words, customers, as audiences, expect higher quality of musical performance through Metaverse. In addition, several studies have also concluded that there is a positive relationship between PE and Behavior Intention to Use, such as a research study by Teng et al. (2022) regarding Educational Metaverse Platform.

The second finding shows no significant relation between EE and Behavior Intention to Use. It can be observed through the t-statistical value of 1.833 < 1.96 and P-values of 0.068 > 0.05. The hypothesis is rejected because students are more concerned with the perception of benefits than the effort that must be expended to use the musical Metaverse.

The third finding shows that there is not a significant relation between SI and Behavioral Intention to Use. The t-statistical value could be 1.504 < 1.96 and P-values of 0.134 > 0.05. Rejection of the hypothesis can occur due to the influence of age. Turchet et al.'s (2021) research also obtained interview results that users of the metaverse platform who are usually easily influenced by their friends or relatives are usually individuals under 18 years of age, while the respondents in this study were 18-25.

The fourth finding shows a significant relation between FC and Behavioral Intention to Use. It could be seen by the t-statistical score of 4.249 > 1.96 and the P-values of 0.000 <0.05. The results have the same conclusion as Turchet et al.'s (2021), which argues that facilitating conditions are essential in accepting the musical Metaverse. Similar research by Teng et al. (2022), which discusses the Metaverse, shows that FC is significantly related to Behavior Intention to Use.

The last findings found that all hypotheses are rejected because the t-statistics score is < 1.96 and P-Values > 0.05. It means that personal innovativeness (PI) cannot significantly moderate the relationship between social influence (SI), effort expectancy (EE), facilitating conditions (FC), and performance expectancy (PE).

By observing the results, metaverse developers or companies may benefit from four implications managerial or insight from this research study, especially in reading the market segments they aim for and the strategies they should focus on. First, FC has the most significant influence on the intention to use the musical Metaverse because good facility conditions may help strengthen individuals' adoption or use of the musical Metaverse in fulfilling entertainment satisfaction. It means that the application of musical Metaverse requires significant facilities support (facilities development) to enable users and audiences to have great Metaverse experiences. Facilitative conditions include the necessary hardware and software availability, significant internet connection speed, and adequate technical support in operating the Metaverse device. It will help

ensure that all Metaverse users can easily access and use musical Metaverse. Using metaverse platforms and devices is only possible with these supporting facilities. Second, PE is a variable that influences the intention of a person to use the musical Metaverse. Interesting features on the musical Metaverse will provide good results in musical performance and can motivate individuals to adopt and use the platform. As a result of becoming the newest technological development in 2022, as it was first released, audiences and all metaverse users expect great musical performances and spectacular experiences of the year. Third, SI and EE do not cause personal motivation or intention to use musical Metaverse. People ought to be convinced to try and experience new technological developments. Therefore, social influence from their communities and surroundings might not affect their willingness to use the Metaverse.

Meanwhile, the problematic usage of new technology will help people's intention to use the device, in this case, the metaverse technological experiences. Fourth, PI has yet to be able to strengthen other factors to have the intention to use the musical Metaverse. It shows that one's innovative level cannot strengthen one's intention to use the musical Metaverse through performance expectations, facilitating conditions, social influence, and expended energy expectations. However, one's innovative level directly influences the intention of using musical Metaverse.

CONCLUSION

This study discovered that facilitating conditions (FC) and performance expectancy (PE) are the variables that have an impact on the intention to use musical Metaverse. Meanwhile, effort expectancy (EE) and social influence (SI) have not significantly influenced the intention to use the musical Metaverse. Equally important, the research found that personal innovativeness has not been able to strengthen the relationship of the factors to the intention in using musical Metaverse. All the results concluded from this research study may help companies developing musical Metaverse to optimally develop more useful features, various digital platforms, advanced functionality development, more diverse communities, and its target market for musical Metaverse. Companies and metaverse developers must also focus on providing suitable and reliable software and hardware for the metaverse device and technology. In addition, the Metaverse company needs to consider developing communities and ecosystems for the continuous and sustainable usage of musical Metaverse, including cultural considerations, community behaviors, and green environmental production.

The usage of Metaverse as part of the pandemic Covid-19 phenomenon may become the limitations of this study. People's need to use metaverse devices after the COVID-19 pandemic may not be considered necessary compared to their needs during the pandemic. Thus, companies and metaverse developers may need to do more observations and some studies before manufacturing and considering advancing vast productions of the technologies and metaverse devices. The reason is that the usage of Metaverse may also be declining when the pandemic situation is resolved. As social beings, people may attend live performances and events. In addition, future researchers may add experimental design research in the form of providing experience to respondents in the form of experience using the musical Metaverse so that what respondents feel in using the musical Metaverse will create the same perception as what

the author meant and can broaden the scope of the research, both from the type of population and theory.

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