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A Study on the User Acceptance Model of Artificial Intelligence Music Based on UTAUT

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[Abstract]

In this paper, the purpose is to verify the impact of performance expectations, effort expectations, social impact, individual innovation and perceived value on the intent of use and the behavior of use. Used Unified Theory of Acceptance and Use of Technology (UTAUT) to verify the applicability of this model in China, and established the research model by adding two new variables to UTAUT according to the situation of the Chinese market. To achieve this goal, 345 questionnaires were collected for experienced music creators using artificial intelligence nuggets in China by means of Internet research. The collected data were analyzed through frequency analysis, factor analysis, reliability analysis, and structural equation analysis through SPSS V. 22.0 and AMOS V 22.0. The verification of the hypotheses presented in the research model identified the decisive influence factors on the use of artificial intelligence music acceptance by Chinese users.

The study is innovative in that it attempts to verify the applicability of UTAUT in the Chinese context. In the construction of the user acceptance model of AI music, three influencing factors will have an effect on users' intentions, and according to the degree of effect, from largest to smallest, they are respectively Perceived Innovativeness, Performance Expectancy and Effort Expectancy. This paper will also provide some management advices, i.e. improving the utility and usability of AI music, encouraging users with individual innovativeness, developing competitive and attractive pricing policies, increasing publicity, and prioritizing word-of-mouth advertising.

▸ **Key words**: Artificial Intelligence Music, UTAUT, Perceived Innovativeness, Performance Expectancy, Effort Expectancy

[요 약]

본 연구는 정보 기술 수용 모델(UTAUT)을 사용하여 이 모형은 중국 내 적용성을 검증하였으며, 중국 시장의 실태에 따라 UTAUT에 새로운 변수 2개를 추가하여 연구 모델을 설립하였다. 이와 같이 본 연구의 목적은 성과기대, 노력기대, 사회영향력, 개인혁신성, 지각된 가치가 사용의도와 사용행동에 미치는 영향을 검증하고자 한다. 이러한 목적을 달성하기 위해 인터넷 조사 방식으로 중국에 있는 인공지능음악 제품을 사용 경험 있는 음악 창작자들을 대상으로 345부의 설문지가 수집되었다. 수집된 자료는 SPSS V. 22.0와 AMOS V 22.0을 통해 빈도분석, 요인분석, 신뢰도분석, 구조방정식모형분석을 실시하여 결과를 분석하였다. 연구모델에서 제시된 가설의 검증을 통해 중국 사용자들의 인공지능 음악 수용에 대한 사용에 결정적인 영향 요인을 확인하였다.

본 연구의 결과는 UTAUT모형이 중국 배경에서의 적용성을 검증하고, 중국 배경에서의 인공지능 음악 사용자 수용 모델을 구축하였으며, 3 가지 영향 요소가 사용자의 사용 의도에 영향을 미치며, 이러한 영향요소의 역할이 영향의 크기에 따라 정렬하는 것이 효과적이다. 본 연구는 인공지능 음악의 유용성을 높이고, 인공지능 음악의 유용성을 높이며, 개인 혁신적인 사용자를 활용해 경쟁력 있고 매력적인 가격 전략을 수립하고, 입소문 홍보에 주력할 것을 관리 조언하였다.

▸ **주제어**: 인공지능음악, UTAUT, 성과기대, 노력기대, 개인혁신성

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I. Introduction

With the advance of technology, "artificial intelligence" has become synonymous with a new era. With the deepening of technology application and the interdisciplinary development of science and technology, the cross-border integration of music and technology has become a field of thought. As a new major in Taiwan, "music technology" is still in its infancy, and has long developed internationally into a comprehensive subject[1].

At present, artificial intelligence has been widely applied in various industries, and the combination of artificial intelligence technology and music has helped upgrade the music industry[2]. According to relevant research results, AI technology can make very complicated music creation while the level of music creation is very high. AI technology establishes basic logic and rules such as musical structure, rhythm, style and scale in the process of creating music, creating melodies through accurate algorithmic system, and combining the sound characteristics and effects of musical instruments.

Artificial music software is so powerful that it can edit, modify, record, and play songs at any time, and intelligently process a variety of musical elements. This new music system is also widely used in music teaching. AI Smart technology and instruments can combine software and hardware to make complex playing simple and easy to learn, and the training process is more interesting, bringing artificial intelligence music to music classrooms, allowing many students to learn new kinds of smart musical instruments that can be played by one person, which provides a new teaching model for current music education. At the same time, students could create in class, combine different musical instruments and play them on the spot, improving the quality of music teaching[3].

To sum up, artificial intelligence technology has been widely used in the music industry, which can help create music, making it more efficient and universal, and driving the commercial development of music. In addition, AI technology can be applied in musical instruments, producing intelligent instruments, and in entertainment teaching, which can be used gradually to promote the upgrading and transformation of the music industry[4].

Artificial intelligent music is not a simple extension of the music industry. Artificial intelligence music has its own technical infrastructure, business model and value chain, new user value, so it needs new thinking, new research perspective and new theoretical framework, because of the characteristics of artificial intelligence music, we believe it is necessary to revise the traditional technology acceptance theory to form a theoretical model more suitable for artificial intelligence music.

Despite the extensive use of artificial intelligence music, the number of users is relatively small, and many have taken a wait-and-see attitude. User use is the basis for the development of artificial intelligence music, and user acceptance, however advanced, is a prerequisite for its development and profit-making[5]. Users' willingness to use is undoubtedly one of the major factors influencing the development of AI music, which directly determines whether AI music can be popularized and widely used among many users. Therefore, it is necessary to study what causes Chinese users to use artificial intelligence music. At present, most of the results of research on artificial intelligence music come from developed countries, and further research remains to be done to prove the applicability of the Chinese market[6]. In addition, AI music is a new musical product. Whether or not it can be accepted by the user affects the user's willingness to use through "individual innovation", while the cost is a factor that must be considered by the user when accepting a new thing. The "sensory cost" also affects the user's willingness to use. Therefore, the purpose of this paper is to analyze which factors will affect users' willingness to use mobile commerce in the context of China, and to consider whether individual characteristics will affect the relationship of variables, and verify by empirical research.

II. Theoretical literature

This study is divided into independent and dependent variables by the relationship between variables. An independent variable is regarded as a variable affecting or determining a dependent variable and is a prerequisite and cause for change in the dependent variable. There are two main reasons why, according to the theory of rational behavior, an individual's specific behavior is determined by his intention to use, i.e. behavior can be predicted by his intention, and studies show that the intention to use is more easily measured and accurate in empirical research. Therefore, the use intention is set as a dependent variable in this study.

Factors affecting the acceptance of emerging IT may not fully explain user motivations as different technology types, target users, and use environments differ. Therefore, this study attempts to excavate the common factor from the existing theoretical basis and extract the main variable's effort expectations, social effects, individual innovation, and perceived costs from the research background of the study.

1. Relationship Between Performance Expectations and Usage Intention

Researchers note that the use of a particular new technology by users can bring about performance that is positively affecting the use of the technology by individuals.

Performance expectations integrate perceived usefulness in TAM/TAM2/C-TAM-TPB models, external incentives in MM models, job matching in MPU models, comparative advantage in IDT and outcome expectations in SCT. Cheng and Park found that perception of usefulness had a significant impact on the intent to use mobile networks[7]. This is consistent with the results of other studies of the integrated variables, such as external incentives, job matching, comparative advantage, and outcome expectations[8].

Performance expectations are seen as the most powerful predictive tool in UTAUT when interpreting the intention of the system to use the system. Therefore, the relationship between the expectation of measurement performance and the intention to use it in this study is presented with assumptions:

H1: Performance expectations have a positive effect on use intent.

2. Relationship Between Expectation and Use Intention

The effort needed to learn and use a technology affects the user's acceptance and use of it.It can be seen from Davis' theoretical model that "sensory ease of use" contains a cost-benefit assessment, whether the information system that the user touches is simple to operate or complex to instruct, and requires a lot of mental and time to understand the memory, so that he is cognitively judged by value. Although there may be other factors, such as the user's personal background, interest, etc. In a free-learning context, at least perception of ease of use can be a basic condition for arousing the will to act, i.e. systems that require less effort are more likely to be accepted by users[9].

In the UTAUT model, efforts are viewed as a direct determinant of use intent. According to research results in China's mobile communications market, Chinese users are more receptive to basic and user-friendly technologies such as text messaging rather than advanced but lacking in user-friendly technologies such as WAP. So, Chinese users may be more likely to look forward to this factor than users in other developed countries[10].

Therefore, the relationship between the expectation of the measurement effort and the intention to use in this study is presented with assumptions:

H2 strives to have a positive effect on the intended use.

3. Relationship Between Social Impact and Usage Intention

Social impact integrates subjective norms in TAM/TAM2/TPB/DTPB/C-TAM-TPB, social factors in MPCU, and images in IDT. In the information system, a great deal of research has proved the significant effect of social influence on the purpose of use[11]. Nysveen et al shows that when people use a mobile service in a public setting, they must first observe and be influenced by others. The positive relationship between social influence and the intention to use has been proved by empirical research, documentary proof and theoretical model[12].

UTAUT argues that there is a significant relationship between social impact and use intent, and that the relationship is also proven in many other models (TAM, TRA, TPB, and DTPB)[13]. Therefore, this study measures the relationship between the social impact and the intention to use and makes assumptions:

H3 Social effects have positive salient effects on use intent.

4. Relationship Between Individual Innovation and Usage Intention

Individual innovation first intervened in the information technology field by Agarwal et al. It was used to measure the individual's willingness to experiment with new information technology. UTAUT measures many variables, but ignores the study of individual characteristics[14], such as individual innovation. Therefore, increasing individual innovation on the basis of UTAUT will help explain the process of technology acceptance and use. Kenneth argues that individual innovation has a positive effect on both perceived usefulness and perceived ease of use[15]. Therefore, this study proposes assumptions:

H4 Individual Innovation has a positive effect on the purpose of use.

5. Relationship Between Perception cost and intention to use

In the study of artificial intelligence music, scholars have all mentioned that prices have a huge impact on artificial intelligence music, because the price sensitivity of the AI music business is not a rigid demand business[16]. The price is not absolute, but consumer perception, which defines the cost as the sum of the costs involved in the use of artificial intelligence music[17].

It can be seen from this that perceived cost is one of the most important influencing factors in the user's acceptance of artificial intelligence music, so add perceived cost variables to this study model and make assumptions:

H5 Significant Effect of Perception Cost on Usage Intention

III. research method

1. Research Model

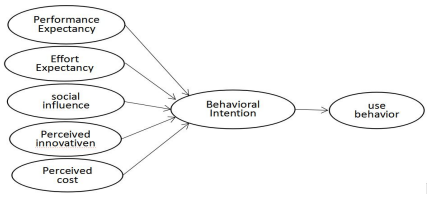

Fig. 1. Research model

2. Subject Investigated

This study targets ordinary music creators currently living in Beijing, China. As a result, an offline survey was conducted to verify the purpose of this paper, and the survey was conducted for about 30 days from March 2 to April 2, 202.The total number of valid samples collected was 345 persons.

3. Operational Definition and Measurement Scale of Variables

Table 1. Operational Definition and Measurement Scale of Variables

variable	Definition	reference literature
Performance Expectancy	It's a feeling that a user perceives that mobile commerce can help them achieve better performance or ease of life	Venkatesh&Davis(2003)
Effort Expectancy	It's a feeling for users to sense whether artificial intelligence music is easy to use	Venkatesh&Davis(2003)
social influence	It's a feeling that users think people around them should or shouldn't use artificial intelligence music	Venkatesh&Davis(2003) Nysveen,Pedersen,Thorbjornsen &Berthon(2005)
Perceived innovativeness	It's an individual's willingness to experiment with new technology	Agarwal&Prasad (1998)
Perceived cost	The sum of all the costs involved in the use of artificial intelligence music	Agarwal&Prasad (1998)

4. Analysis process

For empirical analysis, SPSS V. 22.0 and AMOS V. 22.0 were used. The analysis process is as follows. First, frequency analysis was conducted to identify sample characteristics, the discriminant validity of variables was checked, the single dimension of each configuration concept was analyzed, and reliability analysis was conducted to check the internal consistency of questionnaire. Structural equation model analysis was performed to confirm the suitability and impact of the established study model in this study.

IV. Analysis Result

1. Demographic Characteristics of The Sample

In terms of the general characteristics of the subjects studied, 49(14.2%) of the 345 respondents were men and 296 (85.8%) of women. The ratio of women is higher than that of men. Meanwhile, the largest number of respondents aged 40 to 49 was 127 (36.8%). Next was 103 (29.9%) aged 20 to 29.Then there were 72 respondents (2.9%) aged between 30 and 39.There were four respondents (1.2%) under the age of 20 with the lowest answer rate. Among the graduate students who received the most answers, 165 (47.8%) were university graduates. Next was 68 college graduates (19.7%) and 58 high school graduates (16.8 %). 54 or 15.7 percent of those with the lowest answer rate were from graduate students. The largest number of management responders (38.0%) were among the job survey results. The second was 67(19.4%) in technical jobs. Then came 55(15.9%) of the respondents to the production job. The others with the lowest answer rate were 38(11.0%).According to the survey, 118 respondents (34.2%) answered between 3 and 4 million won (34.2%). Next was 74 (21.4%) out of 4 to 5 million. Next was 70(2.3%) or more of the five million won or more.37 respondents (1.7%) answered the lowest of 200-3 million respondents.

2. Exploratory Factor Analysis and Reliability Analysis

2.1 Exploratory Factor Analysis and Reliability Analysis

Table 2 Exploratory factor analysis of independent variables

Configuration concept	Survey question	Factor load value	α
Performance Expectancy	Performance Expectancy4	.762	.905
	Performance Expectancy1	.759	
	Performance Expectancy3	.742	
	Performance Expectancy2	.683	
	Performance Expectancy5	.652	
Effort Expectancy	Effort Expectancy1	.715	.933
	Effort Expectancy2	.667	
	Effort Expectancy5	.639	
	Effort Expectancy3	.629	
	Effort Expectancy4	.619	
Social Influence	Social Influence3	.738	.928
	Social Influence4	.717	
	Social Influence5	.684	
	Social Influence2	.615	
	Social Influence1	.555	
Perceived Innovativeness	Perceived Innovativeness4	.771	.893
	Perceived Innovativeness3	.743	
	Perceived Innovativeness5	.638	
	Perceived Innovativeness1	.628	
Perceived Cost	Perceived Cost2	.756	.885
	Perceived Cost4	.622	
	Perceived Cost3	.596	
Behavioral Intention	Behavioral Intention1	.679	.872
	Behavioral Intention2	.659	
	Behavioral Intention3	.626	
Use Behavior	Use Behavior2	.781	.898
	Use Behavior1	.699	
	Use Behavior3	.511	

As a result, as shown in Table 2 , all factors were extracted above .5, showing 15.88 percent, 12.94 percent, 12.596 percent, 12.596 percent, 12.37 percent, and 8.74 percent, respectively. In addition, the results of the reliability analysis of the test items show that the Cronbach's Alpha coefficient is above .8 in general allowable values as shown in Table 2.

2.2 Confirmatory Factor Analysis

In [18]order to verify the convergence and discriminant appropriateness of measurement variables, the deterministic element analysis was carried out. It can be observed from Table 3 that the suitability of the measurement model is X2 = 642.03, P = .000, DP = 329, CMIN/DF = 1.951, GFI = .878, AGFI =.849, IFI =.931, IFI =.965, CF =.965, RF=.965, RM=.031. The suitability of the measurement model can be evaluated as a more satisfactory fit.In addition, the measurement model X2(df) = displayed as 642.03(329), suggested that X2/d.f. be priced below 1.951 (large number of specimens), up to 5 Confirm that the measurement model used in this study is good.

In addition, both the elements of the validation factor analysis and the inventory amount show the t-value that is statistically noted and confirm the rationality of convergence. The comprehensive trust was also evaluated through Amos. All projects exceed the generally allowed 0.6, indicating that the result value is trustworthy. On the other hand, the mean fractional extract (AVE) value is calculated by using other measured values of convergent propriety, which is the size of the dispersion that the indicator can account for potential concepts, and is said to be more than 0.5 to be reasonable. The average divergent extract (AVE) value of all factors is above 0.5 in this study, ensuring convergence.

3. Research Hypothesis Verification

AMOS was used to verify the hypothesis. To verify the hypothesis, the path coefficients of the structural equation model can be found in Table 4 .The suitability index for the structural model used in this study is X2 = 702.801, P =.000, DP =334, CMIN/DF = 2.104, GFI =.867, AGFI =.839, NFI =.924, IFI =.94, CFI =.959, CMR =.039.The suitability of the structural equation in this study is not a problem and can be assessed as an acceptable level.

Table 3. Confirmatory Factor Analysis

Configuration concept	Standard factor load	T value	CR	AVE
Social Influence	.844 .835 .796 .796 .776	19.417 17.552 17.488 16.884	.946	.802
Performance Expectancy	.857 .884 .882 .828 .845	22.292 21.969 19.647 2.374	.891	.725
Effort Expectancy	.808 .811 .822 .915 .892	17.547 17.773 2.923 2.14	.912	.761
Perceived Innovativeness	.849 .855 .782 .808	2.546 16.588 17.431	.929	.715
Perceived Cost	.886 .88 .795	17.858 17.996	.925	.779
Behavioral Intention	.901 .882 .868	24.315 22.757	.911	.759
Use Behavior	.855 .901 .843	22.44 19.475	.919	.715
X^2=642.03, P=.000, DF=329, CMIN/DF =1.951, GFI=.878, AGFI=.849, NFI=.931, IFI=.965, CFI=.965, RMR=.031				

*P<.05, **P<.01, ***P<.001

Table 4. Structural model analysis result

Path	Estimate	C.R.	P
Social Influence->Behavioral Intention	.04	.435	.663
Performance Expectancy->Behavioral Intention	.175	2.073	.038
Effort Expectancy->Behavioral Intention	.166	1.719	.086
Perceived Innovativeness->Behavioral Intention	.516	5.097	***
Perceived Cost->Behavioral Intention	.297	3.173	.002
Behavioral Intention->Use Behavior	.762	17.282	***
X^2=702.801, P=.000, DF=334, CMIN/DF =2.104, GFI=.867, AGFI=.839, NFI=.924, IFI=.959, CFI=.959, RMR=.039			

* p<.05 ** p<.01, *** p<.001

H1. Regarding the effect of Social Information on Behavioral Intention, as observed in Table 4, the effect of Social Information on Behavioral Intention is .04. The results of such a study were statistically meaningless at the level noted in .05(C.R=.435, p>.05). Therefore, H6 was rejected.

H2.Regarding the effect of Performance Expectancy on Behavioral Integration, as observed in Table 4, the effect of Performance Expectancy on Behavioral Integration is .175. The results of such a study were statistically significant at a limited level of .05 (C.R=2.073, p<0.5)Therefore, H7 is verified as expected.

H3. Regarding the effect of Effort Expectancy on Behavioral Intention, as observed in Table 4, Effort Expectancy has an impact of .166.These results are not statistically significant at a limited level of .05(C.R=1.719, p>.05). Therefore, H3 was rejected.

H4.Regarding the effect of Percival Involvement on Behavioral Intention, as observed in Table 4, the effect of Percival Involvement on Behavioral Intention is .516.These findings are statistically significant at a limited level of .05 (C.R =5.097, p<0.05). Therefore, H4 is verified as expected.

H5. Regarding the effect of Perceived Cost on Behavioral Intention, as observed in Table 4, Perceived Cost has an effect of .297.These results are statistically significant at a limited level of .05 (C.R =3.173, p<.05). Therefore, H5 is verified as expected.

H6. Regarding the effect of Behavioral Intention on Use Behavior, as observed in <Table 5>, the effect of the Behavior Intention on Use Behavior is .762.These results are statistically significant at a limited level of .05(C.R = 17.282, p<.05). Therefore, H6 is verified as expected.

V. Conclusions

1. Research conclusion

With the further development of technology application and the interdisciplinary development, the combination of artificial intelligence technology and music helps upgrade the music industry. In this context, based on the relevant models and theories in the field of technical acceptance, this paper studies various factors that affect the user's acceptance behavior, constructs the user acceptance model of artificial intelligence music, collects an effective questionnaire through the questionnaire, and examines and analyzes the model and related hypotheses using the structural equation model, and concludes as follows:

1. On the whole, there are three factors that influence the user's intention to use. Their roles range from large to small to performance expectations, effort expectations, and individual innovation.

2. Social and perceived costs have no statistically significant effect on the intent to use.

2. Research on the Revelation of Management Practice

From the results of the study, we can see that in order to enhance the user's initiative and willingness to use, we can start with the following aspects: improving performance expectations, striving expectations and innovating.

1. Improve the usefulness of AI music. The study showed that performance expectations had a positive correlation with use, and that the effect was most significant. Therefore, artificial intelligence music should be considered to bring the practicality of a potential user, who feels that the application is useful and can be of practical value.

2. Increase the ease of use of artificial intelligence music. Hard work is also an important factor affecting the user's willingness to use artificial intelligence music. Lowering the time and effort spent on artificial intelligence music is the primary goal, while emphasizing and promoting user "easy to use" and at the same time enhancing user's perception of usefulness.

3. Take advantage of individual innovative users. Because individual innovation has a positive and significant effect on the intent to use, it is possible

to identify innovative groups and then use them as target customers for the first stage of market strategy by looking for common characteristics.

4. Develop a competitive and attractive price strategy. Cost is always a consideration for users, and this price is not the absolute price of the goods, but the perception of the user. Different levels of users will have different perceptions of the same price. Therefore, enriching the pricing model and maximizing the price ratio of artificial intelligence music are necessary for the development of the business.

5. We should intensify our publicity efforts and pay more attention to publicity by word of mouth. We should strengthen the depth and breadth of publicity, increase the frequency of investment, extend the time of investment, expand the channel of investment, and enrich the form of investment. Through publicity, consumers can get all kinds of information about AI music anytime, anywhere, quickly and easily, thereby constantly enhancing consumers' perception of social impact.

3. Limitations and Prospects of Research

Due to the limitations of manpower, material and time, this research still has limitations in the way and content of research, and a careful summary will be provided for future researchers.

1. The basic model of this study is the model, i.e. the extension based on the model. Thus, the variables are mainly selected, while a new variable is added, namely performance expectations, effort expectations, social effects, individual innovation and perceived costs. All variables are single-dimensional, and the results are more abstract. From now on, performance expectations can be further divided into work performance, convenience, entertainment experience and social impact, which can be divided into the influence of people around you and the influence of mass media. In this way, concrete proposals for artificial intelligence music can be better made, and the acceptance models obtained will be more detailed.

2. Factors affecting the acceptance of mobile commerce by individual users can be explored in many ways. This study is aimed only at the individual users of artificial intelligence music to explore the behavior of using it by means of willingness to use it, expectation of performance, expectation of effort, social impact, perceived cost and individual innovation. In later studies, research can also be carried out from other angles.

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