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Abstract: Knowledge payment based on social media has become a new business model. The research on adoption intention of users could help the users recognize the influence of knowledge payment. Meanwhile, the research is helpful for the suppliers to standard and develop this business model further. According to the social media nature of knowledge payment, use and gratification theory and technology acceptance model were chosen as the theory basis to build the research model of users' adoption intention on knowledge payment. 315 valid samples were collected from questionnaire. Structural equation model was used as the model analysis tool. It is found that the main motivations and purposes of users' adoption on knowledge payment are the willingness to get cognitive gratification, hedonic gratification, and convenience gratification of the users. Meanwhile, in order to increase the users' adoption intentions, knowledge content represented by perceived usefulness is critical, operation process represented by perceived ease of use is the method, but perceived payment price is not the key factor.

Keywords: knowledge payment, adoption intention, use and gratification theory, technology acceptance model

1. INTRODUCTION

With the rapid development of China's economy and mobile Internet technology, the method of knowledge acquisition has gradually changed from free acquisition through various channels to active and paid acquisition of more personalized and customized high-quality content. In this context, the concept of "knowledge payment" has emerged. According to a survey conducted by China youth daily, 63.6 percent of the participants believed that they should be paid for providing high-quality knowledge, while 73.9 percent had paid for the answer to a question. And knowledge payment platforms emerge in endlessly, such as Dedao, Zhihu, Qianliao, etc. Such knowledge payment platform not only has a large audience, but also receives multiple rounds of financing from several venture capital groups. This shows that knowledge payment has gradually formed a mature business model, which will attract more and more users to participate in it. However, the research on knowledge payment is only at the beginning stage, and there is no in-depth research on the definition, characteristics and adoption mechanism of knowledge payment. And for a long time, Chinese people have been deeply rooted in the idea of "borrowlism" of knowledge. How to make users willing to pay for knowledge has become a key issue in the implementation of the knowledge payment platform.

Meanwhile, although knowledge payment is a new business model, it still relies on social media tools in essence. Using this kind of tool can make it easy for users to search, find and pay for the knowledge they need on a specific platform, and can also build their own social network in the knowledge field. Therefore, this paper examines the use of knowledge payment for the present situation, then choose to use and gratification theory (UGT) to explore what practical functions and needs knowledge payment can bring to users under the role of social media, finally combining with the technology acceptance model (TAM) to research why the users will be

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willing to pay for knowledge.

2. THEORETICAL MODEL AND HYPOTHESES

2.1 Definition of knowledge payment

At present, there is no unified understanding of the definition and boundary of knowledge payment. Zhang et al. believe that knowledge payment is a form of sharing economy. Therefore, they believe that knowledge payment refers to "an economic phenomenon in which the public share their idle resources (cognitive surplus) with others through Internet platforms to obtain income", which is a new model of information interaction[1]. Quan and Xie think that in knowledge payment ,the concept of knowledge is broadened to cover all skills and information, which can be regarded as information payment[2]. Song pointed out that knowledge payment is actually a sharing economy feast of "knowledge sharing and content realization". The process of knowledge payment is to share fragmented knowledge with consumers who have leisure time and seek knowledge satisfaction through Internet platforms[3]. Through the above definitions of knowledge payment, it can be found that knowledge payment is a new business model, and the process of payment is the embodiment of knowledge value.

2.2 Adoption of knowledge payment

No matter what kind of knowledge payment platform, its founders and knowledge providers hope that users are willing to use the platform and pay for knowledge. However, different from other traditional payment products, knowledge products have the following characteristics that make it difficult to pay: first, knowledge is intangible and the judgment of knowledge value is highly subjective. Therefore, how to price knowledge has become the primary problem of knowledge payment. Second, China's intellectual property awareness is still in the process of building up gradually, and users have certain feelings of resistance and rejection to the form of knowledge acquisition through payment. Third, the knowledge payment platform is a new type of business model platform, how to pay and how to use the knowledge after paying have also become the problem that users worry about in the process of paying.

Therefore, it is necessary for academia to study the adoption of knowledge payment in the context of knowledge payment. As knowledge payment is an emerging business model, there are few researches on it. For example, Zhang et al. used qualitative research to extract 7 main factors influencing users' online knowledge payment behavior from a qualitative perspective, including individual demand, individual cognition, information quality, subjective norms, convenience, substitutes and economic factors[1]. On the other hand, based on unified theory of acceptance and use of technology (UTAUT), Quan and Xie studied users' specific usage behaviors of the Dedao APP from a quantitative perspective[2]. The results showed that performance expectations, social influences and perceived playfulness have significant effects on users' intention to use. Liu mainly commented on the influence factors of knowledge payment behavior, including content value, professional authority, brand trust, word of mouth, price and so on. And he proposed relevant development suggestions from the perspective of content provision, users and third-party supervision[4].

According to the research of the above scholars, it can be found that at present, the research on users' knowledge payment adoption behavior is still relatively scattered. Most researchers have roughly discussed the factors that affect knowledge payment , and at the same time, there are few relevant empirical studies based on real data. At present, the factors influencing the development of knowledge payment mainly focus on the user's demand, the use of the platform and the price of knowledge. Therefore, based on the nature of social media of knowledge payment, this paper uses TAM model and UGT to study the adoption intention of knowledge payment.

2.2.1 Use of the payment platform and perceived price

Based on social media technology, knowledge payment platform is a medium for users to communicate with knowledge providers and complete payment behaviors. Whether the platform is accepted by users directly determines whether users are willing to pay for knowledge. Therefore, this paper chooses TAM model to explain users' usage attitude towards the platform.

In TAM model, intention of use, perceived usefulness (PU) and perceived ease of use (PEOU) are the three most important variables. Intention of use refers to the possibility that the user anticipates that he or she will produce usage behavior in the future if certain conditions permit[5]. Based on the research background in this paper, the intention of use refers to the possibility that users are willing to use knowledge payment if relevant conditions are met. PEOU refers to the perceived ease of understanding and use of a technology. PU refers to the degree that people can perceive to benefit from a particular technology in the process of using it, namely the usefulness of the technology[6]. Knowledge payment, which includes new payment products and models, is a new technology. Whether a user is willing to use a new technology depends first of all on how difficult the process is and whether the technology is useful for their work and life. For example, when Deng et al. studied the use of SMS in China, they believed that whether users' perceived SMS operation was easy to use and whether it was helpful for users' communication directly determined their usage attitude towards SMS[7]. In their study on the role of social media tools in higher education in Malaysia, Al-rahmi et al. also found that the perceived ease of use and perceived usefulness of social media tools directly determine whether students are willing to use social media tools in the learning process[8]. Therefore, in the process of using knowledge payment, if the knowledge payment service can help users to track the knowledge providers they care about, find the knowledge fragments they need, solve the difficulties in users' work or life, and make users feel that the service is really useful, users will be more willing to complete the knowledge payment behavior. And if the payment platform and the payment process are easy for users to master and get familiar with, users will be more willing to pay for knowledge if they do not need to spend a lot of time on getting used to it and feel easy to use. Moreover, an easy-to-use knowledge payment service can promote users' perception of its usefulness. Conversely, if the service is cumbersome and tedious to complete, the user will not find the service useful. To sum up, this paper proposes the following hypotheses:

H1: perceived ease of use of knowledge payment services positively affects users' intention to pay for knowledge.

H2: perceived usefulness of knowledge payment services positively affects users' intention to pay for knowledge.

H3: perceived ease of use of knowledge payment services positively affects its perceived usefulness.

Although knowledge payment service is essentially a kind of social media technology, its essential difference from many social media (such as WeChat) lies in its payment behavior. Although WeChat also has a payment function, payment in WeChat is an additional function, while the core function of WeChat is still social and entertainment. However，the payment in knowledge payment is its core function, and the service is completed only when the payment behavior is achieved. In view of the particularity of knowledge payment service, another variable -- perceived price is added into TAM model in this paper.

In our study, perceived price refers to the price situation perceived by users in the process of paying for knowledge. Each user has his or her own price range and judgment on the value of a knowledge point. Users are more likely to pay for knowledge if they believe their judgment of the value of that knowledge matches the price demanded by the provider. On the contrary, if the perceived price is too high and the user thinks that the knowledge block is not worth the money or the user is not willing to pay too much for the knowledge block, the

user will not pay for the knowledge block. In the article of Lu et al., it was also demonstrated that users' perception of the service price of SMS has a significant impact on the usage behavior of SMS[9]. And this perception of price will also affect users' judgment of the service itself. The higher the price perceived by users, the less able they feel to complete the payment. Even if the platform can provide rich and useful knowledge, it is impossible to help users, and users will not consider the service useful. Based on the above analysis, this paper proposes the following hypotheses:

H4: perceived price of knowledge payment service negatively affects users' intention to pay for knowledge.

H5: perceived price of knowledge payment service negatively affects its perceived usefulness.

2.2.2 User demand gratification: use and gratification theory

Since most knowledge payment platforms are established based on social media technology, the platform itself has both the functions of knowledge search and payment and users' social communication, which have the dual attributes of media and tools.Therefore, this paper chooses UGT to discuss users' motivations.

UGT can be used to explain the use and choice behavior of individuals, to explain why individuals use such media from psychological needs, and to think that individuals can use the same media for different purposes. At the beginning of the theory, UGT was a typical communication theory, which was mainly used to study the use of traditional media, such as newspapers and television. With the emergence of new information technology and providers of various technical services paying more and more attention to the personalized demands of users, UGT is no longer limited to the study of traditional media, and the adoption of various new technologies and service modes such as E-mail and information system can be studied based on UGT. Ali-hassan et al. studied the impact of social media on employee performance[10]. Based on UGT, they divided employees' demands for social media into three types: social demands, hedonic demands and cognitive demands. And they found that these three types of demands affect employees' daily work performance and innovative work performance through social capital. Chaouali divides user gratification into two dimensions: content obtaining gratification and opportunity obtaining gratification, and believes that these two dimensions of user gratification can affect users' gratification with mobile SNS websites, thus influencing their continuous use behavior[11]. In China, Li et al. applied the UGT to study the intention of continuous use of WeChat public platform. In their study, they identified three types of user gratification: utility, social, and pleasure. These three types of gratification replace each other and have a positive impact on users' continued use of the WeChat public platform. Users will consider continuing to use the platform if they meet one kind of demand[12].

As can be seen from the above literature , UGT is generally used to explain the research on the relationship between users and media from the perspective of individual demands. However, the disadvantage of UGT is that it pays too much attention to the gratification of individual demands and ignores other external factors such as the use experience of the system itself in the selection and acquisition of media. TAM model is to explore the user's adoption behavior from the perspective of system use. Although PU and PEOU variables in TAM model can well explain why users use a certain system, a certain product or a certain service, studies on the antecedent variables of PU and PEOU are still insufficient. In their research on the use of smart phones in South Korea, Joo and Sang divided the user's use motivation into habitual use motivation and purposeful use motivation based on UGT, both of which had significant influence on PEOU and PU variables in TAM model[13]. The research of Joo and Sang provides the basis for this paper, but their classification of use motivation does not go deep into specific user demands. Considering the knowledge characteristics in knowledge payment and the social media attributes of the payment platform, this paper chooses the gratification of cognitive demand, the gratification of hedonic demand and the gratification of convenience demand as the purposes that users wish to meet after paying for knowledge. Therefore, this paper takes UGT as a supplement to TAM model, and uses the above three specific demands to explain the antecedent of TAM model, so as to jointly understand the user's intention

to adopt the new business model of knowledge payment.

The cognitive demand for knowledge payment emphasizes that users believe that the knowledge acquired through payment can help them improve their knowledge reserve and solve problems that cannot be understood in a certain business[10]. Users pay to get the answer to a difficult problem or an academic paper they cannot find. Such paid results can improve users' perception. If the user's cognitive demands are met, he or she will find the payment system useful[13]. Wang et al. also pointed out in their study on employees' use of social networks at work that the gratification of cognitive demands can make users think that the system they choose can help them achieve the purpose of use, thus influencing users' attitude towards use[14]. Therefore, this paper proposes the following hypotheses:

H6: the gratification of cognitive demands can positively affect the perceived usefulness of knowledge payment services.

The hedonic demand of knowledge payment thinks that buying knowledge can not only help users to improve the work effect, but also bring enjoyment and fun to users[13]. This is because the object of knowledge payment also includes hedonic knowledge, such as buying a film or a novel. This kind of hedonic knowledge can naturally bring the gratification of users' hedonic demands. If users believe that the knowledge payment service can meet their hedonic demands, users will think that the payment service can help them achieve the purpose of leisure and enjoyment, and its usefulness is confirmed. Alghawi et al. studied CEOs' use of their microblogs and found that one of the most interactive demands for CEO to use microblogs was the fun-oriented demand, which led them to believe that microblogs can help them relax in the intense work, which is useful[15]. At the same time, hedonism makes knowledge payment service less serious and boring, and this relaxed mentality can make users find the whole service and operation process more interesting. Moreover, the social media attribute of knowledge payment service can also make users feel relaxed and comfortable in the process of using it. For example, the diversification of payment objects and forms, a variety of small games and benefits after payment, etc., can bring users more interesting and relaxed use experience, making them feel that the service is easy to use. Through the research on online game system, Li et al. found that hedonic demand will affect users' evaluation of whether the system is easy to use[16]. Based on this, this paper proposes the following hypotheses:

H7: gratification of users' hedonic demand can positively affect the perceived usefulness of knowledge payment service.

H8: gratification of users' hedonic demand can positively affect the perceived ease of use of knowledge payment service.

The use convenient demand of knowledge payment think knowledge payment service should meet users convenient search, pay and access to knowledge, such as providing to the PC and the mobile payment platform, various channels of payment (bank cards, WeChat payment, Alipay, etc.), the more diverse knowledge search methods (according to the theme, time, knowledge, etc.). If the user's demands are met, it will increase the user's evaluation of the ease of use of the system. Chaouali believes that convenience directly determines whether users are satisfied with the use of social networking sites[11]. The research on online education by Gallego et al. also pointed out that the convenience of online education platform determines whether the platform is easily accepted by users[17]. Based on the above analysis, this paper proposes the following hypotheses:

H9: gratification of users' convenience demand can positively affect the perceived ease of use of knowledge payment service.

To sum up, the research model of this paper is shown in figure 1:

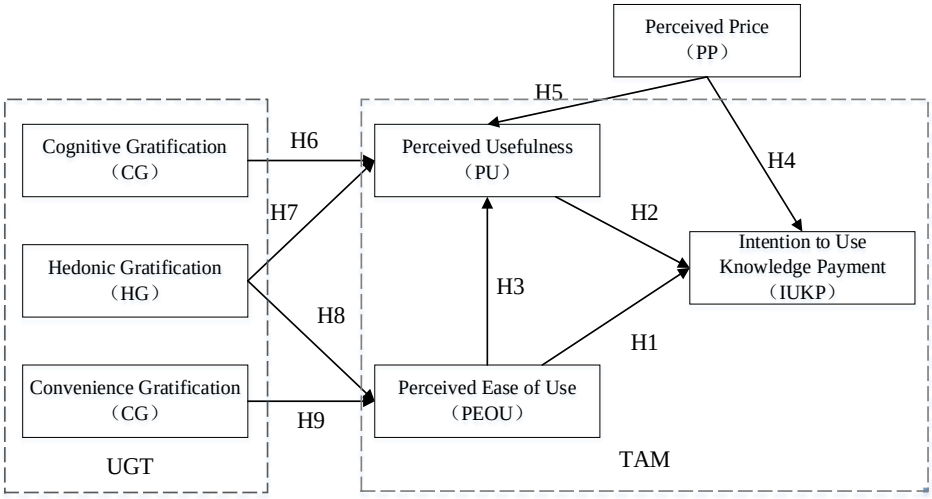

Figure 1. Research model

3. QUESTIONNAIRE DESIGN AND DATA COLLECTION

In this study, questionnaires were used to estimate the variables. The eight variables in this paper were all measured from mature scales used by researchers. For cognitive gratification and hedonic gratification of measurement refers to the Ali Hassan et al. and others research results[10], convenience gratification of measurement refers to the measurement of "convenience" in the paper of Gallego et al[17]. For the measurement of perceived usefulness, perceived ease of use and intention to pay for knowledge, refer to the scale in the study of smart phone adoption in Joo and Sang's article[13]. The measurement scale of perceived price derived from the paper of Lu et al.[9]

Since all the measurement scales of variables refer to English literature, this paper uses the two-translation method to ensure the accuracy of the questionnaire translation process. The questionnaire is mainly composed of three parts. In the first part, there is only one question, asking the subjects to choose whether they have ever paid for knowledge. Only by choosing "yes" can they enter the following survey. The second part is the investigation of the current situation of knowledge payment, including the platform used, frequency and time of use. The third part is the measurement of 7 variables in the research model. All the questions are expressed in the 5-point Likert scale, and the subjects are required to choose the appropriate expression of the stated proposition according to their actual conditions. A score of 1-5 means strongly disagree, slightly disagree, unsure, slightly agree and strongly agree. And the initial questionnaire was also pretested by 30 graduate students with knowledge payment experience, and appropriate modifications were made according to the results of the pretest, and the final questionnaire was finally formed.

This questionnaire is distributed electronically through the Internet to teachers, graduate students, researchers and workers in science and technology enterprises in universities in Wuhan and Shanghai. Because the work of universities, research institutes and science and technology enterprises has a more urgent demand for knowledge, it can highlight the importance and value of knowledge payment. And the recipients have certain economic capacity to pay for knowledge. Finally, a total of 315 valid data were obtained. Table 1 summarizes the basic demographic characteristics of the valid sample data.

Table 1. Demographic information

Measure	Items	Frequency	Percent
Gender	Male	161	51.1%
	Female	154	48.9%

Age	≤25	54	17.1%
	26-30	79	25.1%
	31-40	127	40.3%
	≥41	55	17.5%
Type of work	Postgraduate	72	22.9%
	Universities	93	29.5%
	Research institutes	66	21%
	Science and technology enterprises	84	26.6%
Education level	Master degree or above	212	67.3%
	Bachelor degree	87	27.6%
	Junior college and below	16	5.1%
Time to pay for knowledge	Within half a year	53	16.8%
	Half a year to one year	88	27.9%
	One to two years	109	34.6%
	More than two years	65	20.7%
Preferred form of payment	Pay by times	63	20%
	Pay by time period (such as monthly, quarterly and yearly)	92	29.2%
	Pay by objects	160	50.8%
Amount willing to pay each time	≤10￥	50	15.9%
	11-50￥	34	10.8%
	51-100￥	45	14.2%
	≥100￥	23	7.3%
	Pay by objects and forms	163	51.8%
Types of knowledge payment (multiple choice)	Question and answer	54	17.1%
	Information access	189	60%
	Lectures	132	41.9%
	Audio and video	279	88.6%
	E-books	202	64.1%

4. DATA ANALYSIS

4.1 Reliability and validity analysis

In this study, the structural equation model was used to analyze and verify the hypothesis. Since the research on knowledge payment is still in its infancy, and Smart PLS 2.0 can effectively explore the causal relationship between potential variables at the initial stage of the research, this software is selected as the tool for analysis and processing in this paper[18]. Cronbach's alpha coefficient and composite reliability (CR) are commonly used in academia to judge whether the reliability of measured results meets the requirements. As can be seen from table 2, Cronbach's alpha coefficient and CR value of 7 variables were all above 0.7, indicating that the factor has high reliability. Validity means that the scale can truly reflect the characteristics or degree of the thing to be measured, which is usually divided into convergent validity and discriminant validity. The former was measured using the average variance extracted (AVE) of each factor. The latter can be tested by comparing the correlation coefficient of each factor with the square root of the AVE value of the corresponding factor. It can be seen from table 2 that the AVE values of all factors are greater than 0.5, indicating that the factors have good convergent validity. The AVE square root of the corresponding factor is also greater than the correlation

coefficient between it and other factors, indicating that the model has good discriminant validity.

Table 2. Results of reliability and validity

Factor	α	CR	AVE	Correlation matrix						
CG	0.87	0.88	0.75	**0.87**						
HG	0.92	0.89	0.77	0.53	**0.88**					
NG	0.93	0.91	0.79	0.56	0.57	**0.89**				
PU	0.89	0.91	0.72	0.32	0.52	0.23	**0.85**			
PEOU	0.88	0.87	0.69	0.48	0.33	0.35	0.51	**0.83**		
PP	0.89	0.92	0.72	0.41	0.43	0.41	0.44	0.33	**0.85**	
IUKP	0.91	0.90	0.75	0.38	0.46	0.40	0.47	0.32	0.45	**0.87**

4.2 Model test

In this study, SMART PLS 2.0 was used to test the significance of hypotheses in the model, as shown in figure 3. Six of the nine original hypotheses were supported. Three hypotheses were verified to be insignificant, namely, the influence of H4 perceived price on the intention to pay for knowledge is insignificant, the influence of H5 perceived price on perceived usefulness is insignificant, and the influence of H7 hedonic gratification on perceived ease of use is insignificant. Perceived usefulness, perceived ease of use, and intention to pay for knowledge were accounted for 55.1%, 21.8%, and 32.3% of the changes, respectively, by their antecedent variables.

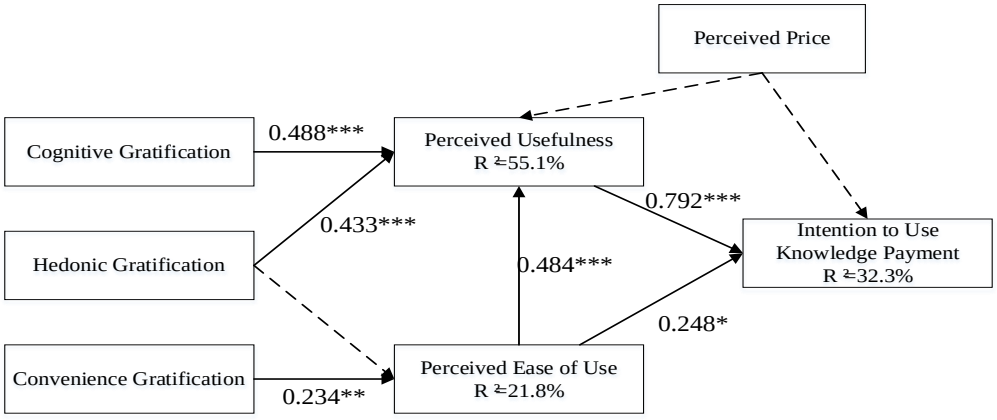

Figure 2. Empirical model

5. RESEARCH CONCLUSIONS AND RECOMMENDATIONS

This study starts from the definition and classification of knowledge payment and builds the user adoption model of knowledge payment platform based on UGT and TAM models.This study can draw the following conclusions and put forward relevant suggestions:

First, to improve the intention to pay for knowledge, knowledge content is the key, the operation process is the means.

This paper selects TAM to build the research model of users' adoption intention of knowledge payment. The research results show that perceived ease of use and perceived usefulness have significant influence on the use intention of knowledge payment, and perceived ease of use also positively affects perceived usefulness. And perceived usefulness is more important than perceived ease of use. This shows that knowledge payment is

essentially a kind of application of social media technology, and it is reasonable to choose TAM to explain its use intention. And all kinds of platforms and means of knowledge payment need to develop around the core content of "knowledge quality". Only when the content of knowledge can truly solve users' problems and difficulties and make them feel useful can users be willing to pay for knowledge. And usability also depends on the user's experience of ease of use. For example, whether it is convenient and quick to search the knowledge required by users, whether the process of payment is safe and reliable, and whether the knowledge obtained after payment can be successfully applied. Therefore, the design of the knowledge payment platform should meet users' demands and operating habits, otherwise users will give up using it because of the tedious operation process or the unsafe payment process, and consider the knowledge payment platform useless.

Second, users use the knowledge payment platform for a clear purpose.

This study found that, based on UGT, with the support of social media technology, social media technology brought about by the media tools and dual attribute can let users get cognitive gratification, hedonic gratification and convenience gratification, and the three kinds of demands gratification is the main motivation and purpose of knowledge payment of users. And the three are also conditioned to become the antecedents of perceived ease of use and perceived usefulness, which expands TAM theory to some extent. On the other hand, H7 proved to be insignificant, suggesting that the user's hedonic gratification did not affect his perception of ease of use. This further demonstrates that the focus of users is on the quality of knowledge, and the use of process is only an auxiliary means. This is also related to the data source of this paper are scientific and technological workers or master and doctoral students. This group already has extensive experience with similar platforms and their processes. And the quality of knowledge has a decisive influence on its work and study. Therefore, even if users want to satisfy their hedonic demands, they will pay more attention to the content of knowledge than to the process of acquisition. This is also one of the limitations of this study.

Third, price is not the decisive factor for the survival and development of knowledge payment platform.

Any payment behavior is inseparable from the consideration of price. However, in this study, the two hypotheses related to perceived price are not valid, which indicates that, based on the data in this paper, perceived price does not affect perceived usefulness, nor does it affect users' intention to pay for knowledge. There are three reasons that may lead to such a conclusion. First, the core of users' concern is still the quality of knowledge. If they think that the quality of knowledge matches the price, they will be willing to pay for knowledge. Secondly, most of the subjects are knowledge workers with certain economic ability, and the current payment price is within their range. Third, the knowledge payment model is still in the stage of development, not mature and standardized. Therefore, most knowledge payment platforms still regard low price as a main means to promote users to pay. However, through the research of this paper, it is found that price is not sensitive to users, and users who are willing to pay for knowledge pursue high-quality knowledge return. To survive and develop, various knowledge payment platforms need to pay more attention to the authority of knowledge providers and the quality of knowledge itself.

Fourth, the timeliness of knowledge payment products is the future research direction.

Generally speaking, there are two different usage patterns after paying for knowledge products. Pattern one is to allow users to use it for life. For example, after purchasing a document, users can download it to their own computer terminal at any time. Pattern two is only available for the duration of the purchase. If you buy a movie on Youku, you can only watch it in two days.With NetEase cloud music changing its paid use of songs from model one to model two, the debate over the timeliness of paid knowledge products has become particularly acute. This study does not involve the timeliness factor, so the influence mechanism of the usage pattern of paid knowledge products on users' adoption behavior will be our future research direction.

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