Determinants and Moderators of Online Users' Knowledge Payment Intention: A Meta-Analysis Postprint

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Abstract

[Purpose/Significance] Investigating the factors influencing online users' knowledge payment intention is of great significance for the construction and sustainable development of knowledge payment platforms; however, there are inconsistencies among the empirical results in existing literature. [Method/Process] Using meta-analysis method and adopting a fixed-effects model, this study conducts a comprehensive analysis of 40 empirical research papers related to online users' knowledge payment intention from domestic and international sources, with 14,452 independent samples. Based on the content-context-identification framework, it summarizes and identifies the key factors influencing online users' knowledge payment intention, and tests the moderating effects through heterogeneity tests and subgroup analysis. [Results/Conclusion] The results show that factors significantly influencing online users' knowledge payment intention can be categorized into three categories: content, context, and identification, including 25 independent variables. Among them, perceived cost significantly negatively influences users' knowledge payment intention, while the remaining variables have significant positive influences. Factors with high correlation to knowledge payment intention include need, experience, perceived expertise, reliability, perceived knowledge quality, perceived interestingness, perceived benefit, and payment attitude. Meanwhile, the study identifies the moderating effect of subject characteristics, finding that whether users have knowledge payment experience is a partial source of heterogeneity across different studies.

Full Text

A Meta-Analysis Research on Influencing Factors and Moderating Variables of Online Users' Willingness to Pay for Knowledge

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Abstract

[**Purpose/Significance**] Exploring the influencing factors of online users' willingness to pay for knowledge is crucial for the construction and sustainable development of knowledge payment platforms, yet existing literature shows inconsistencies in empirical results. [**Method/Process**] Using meta-analysis and a fixed-effects model, this study comprehensively analyzed 40 empirical research papers and 14,452 independent samples related to online users' knowledge payment willingness. Based on the Content-Context-Consciousness framework, we identified key factors influencing online users' knowledge payment willingness and tested the moderating effects of moderating variables through heterogeneity tests and subgroup analysis. [**Results/Conclusion**] The results indicate that factors significantly affecting online users' knowledge payment willingness can be divided into three categories—content, context, and consciousness—comprising 25 independent variables. Among them, perceived cost significantly negatively influences users' knowledge payment willingness, while all other variables have significant positive effects. The factors most highly correlated with knowledge payment willingness include demand, experience, perceived professionalism, reliability, perceived knowledge quality, perceived interestingness, perceived benefits, and payment attitude. Additionally, the study identified the moderating effect of subject characteristics, finding that whether users have prior knowledge payment experience partially explains the heterogeneity across different studies.

Keywords: meta-analysis; knowledge payment; influencing factors; correlation; moderating effect

1. Introduction

Knowledge is invaluable. With the rapid development of mobile internet and the sharing economy, a new generation of knowledge payment platforms such as Ximalaya FM, Zhihu Live, Dedao APP, Fenda, and Zaihang have emerged like mushrooms after rain, making knowledge payment a new trend. These platforms not only help knowledge producers with abundant surplus knowledge achieve monetization but also facilitate consumers with strong demand for high-quality content who are willing to pay for knowledge, thereby establishing an

effective channel connecting supply and demand in the knowledge payment market. However, research shows that the penetration rate of knowledge payment products is not high, presenting a sharp contrast between the rapidly developing knowledge payment market and users' low willingness to pay. Therefore, how to enhance users' knowledge payment willingness and promote the sustainable development of knowledge payment platforms has become a common focus for both industry and academia.

Scholars in library and information science, management, business administration, and journalism and communication have conducted numerous empirical studies on online users' knowledge payment behavior, including research on knowledge seekers' transition from free to paid platforms, knowledge consumers' payment motivations, and the behavioral mechanisms of knowledge payment. These studies have constructed theoretical models based on various disciplinary theories and perspectives to explain knowledge payment behavior, such as social capital theory, theory of planned behavior, information systems success model, expectation-confirmation theory, perceived value theory, status quo bias theory, push-pull-anchor model, grounded theory, and linear regression models. Nevertheless, research conclusions remain inconsistent. For example, Z.Y. Li et al. found that economic factors are relatively unimportant in influencing users' online knowledge payment, while J. Jing et al. discovered a highly significant correlation between perceived cost and knowledge payment willingness ($r = 0.647$). Zhao Yuxiang et al., when studying questioners' transition from free Q&A platforms to paid knowledge Q&A platforms, found a strong negative correlation between economic cost and knowledge payment willingness ($r = -0.584$). Different studies select different subjects, resulting in different influencing factors and effect sizes, which creates difficulties in theorizing online users' knowledge payment and provides unclear guidance for platform design and payment model improvement.

Meta-analysis, also known as 荟萃分析 (huìcuì fēnxī) or comprehensive analysis, is a quantitative research method that statistically analyzes a large number of independent studies to draw comprehensive conclusions, serving as an effective supplement to traditional qualitative literature reviews. Therefore, we applied meta-analysis to systematically review empirical studies on factors influencing online users' knowledge payment willingness, quantitatively testing the effect sizes of influencing factors and the moderating effects of moderating variables to provide in-depth explanations for contradictory findings. This study addresses three questions: (1) What influencing factors of online users' knowledge payment willingness have been identified in existing empirical research? (2) What are the effect sizes of these factors, and which antecedent variables are key influencing factors? (3) Can subject characteristics as moderating variables moderate the relationship between influencing factors and knowledge payment willingness? Theoretically, this study clarifies the relationship between knowledge payment willingness and its influencing factors, identifies key factors to form a more comprehensive model of influencing factors for online users' knowledge payment willingness, and provides an important supplement to existing

research on users' knowledge payment behavior while pointing out directions for future research. Practically, it deepens understanding of users' knowledge payment behavioral characteristics and provides references for knowledge payment platform operators to adopt development strategies, enabling them to allocate resources differentially for construction activities to optimize platform performance and service quality.

2. Literature Review

Knowledge payment refers to user behavior of paying for online knowledge services and products, encompassing the entire process of pre-consumption knowledge payment decision-making, mid-consumption knowledge transaction, and post-consumption knowledge internalization. The current knowledge payment market is booming, forming diverse models including paid Q&A, paid subscriptions, content tipping, micro-lectures, paid communities, and paid consultations, with platforms such as Zhihu Live, Ximalaya FM, WeChat Official Account tipping, Lizhi Micro-courses, Knowledge Planet, and Haodf Online. Regarding these various platforms, scholars have attempted to explore influencing factors of users' knowledge payment willingness to improve the new generation of knowledge payment models and promote sustainable platform development, focusing on three main aspects:

(1) Individual Characteristics. Some scholars propose that knowledge payment is essentially an information consumption behavior and should be studied from the consumer perspective to examine how individual traits and psychological mechanisms influence knowledge payment willingness. For instance, research by T. Fernandes and G. Punj both indicate that users' estimated amounts for online knowledge payment are related to income and education level, while payment willingness is related to age and gender. Mao Yanhua and Li Wu et al. explored the influence mechanisms of personality traits on users' knowledge payment willingness from an individual differences perspective. Wei Wu and Xie Xingzheng, based on the elaboration likelihood model, analyzed the combined effects of online knowledge payment products and individual user needs on users' continued payment intention, finding that instrumental, entertainment, and social needs positively influence continued payment intention, with three content-need combinations triggering antecedent configurations for continued payment intention. Additionally, characteristics such as social media usage, payment experience with other digital products, moral standards, and payment attitudes have also been proven to influence consumer payment willingness.

(2) Product Content. The characteristics of product content and users' subjective evaluation directly affect knowledge payment willingness, including information quality of knowledge products, product price, brand name, service quality of knowledge payment platforms, characteristics of knowledge contributors, and users' perceived value of knowledge payment products. Du Zhitao et

al. found that compared to individual need factors, user-perceived experiences such as professionalism, interestingness, and convenience are the main determinants of online knowledge payment. Y. Zhao et al. discovered that perceived value positively influences askers' payment willingness in paid Q&A, with perceived value being affected by question cost, self-improvement, social support, and entertainment, while question compilation cost had no significant effect on perceived value. S. Cai et al. introduced signaling theory and social learning theory to explain users' purchase decisions before and after paid live streaming, finding that both price and accumulated sales affect product sales in both stages, with the former having a negative effect and the latter a positive effect. Y. Zhao et al., through a negative binomial panel regression model analyzing Zhihu paid Q&A data, concluded that knowledge contributors' reputation, ability, and profile completeness significantly positively affect users' payment decisions, while benevolence had no effect.

(3) Payment Context. Scholars argue that individuals are often influenced by attitudes or behavioral information from close others, with the specific context being an important factor causing differences in knowledge payment willingness, mainly including social interaction, social recognition, positive reciprocity beliefs, other consumer reviews and word-of-mouth, group norms, and property rights protection. G. Oestreicher-Singer and L. Zalmanson found that users' payment willingness is closely related to their community participation level. Zhou Tao et al. examined the mechanism through which social interaction, including information interaction and emotional interaction, influences users' knowledge payment willingness. M. Zhang et al. believe that online user ratings and review feedback serve as persuasive signals affecting paid course users' purchase decisions. X. Shi et al. pointed out that social recognition helps users evaluate the value and credibility of knowledge live courses in social Q&A communities, with users more likely to pay for knowledge live courses in socially recognized environments. Wei Ze also found that subjective norms significantly positively influence college students' online knowledge payment willingness.

In summary, domestic and international scholars have achieved fruitful results in research on factors influencing users' online knowledge payment willingness. However, different studies have different focuses and conclusions based on different perspectives. Moreover, existing research emphasizes model testing and has identified various influencing factors, but even for the same variable, empirical studies may yield inconsistent conclusions due to different research perspectives, methods, and sample selections. These numerous related yet potentially inconsistent independent studies provide conditions for applying meta-analysis. This study aims to use meta-analysis to address these inconsistencies, systematically reviewing the relationship between users' online knowledge payment willingness and its influencing factors to deepen understanding of the behavioral patterns and mechanisms of users' online knowledge payment willingness and provide valuable insights for knowledge payment platform operation and development.

3. Research Design

3.1 Research Method

Meta-analysis is a secondary comprehensive evaluation and analysis of existing research results on the same research topic, capable of drawing more accurate and universal conclusions, effectively overcoming the arbitrariness of qualitative research and making literature reviews more rigorous and scientific. Compared with individual studies, meta-analysis has three advantages: (1) it reconciles inconsistent findings across similar studies; (2) it examines relationships that cannot be obtained in individual studies; and (3) it extracts insights into potential relationships in the research field. The general steps of meta-analysis are: determining research questions; developing literature search strategies (inclusion and exclusion criteria); searching and collecting data; assessing bias in included studies; analyzing data and conducting meta-analysis; addressing reporting bias; presenting results; interpreting results and drawing conclusions. In the 1990s, scholars began discussing the applicability of meta-analysis in library and information science. E. Trahan was among the first to explore the feasibility of applying meta-analysis to library and information science, arguing that it could improve the overall quality and effectiveness of research in the field. Meta-analysis provides deeper insights into research questions by combining numerous studies and has become an important tool in library and information science for resolving inconsistent research conclusions, particularly in information systems, information seeking, and knowledge sharing.

3.2 Sample Data Collection and Selection

Meta-analysis requires scanning extensive literature, including journal articles, conference papers, and dissertations, collecting sample data from multiple sources to overcome publication bias. Therefore, this study selected multiple databases and collected different types of literature, including Web of Science, ProQuest, Scopus, ScienceDirect, as well as Chinese databases such as CNKI, Wanfang, Weipu, and Airiti Library (Taiwan, China). We used combinations of keywords “online,” “community,” “platform” with “knowledge payment,” “pay for knowledge,” “willingness to pay knowledge,” and “pay intention” for retrieval, and converted them into corresponding Chinese keywords for Chinese database searches. Based on literature inclusion criteria, we browsed titles and abstracts of each paper, with a few articles reviewed in full text, excluding irrelevant literature. The screening criteria were: (1) literature must be empirical research, excluding case studies, interviews, pure theory, and review articles; (2) literature must focus on influencing factors of online users’ knowledge payment willingness; (3) literature must be independent studies without duplicate samples; (4) literature must report correlation coefficients between independent variables and knowledge payment willingness, or other data that can calculate correlation coefficients such as t-values and P-values. To ensure consistency in sample selection and screening, we conducted strict literature screening at multiple time points, ultimately obtaining 40 relevant

documents meeting meta-analysis standards, including 6 English and 34 Chinese articles. Full-text literature was obtained through database downloads, interlibrary loans, document delivery, and email contact with authors. Sample data collection was completed by the end of November 2020. The 40 samples produced 43 independent sample effect sizes, totaling 14,452 subjects, with individual sample questionnaire distributions ranging from 127 to 685. This study determined knowledge payment willingness as the dependent variable, systematically 梳理 ed all independent variables affecting online users' knowledge payment willingness, and selected variables appearing more than twice and corresponding literature for meta-analysis.

3.3 Coding and Analysis Process

Meta-analysis requires extracting relevant information and statistical data such as correlation coefficients from existing literature, and coding and organizing the information. Therefore, this study adopted open coding, first using a small number of documents for trial coding to develop the coding scheme, continuously refining coding variables and corresponding values. The coding scheme included literature characteristic information such as title, author, literature type, publication year, subject country, theoretical basis, and variable characteristics, as well as online platform, sample size, and correlation coefficients. Coders had research backgrounds in knowledge payment willingness and behavior and conducted sufficient literature research to ensure sensitivity and insight into theoretical terminology. Coding was performed independently by two researchers without interference. For controversial coding results, a third research member was introduced for discussion until consensus was reached, ensuring coding accuracy. This study followed the meta-analysis steps proposed by L.V. Hedges and J.L. Vevea and used Comprehensive Meta-Analysis V3 (CMA V3) developed by Biostat to execute the meta-analysis program.

In meta-analysis, Pearson correlation coefficients were used to quantify effect sizes. When literature did not report correlation coefficients, they were calculated from t-values and P-values. Larger effect sizes indicate higher degrees of antecedent variables. Meta-analysis includes two different models: fixed-effects model and random-effects model. The fixed-effects model assumes that included studies share the same data collection conditions and true effect size, while the random-effects model assumes that true effect sizes vary across studies. The final correlation coefficients were weighted by sample size through Fisher's Z transformation formula, as shown in Equation (1). For heterogeneity testing, this study used the fixed-effects model for Q-statistic analysis. The Q-statistic is the weighted variance of effect sizes, as shown in Equation (2). The Q-statistic indicates whether variation in effect sizes is due to sample heterogeneity rather than sampling error.

$$\text{Fisher's } Z(T_i) = 0.5 \times \log\left(\frac{1+r_i}{1-r_i}\right)$$

where W_i is the sample size of the ith study, T_i is the effect size of the ith study, and $\bar{T} = \sum(W_i \times T_i)/\sum W_i$.

$$Q = \sum_{i=1}^{k} W_i \times (T_i - \bar{T})^2$$

Publication bias, also known as the "file drawer problem," refers to the phenomenon where studies showing significant effects are more likely to be published, while those without significant effects may remain unpublished and abandoned in file drawers. This study used Fail-safe N and Egger's test to assess publication bias. Fail-safe N reflects the number of studies needed to reduce the P-value to non-significance. When Fail-safe N is greater than $5k + 10$, it indicates no publication bias. As shown in , among the identified influencing factors, except for perceived risk (Fail-safe N = 30 < 35) and switching cost (Fail-safe N = 9 < 25), all other variables' Fail-safe N values exceeded the recommended threshold. Egger's test P-values for perceived risk (p = 0.068 > 0.05) and switching cost (p = 0.364 > 0.05) were both greater than 0.05, indicating no publication bias. Therefore, we can conclude that all influencing factors identified in this meta-analysis are basically robust, minimally affected by publication bias, and the meta-analysis results are valid.

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4. Research Results

4.1 Overall Meta-Analysis Results

4.1.1 Sample Coding Results and Theory Usage Through sample coding, we obtained 16 dissertations and 24 journal papers published between 2014 and 2020. The 40 studies reported 315 correlation coefficients between independent variables and users' knowledge payment willingness. All papers used questionnaire surveys for data collection, covering disciplines such as journalism and communication, library and information science, management, and education. Five studies used college students as subjects, while others included users who had used knowledge payment platforms, users without knowledge payment experience, knowledge payment platform users, and general internet users.

lists 14 theories used more than twice in knowledge payment willingness research. Perceived value theory was applied 13 times, the most frequently used theory. Theory of planned behavior and technology acceptance model were applied 9 and 7 times respectively, showing strong explanatory power for users' knowledge payment willingness. In addition to these 14 theories, other psychological and marketing theories received scholars' attention, such as Big Five personality theory, heuristic-systematic information dual-processing model, elaboration likelihood model, cognitive-affective-conative framework, information foraging theory, social influence theory, community commitment theory, and consumption experience theory.

4.1.2 Publication Bias Test Results As shown in , the Q-statistic results for all independent variables are reported. Perceived benefits ($p = 0.222 > 0.05$) and entertainment value ($p = 0.569 > 0.05$) had non-significant Q-values, indicating homogeneous variables, while all other influencing factors had significant Q-values ($p < 0.01$), showing heterogeneity. This indicates that the heterogeneity presented by the effect sizes of 24 variables originates not only from random sampling error but also from characteristics across different studies. Therefore, further subgroup analysis based on study characteristics is needed to identify moderating variables causing inter-study heterogeneity and explore between-group differences in effect sizes.

This study divided subjects into users with knowledge payment experience and other users. Users with knowledge payment experience refer to consumers who have used knowledge payment products or services, while other users include those without declared knowledge payment experience, such as college student groups, mobile internet users, and potential consumers who have browsed knowledge payment platforms. This study tested the moderating effect of subject characteristics, selecting independent variables with $k \geq 2$ after grouping by moderating factors for meta-analysis. shows the meta-analysis results with subject characteristics as moderating factors.

Moderating effect test results show that when subject characteristics serve as moderating variables, the between-group Q-values for 13 independent variables including payment attitude are significant at the 0.001 level, indicating that sample heterogeneity partially originates from random error within studies and partially from different study characteristics across studies. Different subject characteristics significantly influence the relationships between 13 independent variables and knowledge payment willingness. From the correlation strength, compared with other users, users with knowledge payment experience show stronger effects of payment attitude, perceived socialness, perceived usefulness, perceived ease of use, subjective norms, and perceived cost on knowledge payment willingness, while the opposite is true for recognition of knowledge providers, perceived cost, perceived risk, perceived value, perceived trust, perceived behavioral control, perceived knowledge quality, and subjective norms.

4.1.3 Overall Effect Test Results Among all sample data, 175 factors influencing online users' knowledge payment willingness were identified, with 138 factors appearing only once, 13 appearing twice, and 25 appearing three times or more. To meet the needs of subsequent subgroup studies for testing moderating effects and ensure sufficient literature numbers when implementing subgroup meta-analysis, this study selected 25 influencing factors appearing three times or more for meta-analysis. The overall effect test results are shown in .

All relationships between influencing factors and online users' knowledge payment willingness are statistically significant at the 0.05 level. We used J. Cohen's classification standard to judge the correlation degree between influencing factors and the dependent variable. Cohen pointed out that correlation effect

sizes greater than or equal to 0.10 indicate low correlation, greater than or equal to 0.30 indicate moderate correlation, and greater than or equal to 0.50 indicate high correlation. Highly correlated factors include demand (0.590), experience (0.555), perceived professionalism (0.649), reliability (0.649), perceived knowledge quality (0.505), perceived interestingness (0.594), perceived benefits (0.579), and payment attitude (0.527). Subjective norms (0.462), entertainment value (0.428), social support (0.476), satisfaction (0.366), perceived entertainment (0.414), perceived usefulness (0.457), perceived ease of use (0.467), perceived behavioral control (0.449), perceived trust (0.468), perceived socialness (0.375), perceived value (0.497), and recognition of knowledge providers (0.419) show moderate correlation with knowledge payment willingness. Low-correlation factors include perceived cost (-0.114), perceived risk (0.179), preference (0.258), switching cost (0.143), and perceived cost (0.149).

To enhance the understandability of meta-analysis results, we borrowed the "Content-Context-Consciousness" (CCC) theoretical framework proposed by Guo Yu et al. to classify factors influencing online users' knowledge payment willingness: content factors of paid products (Content), contextual factors of user decision-making (Context), and consciousness factors of users themselves (Consciousness). The CCC framework posits that content factors of knowledge payment products and contextual factors of user consumption decisions are the main references for online users' judgment of knowledge payment task information, while consciousness influencing factors represent individuals' uncontrollable consciousness levels and psychological awareness. The three influence users' knowledge payment willingness through individual effects and synergistic concurrency. After three researchers examined the completeness and appropriateness of the classification framework, we used content analysis to assign influencing factors to specific categories. To identify key factors influencing online users' knowledge payment willingness, this study ultimately selected 25 influencing factors (all appearing more than three times) for analysis.

As shown in , the distribution of influencing factors obtained through meta-analysis is uneven across the three categories, with most independent variables belonging to the content factor dimension (68%), while both context and consciousness dimensions contain 16% of independent variables. Content factors emphasize the characteristics of content products and users' subjective cognitive evaluation, including experience, perceived professionalism, reliability, perceived knowledge quality, perceived interestingness, perceived benefits, entertainment value, satisfaction, perceived entertainment, perceived usefulness, perceived ease of use, perceived socialness, perceived value, perceived cost, perceived risk, switching cost, and perceived cost. Context factors refer to the influence of external environments and interpersonal relationships on payment willingness, including subjective norms, recognition of knowledge providers, perceived trust, and social support. Consciousness factors mainly describe the influence of users' own consciousness levels and psychological awareness on knowledge payment intention from an individual differences perspective, such as de-

mand, preference, payment attitude, and perceived behavioral control. These factors are stable and do not easily change with external environments and time.

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5. Discussion

5.1 Influencing Factors and Their Effect Strengths

5.1.1 Influencing Factors Factors influencing online users' knowledge payment willingness can be divided into three categories: content factors, context factors, and consciousness factors. The consciousness and content categories include variables with high, moderate, and low correlations. This demonstrates the rationality of interpreting users' knowledge payment willingness from a user perspective and reflects that the essence of knowledge payment lies in addressing people's inner anxieties. Zhang Shuai et al.'s qualitative study found that users' online knowledge payment behavior is influenced by multiple variables including individual needs, information quality, individual cognition, subjective norms, convenience conditions, substitutes, and economic factors, with individual needs being the most important, information quality being key, and subjective norms and convenience conditions being important. This is basically consistent with our findings: individual demand and perceived knowledge quality are necessary conditions for users' knowledge payment behavior, subjective norms and perceived ease of use have moderate correlations, and economic factors represented by perceived cost have weak correlations. This indicates that acquiring high-quality knowledge has become the main demand of internet users in the sharing economy, and economic factors will not become the main obstacle affecting users' knowledge payment, reflecting the inevitable trend of the knowledge payment industry shifting from user quantity growth-driven to product value growth-driven.

Context factors were proven to have moderate correlations, indicating that contextual factors have weaker effects on knowledge payment willingness than users' self-perception and subjective cognition. Possible reasons include: first, some contextual factors are ignored in relevant literature, such as relational social capital, social influence, shared vision, and clustering effects; second, some factors in this category may be indirectly and subtly reflected through other variables, such as clustering effects influencing payment willingness by affecting users' perceived socialness of products. Future research should investigate these ignored influencing factors and examine variable substitution and mediation effects. Additionally, this study confirms Wei Ze's view that knowledge payment is both a new communication model and learning form driven by technology and a behavioral decision driven by social demand. Therefore, it can be studied as individual adoption and use of information systems based on theories such as theory of planned behavior, TAM, UTAUT, and IS success model, or as consumer transaction decision behavior based on perspectives such as perceived value theory, social capital theory, and MOA theory. However, a single research

perspective does not comprehensively explain knowledge payment willingness, as users' knowledge payment behavior is a complex process influenced by multiple synergistic factors. This provides ample research space for future studies, which could use qualitative comparative analysis to observe antecedent configurations leading to knowledge payment willingness and explore the importance and interconnections of the three categories of influencing factors.

5.1.2 Effect Strengths Under the condition that both knowledge payment willingness and its influencing factors are robust, this study identified 25 independent variables, among which perceived cost negatively influences knowledge payment willingness, while the other 24 variables have significant positive effects. However, different influencing factors have different effect strengths on knowledge payment willingness, as shown in [Figure 1: see original paper]. The most critical factors for knowledge payment willingness include demand, experience, perceived professionalism, reliability, perceived knowledge quality, perceived interestingness, perceived benefits, and payment attitude. The next tier includes subjective norms, entertainment value, social support, satisfaction, perceived entertainment, perceived usefulness, perceived ease of use, perceived behavioral control, perceived trust, perceived socialness, perceived value, and recognition of knowledge providers. Variables with weak correlations include perceived cost, perceived risk, preference, switching cost, and perceived cost.

Compared with moderately and weakly correlated variables, highly correlated variables have lower Q-values and weaker heterogeneity. Some highly correlated variables, such as perceived benefits and entertainment value, are homogeneous. This indicates that highly correlated influencing factors like perceived benefits and entertainment value have relatively consistent conclusions across empirical studies, while moderately and weakly correlated variables have stronger heterogeneity, meaning inconsistent results are more likely across different studies. Future research should focus more on moderately and weakly correlated influencing factors to obtain more empirical results. For example, regarding the relationship between perceived usefulness (a moderately correlated factor) and users' knowledge payment willingness, some studies consider perceived usefulness as one of the most influential factors, while others find its effect insignificant. For the relationship between satisfaction and users' knowledge payment willingness, different empirical studies yield different effect sizes, with correlation coefficients as low as 0.243 in A.J. Setterstrom et al.'s study but above 0.5 in Huang Zhaojia and Zhu Zuping et al.'s studies. Among weakly correlated factors, Z.Y. Li et al. found that perceived cost significantly positively influences knowledge payment behavior ($r = -0.43$), while Chen Hao et al. found that perceived cost has no significant effect on users' knowledge payment willingness ($r = 0.083$).

Furthermore, although most highly correlated independent variables are weakly heterogeneous, some variables still show strong heterogeneity. For example, Shu Mingchun's study found that payment attitude has no significant positive effect on users' knowledge payment willingness ($r = 0.042$), which contradicts our con-

clusion from meta-analyzing multiple empirical studies. The reason is that studies holding low-correlation views are few in number, and their effects are offset by multiple highly consistent and correlated empirical studies in the meta-analysis. Moreover, comparison reveals different characteristics across these studies, and subgroup analysis confirms that subject characteristics indeed moderate their relationship. Therefore, subsequent research should also pay attention to such variables to provide clearer guidance for practice.

5.2 The Role of Moderating Variables

Heterogeneity tests and subgroup analysis found that subject characteristics can partially explain the heterogeneity in relationships between some independent variables and the dependent variable across different studies. These variables include recognition of knowledge providers, payment attitude, perceived cost, perceived risk, perceived value, perceived socialness, perceived trust, perceived behavioral control, perceived ease of use, perceived usefulness, perceived knowledge quality, subjective norms, and perceived cost. Li Jiannan et al. found that whether users have payment experience leads to differences in their payment needs, motivations, and concerns. Yin Xiang et al. divided knowledge payment users into those without payment experience and those with payment experience, finding differences in influencing factors: users with payment experience do not first consider platform trust but focus more on the usefulness of knowledge products for work and learning and the ease of use in saving time. This study further confirms these differences. Compared with other users, users with payment experience show stronger effects of payment attitude, perceived socialness, perceived usefulness, perceived ease of use, subjective norms, and perceived cost on knowledge payment willingness, while the opposite is true for recognition of knowledge providers, perceived cost, perceived risk, perceived value, perceived trust, perceived behavioral control, perceived knowledge quality, and subjective norms.

The reason may be that users' previous knowledge payment experience helps them gain deeper understanding of paid knowledge products, reducing uncertainty about knowledge payment. Therefore, future research should pay more attention to how differences in subject characteristics affect knowledge payment willingness, further exploring differences between users with payment experience and other users, such as using grounded theory to clarify the motivations and antecedents of knowledge payment willingness among different user characteristics, providing references for platforms to develop differentiated strategies for different users. Currently, no empirical research compares influencing factors of knowledge payment willingness between domestic and foreign users or users of different occupations, which could be expanded based on this study.

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6. Conclusion

6.1 Research Conclusions

Online users' knowledge payment willingness is key to the success of knowledge payment models, yet academia has not reached consensus on its antecedents, leaving industry exploration of knowledge payment platform models directionless. Meta-analysis is a powerful tool for integrating different research results addressing the same problem. Introducing meta-analysis into knowledge payment research helps clarify the relationship between knowledge payment willingness and its influencing factors. Following meta-analysis research procedures, this study collected and analyzed research data from 38 existing domestic and international sample documents on influencing factors of users' online knowledge payment willingness, identifying 25 key factors that directly influence knowledge payment willingness, and tested the moderating effect of subject characteristics as a moderating variable through heterogeneity tests and subgroup analysis.

The study found that 25 key factors directly influencing knowledge payment willingness can be divided into three categories: content, context, and consciousness. Among them, perceived cost significantly negatively influences users' knowledge payment willingness, while other variables have significant positive effects. Factors highly correlated with knowledge payment willingness include demand, experience, perceived professionalism, reliability, perceived knowledge quality, perceived interestingness, perceived benefits, and payment attitude. Additionally, subject characteristics can serve as moderating variables, partially explaining the sources of heterogeneity in some studies. Specifically, users with knowledge payment experience show higher correlations for payment attitude, perceived socialness, perceived usefulness, perceived ease of use, subjective norms, and perceived cost than other users.

Currently, online user knowledge payment research has achieved rich results, but this study's meta-analysis results show there is still room for future research, such as focusing on the effects of moderately and weakly correlated variables on knowledge payment; paying more attention to differences in subject characteristics, such as domestic versus foreign users and users of different occupations; exploring influencing factors of knowledge internalization and diffusion in the latter half of knowledge payment; and using multiple research methods including qualitative comparative analysis and grounded theory to observe knowledge payment behavioral mechanisms for deeper insights.

6.2 Research Contributions

This study has theoretical contributions and practical implications. Theoretically, first, based on large samples, it comprehensively analyzed inconsistent independent studies on knowledge payment willingness, summarizing their common effects to obtain more universal relationships between variables and knowledge payment willingness, which can guide subsequent empirical research. Second, it identified key influencing factors of knowledge payment willingness, form-

ing a more comprehensive influencing factor model for online users' knowledge payment willingness, which promotes theorization in this field and facilitates its further development. Third, it enriches meta-analysis research results in library and information science, elaborating research procedures, data presentation, and analysis indicator norms in detail, providing research strategies and reference frameworks for similar studies in the field and promoting the application of this method.

Practically, this study provides references for knowledge payment platforms to deeply understand users' knowledge payment behavior and effectively promote knowledge payment. For example, in platform development and design, considering the significant influence of subjective norms on users' knowledge payment willingness—especially the higher correlation coefficient for users with payment experience—managers can create a "nudge-to-purchase" consumption scenario through mechanisms such as expert recommendations, friend sharing, and medal rankings, fully leveraging word-of-mouth and opinion leaders. In promotion and publicity, given the critical role of perceived professionalism, reliability, and perceived knowledge quality, managers should focus on both knowledge product packaging and knowledge provider image shaping to provide users with a worthwhile subjective experience, thereby enhancing their knowledge payment enthusiasm. In content production and marketing, given the critical role of demand and experience, content creators can create useful knowledge products catering to different user group needs (such as social, knowledge, instrumental, and entertainment needs), while platform operators can use trial strategies from marketing to provide consumers with opportunities to experience knowledge payment products (such as previews, auditions, and trial learning), reducing information asymmetry risks and uncertainties in knowledge payment, thus enhancing users' knowledge payment willingness.

6.3 Research Limitations and Future Directions

This study still has some limitations. First, although sample data came from multiple mainstream databases and covered various literature types, the sample size for meta-analysis may still be limited, as we did not search specialized conference databases. Future research should use broader databases, obtain more books, conference papers, and multi-regional literature for meta-analysis. Second, due to insufficient sample sizes for moderating effect research, this study could not conduct meta-analysis on moderating variables affecting knowledge payment willingness (such as platform type, product type, research context, and gender). Future research could classify moderating variables more finely to deeply reveal the causes of research heterogeneity. Additionally, future research could use systematic literature review, meta-ethnography, and DEMATEL methods, combining quantitative and qualitative perspectives to integrate influencing factors of knowledge payment willingness, with findings complementing this study's results to provide more comprehensive references for knowledge payment platform development.

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A Meta-analysis Research on Influencing Factors and Moderating Variables of Online Users' Willingness to Pay for Knowledge

Abstract: [Purpose/significance] Exploring the influencing factors of online users' willingness to pay for knowledge is of great significance to the construction and sustainable development of knowledge payment platforms, yet existing literature shows inconsistencies in empirical results. [Method/process] Using meta-analysis method and fixed-effects model, this paper comprehensively analyzed 40 empirical research documents and 14,452 independent samples related to online users' knowledge payment willingness at home and abroad. Based on the content-context-consciousness framework, key factors affecting online users' knowledge payment willingness were summarized and identified, and the effect of moderating variables was tested through heterogeneity test and subgroup analysis. [Result/conclusion] Results show that factors significantly affecting online users' knowledge payment willingness can be divided into three categories: content, context, and consciousness, including 25 independent variables. Among them, perceived cost significantly negatively affects users' knowledge payment willingness, while other variables have significant positive effects. Factors highly correlated with knowledge payment willingness include demand, experience, perceived professionalism, reliability, perceived knowledge quality, perceived interestingness, perceived benefits, and payment attitude. Meanwhile, the study identified the moderating effect of subject characteristics, finding that whether users have knowledge payment experience is part of the source of heterogeneity across different studies.

Keywords: meta-analysis; knowledge payment; influencing factors; correlation; moderating effect

Note: Figure translations are in progress. See original paper for figures.