Postprint: A Study on User Satisfaction Evaluation for Online Paid Knowledge Subscription Services

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Abstract

[Purpose/Significance] This study constructs an evaluation index system for online knowledge payment subscription user satisfaction and analyzes factors influencing the satisfaction of paid subscription users on online knowledge payment platforms, aiming to provide evaluation methods and references for platform operators to optimize their operational mechanisms. [Method/Process] Using a combined approach of Analytic Hierarchy Process (AHP) and fuzzy comprehensive evaluation, a survey was conducted on 250 online knowledge payment subscription users to collect data for empirical research. The weight ranking of first-level indicators affecting online knowledge payment subscription user satisfaction is: content quality > service quality > interaction quality > platform characteristics. The overall satisfaction level of paid subscription users toward online knowledge payment platforms lies between "generally satisfied" and "satisfied," approaching the lower bound of "satisfied," indicating room for improvement. Finally, corresponding strategies are proposed for online knowledge payment platforms to enhance paid subscription user satisfaction.

Full Text

Preamble

Research on the Evaluation of Paid Subscription Users' Satisfaction of Online Knowledge Payment Platforms

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Abstract

[Purpose/Significance] This study constructs an evaluation index system for online knowledge payment subscription user satisfaction and analyzes the fac-

tors influencing satisfaction among paid subscription users of online knowledge platforms, aiming to provide evaluation methods and reference points for platform operators to optimize their operational mechanisms. [Method/Process] Using a combination of the Analytic Hierarchy Process (AHP) and fuzzy comprehensive evaluation method, we conducted a survey of 250 online knowledge payment subscription users, collected data, and performed empirical research. [Result/Conclusion] The weight ranking of first-level indicators affecting online knowledge payment subscription user satisfaction is: content quality > service quality > interaction quality > platform characteristics. The comprehensive satisfaction level of paid subscription users for online knowledge payment platforms falls between general satisfaction and satisfaction, approaching the lower threshold of satisfaction, indicating room for improvement. Finally, corresponding strategies are proposed to enhance paid subscription user satisfaction on online knowledge payment platforms.

Keywords: online knowledge payment; paid subscription users; user satisfaction; analytic hierarchy process; fuzzy comprehensive evaluation

Introduction

In the era of internet knowledge economy, online knowledge payment platforms have attracted significant user attention by helping address knowledge anxiety caused by information overload. Paid subscription has become a primary form of online knowledge payment and is now favored by major knowledge platforms. According to data from iiMedia Research, China' s knowledge payment industry market size has expanded rapidly since 2017, reaching 39.2 billion yuan in 2020 and projected to hit 67.5 billion yuan in 2021 [1]. However, due to the unique nature of knowledge products, users often encounter issues such as mismatched expectations when subscribing to online knowledge products, leading to user dissatisfaction. These problems, if widespread, result in poor user experiences and low repurchase intentions. Therefore, to promote sustainable development of online knowledge payment platforms, knowledge transfer and dissemination strategies focusing on user satisfaction and loyalty have gradually become operational priorities for platform operators.

Current research has primarily focused on users' consumption decisions, particularly pre-payment decision-making behaviors [2-3], while paying insufficient attention to post-payment satisfaction evaluation, creating obstacles to platform sustainability. Based on this gap, this study targets paid subscription users on online knowledge payment platforms, constructs an evaluation index system for their satisfaction, employs feasible evaluation methods to assess their satisfaction empirically, and proposes improvement recommendations and strategies to enhance user satisfaction based on the evaluation results.

Literature Review

Definition and Classification of Online Knowledge Payment

Compared to "free" knowledge sharing, online knowledge payment refers to a new model where users (primarily individual users, also called "knowledge consumers") purchase video, audio, and other knowledge products through online payment on internet knowledge platforms to meet their learning needs, representing a knowledge market-based approach to knowledge sharing and acquisition [4]. Regarding classification, Du Zhitao and Xu Jinghong identified online knowledge payment as user behavior of acquiring knowledge for a fee in internet environments, including paid Q&A, content tipping, paid courses, and content subscriptions [5]. Yuan Rongjian categorized knowledge payment into paid Q&A, paid lectures, and column subscriptions based on content format [6]. Fang Jun identified five main types of paid knowledge products: annual subscription columns, mini-columns, lecture courses, online camps, and paid communities [7]. Zhang Shuai et al. divided knowledge payment into three types: paid subscription, paid Q&A, and user tipping [8]. Among these types, most scholarly research has concentrated on the paid Q&A model [9], using platforms such as Zhihu, Zhihu Live, and Weibo Q&A to collect data for analysis [3,10-14].

Definition of User Satisfaction

User satisfaction originates from customer satisfaction in marketing and represents a key concept for analyzing user behavior in the internet era. Research on user satisfaction is crucial as it not only influences behavioral outcomes such as loyalty, trust, and purchase intention [15-17], but also serves as a critical factor affecting profitability [18]. Existing literature discusses customer satisfaction from two perspectives: transaction-specific and cumulative [19]. Transaction-specific satisfaction refers to user satisfaction with a current transaction, while cumulative satisfaction represents the overall evaluation of experiences with a specific entity (such as a service delivery system, provider, or service supplier) across a series of transactions [20-21].

Research on Knowledge Service Platform User Satisfaction

This paper reviews knowledge service platform user satisfaction research from the perspectives of influencing factors/evaluation index system construction, user types, and data sources. Given China' s pioneering position in the content payment field and the abundance of recent domestic research compared to international studies, we focus on reviewing representative domestic scholars' viewpoints, as summarized in .

As shown in the table, existing research has explored user satisfaction from various angles—some focusing on influencing factors, others on evaluation methods, and some employing satisfaction as a mediating variable (e.g., Zhu Zuping and Zhang Liping [29], Zhao Baoguo and Yao Yao [30], Lu Yanqiang and Li

Gang [31]). However, user satisfaction evaluation research in the knowledge payment domain has not received adequate attention, particularly regarding user types. Studies on paid Q&A platform users are numerous, while research on paid subscription users remains scarce. Moreover, in satisfaction evaluation for knowledge payment platforms, particularly for paid subscription users, indicator selection is incomplete—for instance, lacking indicators that enhance participation—failing to comprehensively reflect paid subscription users' evaluations of online knowledge payment platform service quality.

This study first notes that online paid subscription differs from paid Q&A and user tipping, possessing subscription characteristics that include obtaining knowledge products through subscription columns, online training camps, and course subscriptions. Second, since paid subscription users complete relevant knowledge learning within a certain subscription period, their satisfaction with knowledge payment platforms represents a cumulative result over time. Therefore, based on the cumulative perspective, this study defines user satisfaction as an emotional response based on users' overall evaluation of their prior expectations and experiences with online knowledge payment platforms or knowledge providers, manifested in subjective feelings such as pleasure or dissatisfaction, satisfaction or frustration [21,32].

Building on previous research, this study employs focus group interviews and literature review to explore corresponding index systems for evaluating online knowledge payment satisfaction. Finally, combining the characteristics of paid subscription users and targeting consumers with paid subscription experience on online knowledge payment platforms, we construct a user satisfaction evaluation index system and apply AHP and fuzzy comprehensive evaluation methods to conduct actual evaluation through questionnaire data, providing recommendations for online knowledge payment platforms to improve their operational mechanisms.

Evaluation Index System Construction for Online Knowledge Payment Subscription User Satisfaction

Index Selection

Due to the characteristics of knowledge products before sale (such as intangibility), users often have limited product information before payment. Moreover, knowledge consumption differs from ordinary commodity consumption in terms of consumption process, consumer expenditure, consumer gains, and consumer evaluation [10,33]. Particularly regarding consumer gains, some knowledge products, such as intellectual and user quality-enhancement products, have delayed effects that manifest over longer periods. Mismatches between actual experience effects and user expectations frequently occur, leading to common user dissatisfaction [34]. Therefore, evaluating satisfaction specifically for knowledge payment subscription users can, on one hand, provide important basis and recommendations for knowledge payment platforms and providers to improve

knowledge product quality and service quality according to index weights and evaluation results, thereby better meeting paid subscription users' expectations and personalized needs. On the other hand, it offers insights for further screening users to improve their satisfaction and loyalty, enhancing user stickiness and continuous payment behavior, thus promoting sustainable platform development.

This study adopts the focus group interview method, selecting 12 users with online paid subscription experience as interview subjects. Interview content covered views on paid subscription knowledge products, problems encountered during learning, learning effectiveness, satisfaction, and intentions for continued payment, with a duration of 90 minutes. The interview results were then coded and categorized. Based on existing research and interview results, following principles of comprehensiveness and importance, systematicity and independence, and practicality [35], and combining the characteristics of online knowledge payment subscription users, this study constructs the following user satisfaction evaluation index system:

The first layer is the target layer: the online knowledge payment subscription user satisfaction evaluation index system. The second layer is the criterion layer (or "first-level indicators"), selecting four primary factors affecting paid subscription user satisfaction—interaction quality, platform characteristics, content quality, and service quality [20,22-28,36]—and building the scheme layer (or "second-level indicators") upon this foundation, comprising 24 second-level indicators that basically reflect all aspects affecting user satisfaction during the interaction process among knowledge payment platforms, knowledge providers, and users, as shown in [Figure 1: see original paper].

Index Meanings

(1) Interaction Quality. This primarily evaluates users' interactive experiences with knowledge platforms, providers, and other users after subscribing to knowledge products. High-quality interaction between users and knowledge payment platforms, providers, or other users may reduce users' perceived uncertainty, thereby generating trust, empathy, and reliability toward platforms or providers [37-38]. It includes five second-level indicators. Among them, responsiveness in interacting with knowledge providers and platform parties refers to timely feedback when users have questions; friendliness of interactive sharing refers to whether users can find like-minded friends on the platform for mutual progress.

(2) Platform Characteristics. This focuses on users' evaluation of the tangible features of products or services provided by knowledge payment platforms. Since the transaction object in knowledge markets is intangible knowledge products requiring user participation, the surrounding environment (such as platform characteristics) will influence users' perception of overall satisfaction [39]. It includes seven second-level indicators, where interface friendliness, clarity, and

aesthetics refer to whether interface design is concise and clear, whether operation procedures are convenient, and whether layout is reasonable and visually pleasing; platform stability, security, and timely responsiveness refer to whether the system is stable and secure with fast processing and reaction speeds; payment method characteristics describe whether platform payment methods are diverse and convenient.

(3) Content Quality. Content quality constitutes an important aspect of paid subscription user satisfaction experience, mainly including paid knowledge content characteristics (four second-level indicators) and content value (three second-level indicators), involving professionalism, systematicity, richness, novelty, value-for-money, and the degree of demand satisfaction and expectation alignment of paid knowledge content. Among them, content novelty refers to whether content has platform-specific features; value-for-money refers to whether platform content matches users' perceived product utility and value; demand satisfaction and expectation alignment refer to the degree to which platform knowledge content meets user needs and matches user expectations.

(4) Service Quality. Service quality also significantly affects paid subscription user satisfaction, referring to users' perception of service quality involving humanization, personalization, innovation, service attitude, and enhanced participation of services provided by knowledge platforms or providers. Among them, service humanization refers to users' natural and comfortable experience using the platform; service personalization refers to whether service providers (including platform parties and knowledge providers) offer personalized services based on user habits and behavior; service innovation refers to whether service providers employ new technologies and concepts to provide innovative services; enhanced participation refers to whether platforms or knowledge providers adopt measures to strengthen user engagement.

Research Methodology Selection

In multi-indicator comprehensive evaluation, weight determination is crucial. In practice, methods such as subjective scoring, Delphi method, AHP, and entropy method exist. Referencing common practice in existing research, this study adopts the Analytic Hierarchy Process (AHP) to determine indicator weights. AHP is essentially an expert-participatory decision-making method that decomposes a complex problem into several constituent elements, forms a hierarchical structure according to dominance relationships, and then uses pairwise comparison to determine the relative importance of decision alternatives, representing a qualitative-quantitative combination approach [40].

When evaluating online knowledge payment subscription user satisfaction, this study employs fuzzy comprehensive evaluation (applying fuzzy set transformation principles to comprehensively evaluate the membership grade of evaluated objects from multiple perspectives, divided into single-level and multi-level fuzzy comprehensive evaluation; this study adopts the latter) [35,41] for the following

reasons [35]: (1) The evaluation indicators designed in this study are qualitative indicators that possess a certain degree of fuzziness; (2) When evaluating user satisfaction, it is necessary to collect users' views on currently used online knowledge payment platforms, but actual users are often influenced by subjective factors during evaluation, resulting in insufficient objectivity. Therefore, to improve evaluation objectivity, fairness, and correctness, and achieve indicator transformation from qualitative to quantitative, this study adopts multi-level fuzzy comprehensive evaluation to express evaluation results with specific numerical values.

The specific steps are as follows [35,40-41]:

(1) **Establish the factor set (or indicator set).** The factor set is a collection of various factors affecting the evaluated object, typically denoted as U:
$U = u_1, u_2, ..., u_m$
where $u_i (i = 1, 2, ..., m)$ represents m influencing factors, which typically possess varying degrees of fuzziness.

(2) **Establish the weight set.** To reflect the importance of each factor, different weights $w_i (i = 1, 2, ..., m)$ are assigned to each influencing factor $u_i (i = 1, 2, ..., m)$. The collection of weights $W = w_1, w_2, ..., w_m$ is called the weight set, whose elements satisfy positivity and normalization: $w_i > 0 (i = 1, 2, ..., m)$; $\sum_{i=1}^{m} w_i = 1$.

(3) **Establish the evaluation set.** The evaluation set is typically denoted as V:
$V = v_1, v_2, ..., v_n$
where $v_j (j = 1, 2, ..., n)$ represents various possible evaluation results. Referencing existing research, this study sets n=5, using five evaluation results: very satisfied, satisfied, neutral, dissatisfied, and very dissatisfied, denoted as $V = v_1(\text{very satisfied}), v_2(\text{satisfied}), v_3(\text{neutral}), v_4(\text{dissatisfied}), v_5(\text{very dissatisfied})$.

(4) **Calculate membership degrees to form the fuzzy relation matrix R.** During evaluation, it is necessary to first calculate users' membership status regarding grade evaluation fuzzy subsets for each indicator, i.e., membership degrees, to form the fuzzy relation matrix R:

$$R = \begin{pmatrix} r_{11} & r_{12} & \cdots & r_{1n} \\ r_{21} & r_{22} & \cdots & r_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ r_{m1} & r_{m2} & \cdots & r_{mn} \end{pmatrix}$$

where $r_{ij} (i = 1, 2, ..., m; j = 1, 2, ..., n)$ represents the membership degree of the i-th evaluation factor to the j-th evaluation grade.

(5) **Select composition operators to combine fuzzy relation matrix R with weight set W to obtain comprehensive evaluation matrix B.**

$$B = W \circ R$$

where "$\circ$" represents fuzzy composition operators.

(6) **Determine the weighted vector of evaluation grades V and combine it with comprehensive evaluation matrix B to obtain the final comprehensive evaluation value S.** To make the superiority of single-level fuzzy comprehensive evaluation results more distinguishable, this study introduces the weighted vector V of evaluation grades. Based on existing research, the weighted vector is set as $V = v_1(\text{very satisfied}), v_2(\text{satisfied}), v_3(\text{neutral}), v_4(\text{dissatisfied}), v_5(\text{very dissatisfied}) = 100, 80, 60, 40, 20$. The final evaluation result is:

$$S = B \cdot V^T$$

where S is the final evaluation result, and a larger S value indicates higher user satisfaction.

The above steps describe the single-level fuzzy comprehensive evaluation process. For multi-level fuzzy comprehensive evaluation, after calculating single-factor evaluation results, these results are used to construct the fuzzy relation matrix at the next higher level to calculate fuzzy comprehensive evaluation for higher-level factors, proceeding upward level by level. This study adopts a two-level fuzzy comprehensive evaluation method to assess paid subscription user satisfaction.

Empirical Study

This study collects user evaluation data through questionnaires to assess satisfaction of knowledge payment platform paid subscription users. From May 9 to May 13, 2020, questionnaires were distributed via the "Wenjuanxing" platform. The generated link was sent to friends of the authors who subscribed to paid courses through social circles, WeChat friends, and email. Since the survey targeted users with online paid subscription experience, a screening question was placed at the beginning: "Have you ever had experience with online paid subscription knowledge products?" This question filtered out users without such experience.

A total of 250 valid questionnaires (after invalid questionnaires were removed) were obtained. Basic demographic information of respondents is shown in .

As mentioned above, this study uses AHP to determine indicator weights. First, based on the established index system, the 9-point scale method (meanings shown in) is used to judge the importance between indicators. Ten experts in relevant fields (2 platform personnel, 2 knowledge providers, and 6 senior knowledge payment platform users) were invited to form an evaluation panel

and construct judgment matrices according to the 9-point scale method (5 judgment matrices total). Using yaahp software, the maximum eigenvalue and eigenvector of each judgment matrix were calculated, and consistency tests were performed. The consistency ratio is calculated as $CR = CI/RI$, where $CI = (\lambda_{max}–n)/(n–1)$, λ_{max} is the maximum eigenvalue of the judgment matrix, n is the order of the judgment matrix, and RI values are shown in .

Test results: If $CR < 0.1$, the judgment matrix is generally considered to have satisfactory consistency; if consistency fails, the judgment matrix should be abandoned or the original expert should be asked to re-evaluate.

The questionnaire' s satisfaction levels serve as the model' s evaluation set to construct membership functions. Using membership function transformation, the proportion of respondents at each satisfaction level for each indicator is used as the representative of the relationship between indicators and the evaluation set. For example, the proportion of "satisfied" responses for platform security = number of questionnaires rating platform security as satisfied / total valid questionnaires = 111/250 = 0.444. These values constitute the second-level indicator fuzzy membership evaluation table, shown in .

As described above, this study uses AHP to determine weights. After collecting relevant data, yaahp software was used for weight calculation and consistency testing. All judgment matrices passed consistency tests, ultimately determining weights at each level and each indicator' s weight relative to the overall goal. Relevant data and results are shown in through .

Based on fuzzy comprehensive evaluation principles and combined with fuzzy weight sets, the fuzzy comprehensive evaluation matrix for interaction quality satisfaction B_1 can be obtained:
$B_1 = W_1 \circ R_1$

Similarly, the fuzzy comprehensive evaluation information matrices for interaction quality, platform characteristics, content quality, and service quality $B_{4\times5}$ can be obtained.

From the fuzzy comprehensive evaluation information matrix $B_{4\times5}$, combined with corresponding weights for interaction quality, platform characteristics, content quality, and service quality, the two-level fuzzy comprehensive evaluation matrix B can be obtained:

$$B = W \circ B_{4\times5}$$

Introducing the weighted vector V, the final comprehensive evaluation value S for online knowledge payment subscription user satisfaction indicators can be obtained:

$$S = B \cdot V^T$$

Results Analysis and Recommendations

(1) The indicator weights calculated using AHP are shown in . First-level indicator weights are: interaction quality 0.1377, platform characteristics 0.0838, content quality 0.5462, and service quality 0.2323. This indicates that users value content quality most, followed by service quality and interaction quality, with platform characteristics ranking last. The likely reasons are: First, from the perspective of platforms or knowledge providers, content forms the foundation for interaction with users and service delivery. Good content can resonate with users—content remains the core, making quality improvement crucial, though the proportion of service should not be neglected. In other words, content should be the core while service should be the priority [7]. From the user perspective, users first focus on content, then service. Service acts as a catalyst—good service helps users better understand paid knowledge products and enjoy learning. Service also creates positive word-of-mouth for platforms. Second, interaction quality also affects user satisfaction. Interaction between users and platform parties or knowledge providers, as well as communication among users, influences satisfaction. This positive interactive atmosphere and opportunity can help users keep up with courses and improve completion rates, representing an area requiring strengthening by platforms and knowledge providers. Finally, platform characteristics have relatively lower impact on user satisfaction compared to other indicators. Since a course or training camp often lasts for a period, platform characteristics such as stability, security, and interface design have relatively reduced impact on satisfaction after paid subscription users become accustomed to the platform.

(2) Among scheme-level indicators, "demand satisfaction" and "expectation alignment" under "content quality" show higher relative importance, as shown in . This demonstrates that in the internet knowledge economy era, users are increasingly pragmatic, emphasizing the actual degree to which paid knowledge products meet their needs and the alignment between expectations and reality, representing a significant shift from previous trendy knowledge consumption behaviors. Under "service quality," the "service attitude" indicator shows higher relative importance, indicating that service attitudes of both platform parties and knowledge providers directly affect user satisfaction.

(3) According to the fuzzy comprehensive evaluation information matrix $B_{4\times5}$, in the evaluation of interaction quality, membership degrees for "satisfied" and "neutral" are relatively high, while those for "dissatisfied" and "very dissatisfied" are low. Overall, knowledge payment subscription users' satisfaction evaluation is "satisfied," with similar patterns for other indicators at the same level.

(4) According to the two-level fuzzy comprehensive evaluation matrix B, the

membership degree for "very satisfied" is 0.1772, for "satisfied" is 0.4948, for "neutral" is 0.2737, for "dissatisfied" is 0.0455, and for "very dissatisfied" is 0.0087. This shows that the overall satisfaction of online paid subscription users is relatively high.

(5) Based on AHP and fuzzy comprehensive evaluation methods, the total satisfaction score for online paid subscription users is 75.72, falling between neutral and satisfied, approaching the lower limit of satisfaction. Therefore, there is room for improvement in user satisfaction.

To enhance subscription user satisfaction, online knowledge payment platforms can adopt targeted improvement measures based on indicator weights and user satisfaction evaluation results for each indicator.

Recommendations for Improving Content Quality

(1) Online knowledge payment platforms should continuously improve knowledge screening and evaluation mechanisms, strengthen detailed classification of paid users, help users identify their knowledge gaps, and establish targeted screening standards [32] to distinguish consumers with different knowledge foundations. This ensures potential paid users can clearly understand possible learning outcomes before payment, form reasonable expectations of knowledge providers and platforms, and have these expectations fulfilled, thereby enhancing paid users' trust and loyalty toward knowledge payment platforms and providers [6].

(2) According to internet content dissemination characteristics and final effects, knowledge payment platforms need to further segment knowledge products and establish recommendation and matching mechanisms [6], ensuring users can retrieve, filter, and even directly find suitable paid knowledge products that maximize their needs in the shortest time [42]. This requires platforms and knowledge providers to deeply understand the importance of scenario-based operations and improve user effectiveness of paid knowledge products.

(3) Improve the collaborative mechanism between knowledge payment platforms and knowledge providers in creating knowledge products, incentivize and assist knowledge product providers in building personal brands, and ensure the professionalism, systematicity, scenario-based nature, and novelty of produced knowledge. This requires platforms and providers to understand market trends, gain insights into user needs, deeply cultivate content, and design knowledge into products with user value and commercial value. Based on user needs and feedback, timely product iteration should be conducted to enhance user satisfaction.

(4) Draw on publishers' content production experience, increase joint development efforts for premium content, and continuously explore linkage mechanisms between publishers and the knowledge payment industry to

improve knowledge product content quality [32].

Recommendations for Improving Service Quality

(1) Reasonably determine the proportion of content and service in paid knowledge products. Adhere to content as the core and service as the priority. For paid users, content remains paramount, but when content is similar, service naturally becomes the focus.

(2) Improve service providers' attitudes. Although online knowledge product consumption differs from offline product purchasing scenarios, service provision permeates the entire process from initial attention through payment to post-payment stages. Service attitudes directly affect user satisfaction and continuous payment intentions. Therefore, knowledge payment platforms should establish good incentive and evaluation feedback mechanisms for knowledge producers, encouraging knowledge providers to participate in knowledge community maintenance and jointly enhance user experience and effectiveness with good service attitudes [6].

(3) Enhance service personalization and humanization. Conduct research on platform veteran users and new experience users, and provide personalized services tailored to users with different occupations, needs, and purposes [28]. Rely on intelligent technology upgrades to deeply identify users' life scenarios and provide personalized services through platform professionals [42]. Simultaneously, transform thinking to improve service delivery methods—for example, some platforms offer free trials and experiences, demonstrating service humanization that makes users feel comfortable and natural when using the platform, thereby improving user retention rates.

(4) Establish corresponding mechanisms to strengthen user participation. Platforms can adopt various measures to encourage user participation, such as setting up rewards for perfect attendance, regularly pushing course update reminders for users with low course opening rates, and incentivizing users to improve completion rates. Using products to shape user habits can further enhance their satisfaction. Through these diversified channels to improve service quality, platforms can increase user retention and activity rates. As Liu Youzhi pointed out, knowledge payment platforms should capture user pain points and provide users with complete and dynamic knowledge products that include knowledge carriers and a series of knowledge services before, during, and after knowledge product purchase [42].

Strategies for Enhancing Interaction Quality

(1) Knowledge payment platforms should encourage knowledge providers to actively participate in interactions with users, timely sort out and respond to user feedback, actively reply to user questions, and leverage professional

advantages—this also serves as the basis for product iteration and improvement.

(2) Knowledge payment platforms should strengthen attention to user issues, simplify user feedback processes [28], and provide users with a convenient interactive atmosphere.

(3) Increase social elements on platforms, enhance community interaction, and encourage users to communicate learning experiences or problems with other students in the community. Member exchanges and discussions help deepen knowledge understanding, enhance knowledge relevance, and truly internalize knowledge into users' own knowledge [32]. For example, the Carbon 9 community, which emphasizes "output," improves knowledge transformation effects and better meets user needs through unique peer learning and group review concepts.

Improvement Strategies for Platform Characteristics

Platform characteristics have the smallest weight in the user satisfaction evaluation index system. According to the maximum membership principle, user satisfaction evaluation for this dimension is "satisfied" (membership degree 0.5001), higher than other levels. Therefore, platforms can collect targeted feedback on platform characteristics from new and veteran users to make selective improvements.

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