

# Knowledge payment research: status quo and key issues

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## Abstract

**Purpose** – Knowledge sharing has entered the stage of knowledge payment with the typical models of paid Q&A, live session, paid subscription, course column and community service. Numerous knowledge suppliers have begun to pour into the knowledge payment market, and users' willingness to pay for premium content has increased. However, the academic research on knowledge payment has just begun.

**Design/methodology/approach** – In this paper, the authors searched several bibliographic databases using keywords such as “knowledge payment”, “paid Q&A”, “pay for answer”, “social Q&A”, “paywall” and “online health consultation” and selected papers from aspects of research scenes, research topics, etc. Finally, a total of 116 articles were identified for combing studies.

**Findings** – This study found that in the early research, scholars paid attention to the definition of knowledge payment concept and the discrimination of typical models. With the continuous enrichment of research literature, the research direction has gradually been refined into three main branches from the perspective of research objects, i.e. knowledge provider, knowledge demander and knowledge payment platform.

**Originality/value** – This paper focuses on discussing and sorting out the key research issues from these three research genres. Finally, the authors found out conflicting and contradictory research results and research gaps in the existing research and then put forward the urgent research topics.

**Keywords** Knowledge payment, Knowledge demander, Knowledge payment platform, Knowledge provider, Paid Q&A, Knowledge supplier

**Paper type** Literature review

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## 1. Introduction

The business model of knowledge payment existed long ago. For example, Google has set up a peer-to-peer bonus system allowing employees to reward useful behavior through token payments. Google Answer, founded in 2002, is an online Q&A platform where knowledge demanders have the pricing power. Google Answer combining free exchange of information and fee-based services uniquely is an early prototype of paid Q&A (Ruth, 2012). The process of collecting and redistributing intangible assets such as “idle” knowledge, experience and skills based on online services is called knowledge sharing economy (Finley, 2013). In the knowledge sharing economy, knowledge is regarded as a commodity and can be purchased and sold (Cellary, 2010). Most scholars of sharing economy emphasized the untapped value of intangible assets (Botsman, 2014).



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In fact, advertising was the main source of revenue in early journalism (Mensing, 2007). But because of high production and distribution costs and the advertising base destroyed by new technologies, advertising revenue is insufficient to support news reporting business, so many online news suppliers have attempted to charge for online content (Huang and Wang, 2014; Oh *et al.*, 2013). At present, most American daily newspapers have launched paid content subscription or pay wall plan. Remarkably, according to the *New York Times*, its circulation revenue has surpassed advertising revenue after two years of digital subscription (Huang and Wang, 2014).

In the early traditional virtual communities, people voluntarily contribute and freely acquire knowledge (Bock *et al.*, 2005). In this case, the knowledge suppliers have no monetary gain (Wasko and Faraj, 2005) and the information quality may be low due to lack of control. At the same time, knowledge demanders may be submerged by information overload. As a result, the time cost for knowledge demanders to screen premium content is increasingly exacerbating (Zhang *et al.*, 2018), and the willingness to pay for premium content increases consequently.

At present, knowledge payment is springing up all over the world, and lots of knowledge suppliers are pouring into the knowledge payment market. Companies such as Quora Knowledge Prize (USA), Skillshare (USA), Zhihu (China) and Zaihang-Yidian (China) are changing the way people share knowledge. The development trend of knowledge payment services in China is particularly remarkable. 2016 was known as “the first year of knowledge payment”. In 2017, the scale of China’s knowledge payment industry is about 4.9 billion yuan (iresearch, 2018). The transaction volume of knowledge sharing economy is growing at a rate of 205 per cent (SIC, 2017), indicating the tremendous growth potential of knowledge payment in China market.

In the knowledge payment platform, knowledge demander compensates the individual contribution by monetary rewards (Zhang *et al.*, 2018). Knowledge payment emphasizes the commodity attribute of knowledge and penetrates knowledge liquidation into the whole process of knowledge sharing, to a certain extent, improving the efficiency of user information screening, and thus directly resolving the conflicts of unlimited information and limited energy.

With the continuous prosperity of the knowledge sharing economy, research on knowledge payment has flourished. To explore the key issues in the knowledge payment field, this paper collects research literatures related to news paywall, online health consultation platform and so on. The research literature mainly comes from six bibliographic databases, including ABI, ACM Digital Library, Elsevier, EBSCO, SAGE and JSTOR where we can find papers that are highly relevant to the research field; to include as many relevant papers as possible, we choose synonyms of knowledge payment, the names of knowledge payment platforms, as well as online health consultation as search terms. Finally, the search terms are: TO = (“knowledge payment” OR “pay for knowledge” OR “pay for answer” OR “paid Q&A” OR “pay content subscription” OR “paywall” OR “social Q&A” OR “Quora” OR “Zhihu” OR “Google Answers” OR “Mahalo Answer” OR “online health consultation” OR “online health community”). The research literature is limited to English papers. First, we completed all searches and downloads by December 20, 2018. Then we deleted book reviews, editorial introductions, reviews and letters. And through skimming reading, we deleted the papers not related to the knowledge payment field. Finally, 116 papers were retained.

Based on these research documents, this paper combs and analyzes the current status and key research issues of knowledge payment field. Firstly, we clarified the definition of the knowledge payment concept and analyzed the differences of knowledge payment business models. Then, we divided the existing research literature into three main parts according to the research objects, namely, knowledge supplier, knowledge demander and

knowledge payment platform. From these three perspectives, this paper summarizes and evaluates the key research issues in detail to provide important references and research directions for researchers.

## 2. Model research of knowledge payment

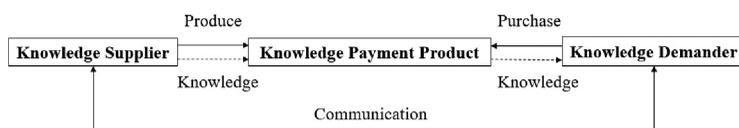
### 2.1 Definition of knowledge payment

Because knowledge transfer, knowledge sharing and knowledge exchange involve many fields, these three concepts are often borrowed and used alternately, leading to confusion and ambiguity among concepts. Knowledge transfer includes not only the sharing of knowledge by knowledge sources, but also the acquisition and application of knowledge by recipients. However, it's usually used to describe knowledge transfer between different units, departments or organizations, rather than individuals (Szulanski *et al.*, 2004, p. 1602). Knowledge sharing refers that the knowledge source provides task information or knowledge, aiming at helping others or cooperating with others to solve problems (Cummings, 2004; Dorsey, 2003). Knowledge exchange is different from knowledge sharing. Although knowledge exchange and knowledge sharing have been used interchangeably in many literatures (Cabrera *et al.*, 2006), knowledge exchange includes both knowledge sharing (users provide knowledge to others) and knowledge seeking (users seek knowledge from others) (Wang and Noe, 2010). Therefore, knowledge payment is most similar to knowledge exchange. But the notable difference is that knowledge payment has typical characteristics of e-commerce (i.e. purchase and sale), so it can be distinguished from previous forms of knowledge transfer, knowledge sharing and knowledge exchange (Zhang *et al.*, 2018).

Previously, untapped knowledge owned by most people was regarded as a free public good (Zhang *et al.*, 2018). However, knowledge payment emphasizes the commodity attribute of knowledge (Zhang *et al.*, 2018). Individuals who provide “idle” knowledge can receive not only social returns but also monetary compensation (Zhang *et al.*, 2018). Therefore, this paper puts forward and defines the concept of knowledge payment as follows. With specific knowledge and skills, knowledge suppliers share and disseminate knowledge in the form of products on the platform, while knowledge demanders pay money for getting access to reading, listening to or viewing knowledge products, and this interactive process is called “knowledge payment”. Figure 1 illustrates the primary actions and direction of knowledge flow in knowledge payment.

### 2.2 Typical models of knowledge payment

In China, there is basically consensus on the five main business models of knowledge payment: paid Q&A, live session, paid course and column, offline appointment and community service. “Zhi”, a subproduct of “Zhihu”, and “Zaihang-Yidian”, formerly known as “Fenda” have a typical paid Q&A model with obvious customization characteristics. However, it can only solve superficial problems and not meet the deep-seated knowledge needs. “Zhihu live” has a classic live session model where the cost of organizing lives by knowledge suppliers is relatively high, but large-scale income can be obtained. In addition, compared with paid Q&A service, live session has a lower degree of personalization, but a deeper level of knowledge. Paid course and column such as “Himalaya” is less interactive



**Figure 1.**  
Actions and direction  
of knowledge flow in  
knowledge payment

but meets the systematic knowledge seeking needs of knowledge demanders. The offline appointment such as “Zaihang” provides high-quality and interactive knowledge products. Community service such as “Fandeng Reading Club” has strong interaction and obvious social attributes, but its content fragmentation is relatively high. The specific advantages and disadvantages of these business models are shown in [Table I](#).

Therefore, due to significant differences, these five business models are applicable to different knowledge demanders. People need to choose appropriate models based on their free time and knowledge needs. If the knowledge demander needs to solve a specific problem, such as health, emotional problems, etc., the “paid Q&A” is appropriate because short text or audio messages can convey information promptly and effectively. If the knowledge demander is looking for more professional answers, “live session” is appropriate because these conversations are usually on-site courses last for an hour or longer. If the knowledge demander needs systematic learning experience, then “paid course and column” is more appropriate. In addition, different business models correspond to different human capital composition. For instance, knowledge suppliers are limited to experts in paid course and column, while many amateur experts can provide consultation services in paid Q&A.

Through new technological means, the knowledge payment business models enable knowledge to be learned and disseminated more effectively. For example, on Zaihang-Yidian and Whale, knowledge suppliers can record their answers directly using audio more effective than text, enhancing social connections between communicators ([Lunt and Curran, 2010](#);

Business model	Knowledge payment products	Advantages	Disadvantages
Paid Q&A	Weibo Q&A, Zhi (a subproduct of Zhihu), Zaihang-Yidian	High level of customization; low price threshold	High requirement for knowledge demander’s questioning skills; not systematic and thoroughly; difficult to get scale income
Live Session	Zhihu Live, Qianliao Chat, Litchi Microlecture	Interactive; in-depth and systematic; rich presentation modes; low price threshold; easy to get scale income	High requirement for knowledge supplier’s teaching technology
Paid Course and Column	Himalaya, iget, Dragonfly FM, Jianshu, Cloud classroom of Netease, Massive open online course	Low price threshold; in-depth and systematic; strong sense of companionship; easy to get scale income	Less interactive; weak timeliness; serious problem of copyright protection; high price threshold
Offline Appointment	Zaihang	High level of customization; interactive; good user experience	Highly unstandardized contents; difficult to form a unified evaluation and screening standard; high price threshold; high energy consumption and high cost of knowledge suppliers; difficult to get scale income
Community Service	Spiritual Wealth Club, Hundun University	Long-term continuous service; clear social attributes; interactive	Highly unstandardized contents; high level of content fragmentation; difficult to establish user trust directly; difficult to regulate

**Table I.**  
Taxonomy of  
knowledge payment  
business models

Sherman *et al.*, 2013). Zhihu live, Periscope and Facebook Live use live streaming channels to enhance the interaction between knowledge suppliers and demanders (Wang *et al.*, 2016). In addition, when knowledge demanders consult experts online, they can upload electronic files, which can help experts more accurately carry out consulting services (Wu and Lu, 2018).

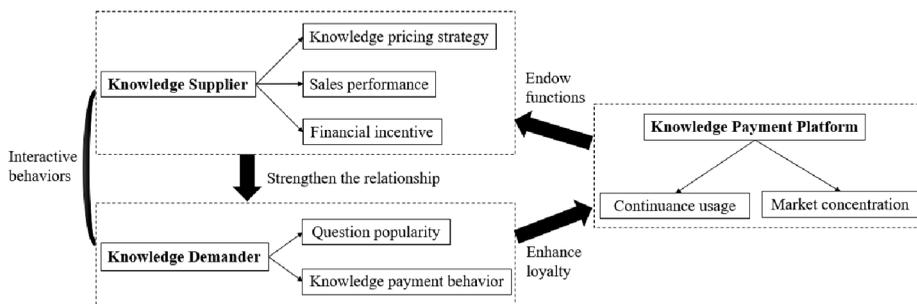
### 2.3 Development of paid Q&A model

Because the previous research in the knowledge payment field mostly focused on paid Q&A, here, the paid Q&A model is elaborated in detail. Online Q&A has developed since 1979 (Lueg and Fisher, 2012). Shah *et al.* defines online Q&A as an online knowledge community where knowledge demanders ask questions and other community members volunteer to provide solutions (Shah *et al.*, 2008). These Q&A websites include Yahoo Answers, Stack Exchange and Quora, which promote information exchange and knowledge sharing among community members (Preece, 2000; Atanasova *et al.*, 2018).

Zhihu, one of China’s most ballyhooed online Q&A platforms, has carried out a recommendation mechanism for improving the respond speed and quality of answers (Horowitz and Kamvar, 2010). However, online Q&A services still inevitably face the challenge of motivating experts to provide quicker and better answers. At present, as typical paid Q&A platforms, Zaihang-Yidian (China), Zhi (China) and Whale (USA) allow knowledge suppliers to price their answers, thus motivating experts directly and successfully (Guo *et al.*, 2018). In terms of Zaihang-Yidian and Zhi, users ask specific experts questions by paying the price set by knowledge suppliers, just a bit like a free market, effectively improving the respond speed and quality of expert answers (Jan *et al.*, 2018).

Compared with traditional fee-based offline consultation services and free online Q&A platforms, online paid Q&A platforms have the following advantages: beyond geographic proximity, 24-h availability, cost and time savings, lack of embarrassment, more reliable privacy protection, convenient retrieval of information and the ability to make an appointment of commutation with a specific expert (Xiao *et al.*, 2014; Ybarra and Suman, 2006; Atanasova *et al.*, 2018; Li *et al.*, 2016).

The research on the concept and models of knowledge payment is still in the continuous progress, but with the continuous enrichment of research literature, research issues have been refined. As knowledge payment involves three main research objects: knowledge supplier, knowledge demander and knowledge payment platform, research scholars have carried out in-depth research on knowledge payment based on different research objects. Here, we proposed a comprehensive research framework applicable to the above five business models, as shown in Figure 2.



**Figure 2.**  
Research framework  
of knowledge  
payment

### 3. Key research issues of knowledge suppliers

#### 3.1 The impact of knowledge pricing strategy

In traditional knowledge payment platforms such as Google Answers and Mahalo Answers, the knowledge demander is the product price-maker. They make pricing decisions according to the nature and difficulty of the problem. For example, when asking factual questions, the knowledge demander is more likely to pay for them, and when the problem is more difficult, the pricing will be higher (Hsieh *et al.*, 2010). At present, the knowledge supplier has the right to price knowledge payment products in the knowledge payment platform. In addition, due to the prominent feature of asymmetric information in knowledge payment market, knowledge suppliers have more information and thus stronger bargaining power (Pan, 2018). Therefore, the knowledge payment platform provides an opportunity for knowledge suppliers to achieve a price premium for their services (Chen *et al.*, 2015). Therefore, price dispersion generally exists (Xing *et al.*, 2004; Pan *et al.*, 2002) and it is necessary to explore the causes and consequences of price dispersion.

As for the causes of price dispersion, Brynjolfsson *et al.* found that brand differentiation, popularity and the trust level of consumers all lead to price dispersion (Brynjolfsson and Smith, 2000). In addition, based on the research background of online health consulting platform (Pan, 2018), online retail market (Luo and Chung, 2010), hotel industry (Öğüt and Onur Taş, 2012), studies suggest that online service evaluation and online service evaluation rate both play an obviously positive impact on service price. Later, Pan *et al.* found that consumers are willing to pay higher prices for goods or services with good electronic word-of-mouth (Pan, 2018), confirming the previous research conclusion that electronic word-of-mouth positively affects prices.

There has been a large amount of literature research on the impact of information or service pricing strategies, as shown in Table II. After the New York Times changed its information pricing strategy from “free of charge” to “charging a fee”, the impact of electronic word-of-mouth on website traffic was significantly weakened (Oh *et al.*, 2013). Also, Dawes found that the price rise poses a potential threat to the establishment and maintenance of long-term customer relationships and loyalty (Dawes, 2009). Additionally, through a systematic review of the literature on the relationship between service price and customer satisfaction, we find conflicting research results: positive relationship (Clemes *et al.*, 2008; Dapkevicius and Melnikas, 2009); negative relationship (Malik *et al.*, 2012); inverted U-shaped relationship (Campo and Jesús Yagüe, 2009); no relationship (Mahmud and Jusoff, 2013; Pedraja Iglesias and Jesus Yagüe Guillén, 2004). Moreover, Liu found that price had a direct positive effect on online health consulting purchases (Liu and Ye, 2015). Therefore, pricing strategies affect user engagement, loyalty, satisfaction and purchasing behavior to a certain extent. Knowledge

Main factors	Influence direction	Articles
Website traffic	Negative	Oh <i>et al.</i> (2013)
Customer relationships	Negative	Dawes (2009)
Loyalty	Negative	Dawes (2009)
Customer satisfaction	Positive	Clemes <i>et al.</i> (2008), Dapkevicius and Melnikas (2009)
	Negative	Malik <i>et al.</i> (2012)
	Inverted U-shaped relationship	Campo and Jesús Yagüe (2009)
	Non-significant	Mahmud and Jusoff (2013), Pedraja Iglesias and Jesus Yagüe Guillén (2004)
Purchase behavior	Positive	Liu (2015)

**Table II.**  
Effect of pricing strategies

Payment Platform provides a rich research background to analyze the impact of knowledge product pricing strategies. Due to the intangibility, inseparability and heterogeneity of knowledge service product (Wu and Lu, 2018), its price is usually more difficult to evaluate (Matzler *et al.*, 2006). Therefore, in the context of knowledge payment, it is necessary to re-validate the above findings. In particular, the research conclusions on the relationship between the price of knowledge products and customer satisfaction are conflicting, so it's necessary to explore the relationship more rigorously.

In addition, it is worth noting that most of the previous literature analyzed price differences among different sellers. In the context of knowledge payment, price differences exist not only among sellers, but also within sellers because of the diversity of knowledge payment services. Different services have their unique attributes, including length, timeliness and channels, which expand the choice space of knowledge demanders. Research indicates that price differences among services provided by knowledge suppliers can significantly reduce knowledge demanders' satisfaction (Wu and Lu, 2018). However, the causes of price differences among paid products within sellers, and their possible effects on sales performance, customer retention rate and the optimal range of price differences among products have not been explored in depth.

In view of the drawbacks of existing research discussed above, the following key research issues deserve further exploration:

- RQ1. What is the impact of the knowledge products' price, especially how price affects customer satisfaction?
- RQ2. What are the causes, effects and the best range of price differences among different products within the same knowledge supplier?

### 3.2 Influencing factors of sales performance

The knowledge supplier as a social professional has valuable knowledge and skills and plays an important role in the knowledge payment platform. The active participation of knowledge suppliers is the key to the success of online knowledge communities (Wang *et al.*, 2017). However, the development stage of content-side lags behind that of platform-side, and thus establishing ecology is the development focus of the current knowledge payment platform (Iresearch, 2018). Studying the influencing factors of sales performance will help platform designers and decision makers to better maintain and build the platform.

Previous research scholars have analyzed the impact of various functions of website design on sales performance. For example, Facebook's thumbs-up function significantly improves sales performance (Lee *et al.*, 2015). Online feedback system reduces the negative impact of information asymmetry (Aggarwal *et al.*, 2012) and thus promotes sales (Chevalier and Mayzlin, 2006; Chintagunta *et al.*, 2010; Dhar and Chang, 2009). In addition, the influence of user's own characteristics on sales performance has also been studied. For example, user capabilities and technical capabilities promote performance by mutual compensation (Serrano and Karahanna, 2016). The trustworthiness reflected by user ability, reputation and benevolence is positively correlated with the number of physician's orders (Yang *et al.*, 2018). Other researchers have analyzed it from the perspective of consulting products, and found that higher consulting prices can reduce patients' perceived risk, thereby improving doctors' online sales performance (Yang *et al.*, 2018). The diversity of consulting services provides more information about experts for knowledge demanders, reducing the perceived uncertainty, and thus improves service utilization (Wu and Lu, 2018). Guo carried out research from the perspective of social relationship and found that weak ties

can bring economic and social returns to experts, but strong ties mediate the impact of some weak ties (Guo *et al.*, 2018). Table III shows the main influencing factors of sales performance from the four research perspectives.

In the past, many vertical fields such as online health consultation were studied, but now the paid Q&A platforms are mostly integrated platforms. Accordingly, it is necessary to further explore whether there are differences in the influencing factors among different fields. Besides, the new paid Q&A platforms give knowledge suppliers more new decision-making tools (such as “free listening” and “top setting”). It is imperative to explore the impact of these decision-making tools on sales performance.

In view of the drawbacks of existing research discussed above, the following key research questions deserve further exploration:

*RQ3.* Does price have different impact on sales performance in different service areas?

*RQ4.* How do new decision-making tools (such as “free listening” and “top setting”) affect the sales performance?

### 3.3 Effect of financial incentive

Previous Q&A platforms were mostly free, only involving free knowledge sharing. Researchers have summarized three main motivation factors for knowledge sharing: intrinsic, social and extrinsic (Jin *et al.*, 2013). In the context of knowledge payment, studying the impact of financial incentive which belongs to external incentives becomes extremely essential. Thus, compared with previous free Q&A platform, whether the financial incentive plays a dominant role in knowledge sharing needs to be further explored.

Previous research involving the online Q&A community (Lou *et al.*, 2013) and the open source software community (Roberts *et al.*, 2006) found that financial incentive significantly affected the knowledge sharing behavior. Wang *et al.* found that there was concave-down-increase causal relationship between financial incentive and knowledge sharing (Wang *et al.*, 2017) by analyzing Good Doctor website. Therefore, there are contradictions and conflicts in the relevant research results about the impact of money incentives on knowledge contribution. It is necessary to control the irrelevant variables and re-study the relationship in the context of knowledge payment.

Specifically, experts’ knowledge sharing behavior mainly focuses on the way to answer questions (e.g. the number, quality, length and speed of answers). Previous literature has explored the impact of financial incentive on the way of answering, but caused dispute on the conclusions.

Research perspectives	Main factors	Articles
Functions of website design	Thumbs-up function Online feedback system	Lee <i>et al.</i> (2015) Aggarwal <i>et al.</i> (2012), Chevalier and Mayzlin (2006), Chintagunta <i>et al.</i> (2010), Dhar and Chang (2009)
User’s own characteristics	User capabilities Technical capabilities Trustworthiness	Serrano and Karahanna (2016) Serrano and Karahanna (2016) Yang <i>et al.</i> (2018)
Knowledge payment products	Consulting prices	Yang <i>et al.</i> (2018)
Influencing factors of sales performance	Diversity of consulting services	Wu and Lu (2018)
	Social relationship Weak and strong ties	Guo <i>et al.</i> (2018)

**Table III.**  
Influencing factors of sales performance

Financial incentive increases the number of best answers (Hsieh *et al.*, 2010; Song *et al.*, 2014) and improves the overall quality of answers as well (Harper *et al.*, 2008; Zhao *et al.*, 2018; Song *et al.*, 2014). However, when all the answers' scores are used, the financial incentive positively affects the quality of the answers (Harper *et al.*, 2008; Hsieh and Counts, 2009). When the single best answer is used, the financial incentive had no significant effect on the quality of the answers (Chen *et al.*, 2010). In addition, Harper and other scholars have found that Q&A based on payment has better and longer quality answer (Harper *et al.*, 2008; Janes *et al.*, 2001) (Hsieh and Counts, 2009). However, the more money rewards, the longer the answer in Mahalo Answers, but no improvement in quality (Hsieh *et al.*, 2010; Zhao *et al.*, 2018; Jeon *et al.*, 2010). In addition, increased response speed of knowledge suppliers can significantly improve user experience, thereby improving the participation of Q&A websites. Due to financial incentive, Zaihang-Yidian and Whale respond faster than most free Q&A platforms, while still slower than Yahoo Answers with mode of crowdsourcing (Jan *et al.*, 2018). However, the average response time of a new crowdsourcing channel in Zaihang-Yidian is even faster than Yahoo Answers (Jan *et al.*, 2018; Jeon *et al.*, 2010; Zhu *et al.*, 2016). But some studies have shown that although payment reduces response latency, it has no significant effect on response quality (Chen *et al.*, 2010; Jeon *et al.*, 2010; Hsieh *et al.*, 2010). The effect of financial incentive is shown in Table IV.

Furthermore, other literatures have conducted research from the perspectives of the quality of questions, customer retention rate, and even non-motivated participation behavior. For example, financial incentive improves the quality of questions (Hsieh *et al.*, 2010; Hsieh and Counts, 2009). Financial incentive plays an important role in initiating users, but can't guarantee their continued participation (Raban, 2008). For the non-incentive participation behavior, Yan *et al.* found that in Zhihu financial incentive significantly affects the non-incentive online engagement behavior such as voluntary knowledge sharing and social engagement, but has no significant impact on users' knowledge seeking behavior (Yan *et al.*, 2018). In the Open Source Software community, developers who pay to join are found involving more than their unpaid counterparts (Roberts *et al.*, 2006).

However, previous studies on financial incentive were mostly based on paid Q&A platforms such as Google Answers and Mahalo Answers (Chen *et al.*, 2010; Hsieh *et al.*, 2010; Lee *et al.*, 2013, 2012). In most of these paid Q&A platforms, knowledge demanders are the price makers, aiming to motivate knowledge suppliers to improve their response speed and quality, which is contrary to the pricing model in the context of new emerging knowledge payment. Besides, both knowledge demander and supplier can get benefits due to the eavesdropping mechanism. Hence, it's essential to analyze the effect of financial incentive under the premise of pricing by the knowledge supplier.

Main factors	Influence direction	Articles
Knowledge sharing behavior	Positive	Roberts <i>et al.</i> (2006), Lou <i>et al.</i> (2013)
	Concave-down-increase	Wang <i>et al.</i> (2017)
Number of best answers	Positive	Hsieh <i>et al.</i> (2010), Song <i>et al.</i> (2014)
Length of answers	Positive	Janes <i>et al.</i> (2001), Harper <i>et al.</i> (2008), Hsieh and Counts (2009), Hsieh <i>et al.</i> (2010), Jeon <i>et al.</i> (2010), Zhao <i>et al.</i> (2018)
Quality of answers	Positive	Janes <i>et al.</i> (2001), Harper <i>et al.</i> (2008), Hsieh and Counts (2009), Song <i>et al.</i> (2014), Zhao <i>et al.</i> (2018)
	Negative	Chen <i>et al.</i> (2010), Hsieh <i>et al.</i> (2010), Jeon <i>et al.</i> (2010), Zhao <i>et al.</i> (2018)
Response speed	Positive	Jan <i>et al.</i> (2018)

**Table IV.**  
Effect of financial  
incentive

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In view of the drawbacks of existing research discussed above, the following key research questions deserve further exploration:

- RQ5. How does financial incentive affect the quality, length and speed of answers in a paid Q&A platform?
- RQ6. How does financial incentive affect the quality of questions in a paid Q&A platform?
- RQ7. How does financial incentives affect the sustained participation of knowledge demanders and suppliers in a paid Q&A platform?

#### 4. Key research issues of knowledge demanders

##### 4.1 Influencing factors of question popularity

In April 2017, Zhihu launched a sub-product “Zhi”. In Zhi, the price of information consulting service is set by the knowledge suppliers, and the knowledge demanders freely choose the knowledge suppliers to put questions publicly or privately. It should be noted that questions publicly asked can be eavesdropped by other users by just paying 1 yuan (approximately equivalent to \$0.14). The eavesdropping fee will be shared equally by the knowledge suppliers and demanders, which allows good questions to generate afterwards revenue. Therefore, a good enough question has an opportunity to attract enough eavesdroppers to compensate for the initial costs, and even earn additional benefits (Jan *et al.*, 2018).

Most of the previous literatures analyzed the evaluation indicators or criteria for the quality of answers. Through the analysis of the best answers on Yahoo Answers, it is found that content, cognition, social emotion, exterior, information source, utility, general statement, attitude and expertise (Kim *et al.*, 2007; Jeon and Rieh, 2014) affect the quality of answers. Zhu *et al.* developed a framework for evaluating the quality of answers in e-learning Q&A websites, including 13 dimensions such as informativeness, politeness, completeness, readability, relevance, conciseness, authenticity, level of detail, originality, objectivity, novelty, usefulness and expertise (Zhu *et al.*, 2009). Paul *et al.* used the number of votes obtained by the answer as a quality signal in the social Q&A community (Paul *et al.*, 2012). Jin *et al.* also analyzed the popularity of the answers and found that the number of pictures in the answers increased their popularity, but the influence of the number of words was non-linear (Jin *et al.*, 2017).

However, few scholars analyze the prevalence of the question itself. In the context of paid Q&A, the form of answer is replaced by text with voice. As a result, users can not know any information about the answer before paying money and thus the influence of the answer on the popularity of the question is limited to a certain extent and the amount of eavesdropping income is largely determined by the popularity of question. Therefore, the study of question popularity is very important for the income and sustainable use of knowledge suppliers and demanders. However, the influencing factors of the popularity have not been explored. We don't know whether the popularity of the questions is also affected by the series of indicators related to the quality of answers mentioned above.

In view of the drawbacks of existing research discussed above, the following key research questions deserve further exploration, including:

- RQ8. What are the factors influencing the popularity of questions in paid Q&A?

##### 4.2 Influencing factors of knowledge payment behavior

For knowledge payment service suppliers, knowledge payment behavior is critical to their survival and success (Zhang *et al.*, 2017c). However, unlike other C2C platforms, Q&A services

are more like experience goods. Knowledge demanders can neither predict the quality of answers in advance, nor obtain any product information other than price. Therefore, knowledge demanders must face serious information asymmetry problem, and may not be able to identify the true quality of knowledge suppliers before making purchase decisions. Over the past few years, the consumption of online services and digital content has increased significantly. A lot of scholars have analyzed the user's payment behavior from product, supplier, demander and platform design perspectives, as shown in Table V (Jia and Tong, 2015).

From the product perspective, one study suggests that price has a directly positive effect on the purchase behavior of online health consulting (Liu and Ye, 2015; Yang et al., 2018) and mobile data services (Shuyler and Knight, 2003; Li et al., 2017). The price of paid answers positively regulates the relationship between user trust and purchase decisions (Zhao et al., 2018). And perceived value of online content products and services such as music was found to be an important factor in purchase decisions (Li et al., 2017; Katz and Moyer, 2004).

Because of the uncertainty of services and digital content products, users need to seek information other than services and products themselves to reduce risk. From the perspective of knowledge suppliers, both quality of service and electronic word-of-mouth had a positive impact on knowledge demanders' decision-making (Cao et al., 2017; Duan et al., 2008; Pan, 2018; Chevalier and Mayzlin, 2006; Ye et al., 2011). Zhao proposed that reputation, ability and integrity of knowledge suppliers have positive effects on purchase decision-making, while benevolence doesn't (Zhao et al., 2018). In the context of paid OHCs, patients regard perceived quality based on exposed information about doctors' abilities as an important basis for payment decision-making (Yang et al., 2018; Liu and Ye, 2015).

From the perspective of knowledge demanders, task-driven and subjective norms are found to be important factors affecting online knowledge payment behavior (Li et al., 2017). Zhang found that utilitarian value (including uniqueness and

Research perspectives	Main factors	Influence direction	Articles
Knowledge payment products	Price	Positive	Shuyler and Knight (2003), Liu and Ye (2015), Li et al. (2017), Yang et al. (2018), Zhao et al. (2018)
	Perceived value	Positive	Katz and Moyer (2004), Li et al. (2017)
Knowledge suppliers	Quality of service and electronic word-of-mouth	Positive	Chevalier and Mayzlin (2006), Duan et al. (2008), Ye et al. (2011), Cao et al. (2017), Pan (2018)
	Reputation, ability and integrity	Positive	Zhao et al. (2018)
	Benevolence	Negative	Zhao et al. (2018)
Knowledge demanders	Perceived quality	Positive	Liu and Ye (2015), Yang et al. (2018)
	Task-driven and subjective norms	Positive	Li et al. (2017)
	Utilitarian value and hedonic value	Positive	Zhang (2017)
	Perceived risk	Negative	Zhang (2017)
	Perceived unfairness	Negative	Wang et al. (2005)
	Free mentality	Negative	Lin et al. (2013)
Platform design	Convenience	Non-significant	Li et al. (2017)
	Interactivity	Positive	Wang et al. (2005)
	Accessibility	Positive	Wolk and Theysohn (2007)
		Positive	Wolk and Theysohn (2007)

**Table V.**  
Influencing factors of  
knowledge payment  
behavior

convenience) and hedonic value (including curiosity and flow) are significantly positively correlated with readers' purchase intention of e-books, while perceived risk slightly negatively affects it (Zhang *et al.*, 2017c). In addition, perceived unfairness negatively affects the willingness to subscribe Web content (Wang *et al.*, 2005). Lin *et al.* also found that free mentality has a negative impact on the willingness to pay for online music services (Lin *et al.*, 2013), while Li *et al.* verified it has no significant impact on knowledge purchase behavior (Li *et al.*, 2017).

From the perspective of platform design, scholars point out that users' perceptions of convenience (Wang *et al.*, 2005), interactivity (Wolk and Theysohn, 2007) and accessibility (Wolk and Theysohn, 2007) are positively correlated with their willingness to pay for online content or services.

In addition, researchers have also analyzed the moderating factors affecting online content and service purchase behavior. The determinants of online music payment decisions are different between actual purchasers and potential purchasers (Chu and Lu, 2007). Punj *et al.* found that the willingness to pay for online digital content is related to age and gender (Punj, 2015).

Although lots of studies have been carried out on the driving factors of online content and service payment behaviors, there is still a lack of pertinent literature on online knowledge payment service. Consumers can find a lot of information from the paid Q&A communities, but researches have not yet explored how knowledge demanders process this information and how this process affects purchase behavior. It is important to explore the influencing factors of user purchase decision in knowledge payment platform, and introduce more valuable moderating variables for a more comprehensive analysis (Zhao *et al.*, 2018).

In view of the drawbacks of existing research discussed above, the following key research questions deserve further exploration:

- RQ9. How does the free mentality of knowledge demanders affect knowledge payment behavior?
- RQ10. Does the diversified marketing design provided by the knowledge payment platform (e.g. "free listening" and "top setting") affect the knowledge payment behavior?
- RQ11. What are the different influencing factors of purchase behavior between questioners and eavesdroppers in the paid Q&A platform?

## 5. Key research issues of knowledge payment platform

### 5.1 Influencing factors of continuance usage

The research on continuance of information technology has made tremendous progress in recent years, among which the expectation-confirmation theory model is widely used. People use information technology with expectations, and if satisfied with the system, they will continue to use (Ruth, 2012). Ambalov *et al.* summarized the strength and validity of the relationship in the expectation-confirmation model in the relevant literature (Ambalov, 2018).

One characteristic of knowledge is a positive feedback, that is, the more knowledge one acquires, the more one needs new knowledge, which to some extent means the continuance of the knowledge payment business model (Cellary, 2010). However, due to the Internet users' multi-membership of different communities, member turnover is still very high, and thus it is difficult for any online community to guarantee member commitment (Joyce and Kraut, 2006). Therefore, continuance has become an important challenge for online knowledge communities (Wasko and Faraj, 2005; Dholakia *et al.*, 2004; Galehbakhtiari, 2015; Lai and Chen, 2014;

Ridings and Gefen, 2004; Yan *et al.*, 2016). Some scholars have analyzed the influencing factors of continuance from the perspectives of outcome expectation, user participation behavior, incentive mechanisms, lurkers and environmental factors, as shown in Table VI.

From the perspective of outcome expectation, the cognitive factors of expectation (Zhou, 2018) such as hope and regret (Ding, 2018) have an impact on users' continuance usage. The effect of hope on continuance usage is insignificant in the first use, but becomes significant later (Ding, 2018).

From the perspective of user participation behavior, it is found that free activity in paid Q&A websites significantly improves satisfaction and continuance usage (Ruth, 2012). User's knowledge seeking behavior (Yan *et al.*, 2018) and community's response (Donovan *et al.*, 2014) affect the newcomers' future participation to some extent. In addition, many researchers have found that social interaction affects user generated content behavior (Ren *et al.*, 2012) and significantly impacts continuance usage (Yang *et al.*, 2016; Zhang *et al.*, 2017a, 2017b, 2017d, 2017e). However, Zhou didn't find a significant relationship between social interaction and continuance usage (Zhou, 2018).

From the perspective of incentive mechanisms, if the answerer is rewarded for answering questions, he or she will prefer to answer more questions positively (Cavusoglu *et al.*, 2015). Awarding points (Farzan *et al.*, 2008; Harper *et al.*, 2007), social comparisons (Harper *et al.*, 2007), level titles (Khusro *et al.*, 2017), money (Khusro *et al.*, 2017) and granting site privileges (Khusro *et al.*, 2017) are used to motivate long-term participation of community members (Khusro *et al.*, 2017).

From the perspective of lurkers, some scholars demonstrate that the biggest challenge to promote the sustainable development of knowledge payment communities is to keep members providing knowledge continuously, but lurkers often occupy a large proportion of online communities (Nonnecke, 2000; Nonnecke and Preece, 2000). In large active communities, the existence of lurkers is admissible. However, if latent behavior is dominant

Research perspectives	Main factors	Influence direction	Articles
Outcome expectation	Hope and regret	Positive	Zhou (2018), Ding (2018)
User participation behavior	Free activity	Positive	Ruth (2012)
	User's knowledge seeking behavior	Positive	Yan <i>et al.</i> (2018)
	Community's response	Positive	Donovan <i>et al.</i> (2014)
	Social interaction	Positive	Ren <i>et al.</i> (2012), Yang <i>et al.</i> (2016), Zhang <i>et al.</i> (2017a), Zhang <i>et al.</i> (2017b), Zhang <i>et al.</i> (2017d), Zhang <i>et al.</i> (2017e)
Incentive mechanisms	Awarding points	Non-significant Positive	Zhou (2018) Harper <i>et al.</i> (2007), Farzan <i>et al.</i> (2008)
	Social comparisons	Positive	Harper <i>et al.</i> (2007)
	Level titles, money, and granting site privileges	Positive	Cavusoglu <i>et al.</i> (2015), Khusro <i>et al.</i> (2017)
Lurkers	Latent behavior	Negative Positive	Rau <i>et al.</i> (2008) Preece <i>et al.</i> (2004)
Environmental factors	Ubiquitous media systems dependency	Positive	Carillo <i>et al.</i> (2017)
	System quality and knowledge quality	Positive	Zhou (2018)

**Table VI.**  
Influencing factors of  
continuance usage

in the community, then communities with little or no posting can't survive (Rau *et al.*, 2008). In the paid Q&A platform, lurkers become eavesdroppers and their status has changed. Although eavesdroppers don't participate publicly, they do seek answers (Preece *et al.*, 2004). Moreover, eavesdroppers who have the tendency and possibility to turn into questioners are also a kind of wealth, which is the same as traditional platforms. But the way that both knowledge demander and supplier share the income of eavesdropping alleviates the hitchhiking phenomenon of the lurkers and encourages users to put questions publicly to a certain degree. Therefore, it is necessary to further explore reasons for users' lurking that whether users are more affected by perceived risks or benefits in the choice of questioning and eavesdropping. Besides, eavesdropping degree can help predict the future revenue of knowledge suppliers in the current knowledge payment platform.

From the perspective of environmental factors, almost all knowledge payment platforms have a mobile and non-mobile version, which enables users to complete tasks and interact smoothly in the ubiquitous digital ecosystem. The ubiquitous media system dependency significantly impacts continuance usage decision (Carillo *et al.*, 2017). The environmental factors of system quality and knowledge quality also help to retain users and promote the sustainable development of the platform (Zhou, 2018).

In view of the drawbacks of existing research discussed above, the following key research questions deserve further exploration:

- RQ12. Does the degree of social interaction affect users' continuance usage of knowledge payment platform?
- RQ13. Does the cost-benefit tradeoff influence the choice of questioning or eavesdropping in paid Q&A platform?
- RQ14. To what extent can eavesdropping predict future revenue of knowledge suppliers?

### 5.2 Market concentration analysis

Most of e-commerce markets are dominated by a few best-selling products, that is, superstar effect. However, the market concentration of knowledge payment industry is still open to debate. A well-known expert often has a key advantage in getting access to client resources. However, Guo *et al.* found that the online health consulting market weakens the influence of celebrity doctors to some extent and optimizes the allocation of medical resources (Guo *et al.*, 2017). However, Yang found that the online health consulting market is more concentrated than the offline (Yang *et al.*, 2018). Li also found the online health counseling market still follows the 20/80 principle basically, that is, about 80 per cent of patients are diagnosed by nearly 20 per cent of doctors (Li *et al.*, 2016). In addition, the top 5 per cent of knowledge suppliers on the Zaihang-Yidian platform have achieved almost 90 per cent of the total profit (Jan *et al.*, 2018).

In addition, it is not clear whether the long tail effect improves the market performance of knowledge payment. Online news payment has a disproportionate impact on electronic word-of-mouth of popular and niche articles, creating a longer tail in content-sharing distribution, and improving overall sales performance consequently (Oh *et al.*, 2013). However, Huang suggested that the long tail power of the online journalism, namely, content diversity, significantly promotes website traffic, but its relationship with financial performance was not as significant as traffic performance (Huang and Wang, 2014). Besides, it can't be ignored that if consumers become more and more accustomed to paying for information goods, the proportion of heavy users will reduce relatively, which will weaken the long-tail mode of content consumption (Oh *et al.*, 2013). Therefore, it is necessary to study the effect of market concentration on market performance under the new situation of knowledge payment.

Although the long tail effect on the overall market performance is not clear, it does improve market efficiency. Some scholars say that when the market is highly concentrated on some well-known experts, the service efficiency of the whole society will be negatively affected (Wun *et al.*, 2010). Through practical observation, it is found that most platforms are carrying out effective strategies to help knowledge suppliers differentiate and build competitive advantages in the online paid Q&A market, aiming at improving market efficiency. To help new knowledge suppliers to market themselves, Zaihang-Yidian allows users to choose “Knowledge Opening Plan” independently, which gives knowledge demanders the right of free listening. And all the Q&A in Whale are free and open to the public on June 26, 2017, which to a certain extent reduces the negative impact of concentration on the knowledge suppliers. In addition, some researchers have proposed that information disclosure mechanisms (e.g. online reputations and self-representation) can be used to balance the supply and demand of medical services and thus reduce the concentration of electronic consultation, thereby improving market efficiency (Li *et al.*, 2016). However, it should be noted that the new knowledge payment market has more abundant online functions (such as “free listening” and “top setting”). Thus, whether the new online functions are conducive to reducing market concentration needs to be studied. Previous studies on market concentration mainly focused on vertical platforms such as online health counseling, while in the context of knowledge payment, most of platforms are comprehensive. The differences of concentration in different service areas deserve to be analyzed.

In view of the drawbacks of existing research discussed above, the following key research issues deserve further exploration:

- RQ15.* How does market concentration affect market performance in the new knowledge payment market?
- RQ16.* Is there a significant difference in the concentration among different areas in the knowledge payment platform?
- RQ17.* Do the new online functions in the knowledge payment platform help to reduce concentration?

## 6. Research conclusions

The field of knowledge payment is expanding and attracting more and more researchers. This paper comprehensively summarizes the development and research context of knowledge payment, which not only helps researchers understand the current status of knowledge payment, but also provides some practical inspiration for knowledge payment website designers and decision makers. It is found that most of the previous studies are limited to the traditional online digital content and service market, while the knowledge payment field is still in infancy. This paper finds that the existing literature often contains contradictory and conflicting research results based on the above literature review. Therefore, to carefully test these research results again is needed. In addition, researchers usually explore research factors independently. In the future, a cohesive theoretical framework should be established to integrate factors and thus provide an understanding of the relative importance of factors. As most of the literature is based on a single environment, generalizability is limited. Therefore, future research on multi-community analysis will help to improve and expand our understanding of knowledge payment communities. Importantly, by studying the relevant literature and analyzing the existing knowledge payment system, this paper puts forward some key issues worth being studied from three perspectives of knowledge supplier, knowledge demander and knowledge payment platform, which provides future research directions and reference for researchers.

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