What Users Trust in Paying-for-knowledge: An Empirical Study of Chinese Online Q&A Community

Xian Hu
School of Information Management, Wuhan University, Wuhan, 430072, China

Ke Wang
School of Information Management, Wuhan University, Wuhan, 430072, China

Jiang Wu
School of Information Management, Wuhan University, Wuhan, 430072, China, jiangw@whu.edu.cn

Recommended Citation

What Users Trust in Paying-for-knowledge:

An Empirical Study of Chinese Online Q&A Community

Xian Hu[1], *Ke Wang*[1], *Jiang Wu*[1*]

[1]School of Information Management, Wuhan University, Wuhan, 430072, China

Abstract: In the era of information explosion, desire for high-quality information has triggered the development of paying-for-knowledge. Even paying-for-knowledge has interesting business model, there are several problems to be solved, and one of the most salient problem is what influences users' payment behaviors. Previous researches indicate that trust is one of the most important factors in paying-for-knowledge. However, the specific influence mechanism of trust remains unknown. In this paper, we tried to estimate the effects of character trust and situational trust. For validating our hypotheses, text analysis and economics are combined in this research. The authors find that competence-based trust, benevolence-based trust and situational trust all have positive effects on consumers' behavior of paying-for-knowledge. The findings are expected to help the sustainable development of paying-for-knowledge.

Keywords: paying-for-knowledge, character trust, situational trust, knowledge sharing

1. INTRODUCTION

Sharing economy refers to the sum of activities that utilize modern information technology to integrate massive decentralized resources and meet diversified needs. The biggest characteristic of it is the separation of ownership and use right. The rapid development of sharing economy has had dramatic impacts on various aspects of today's social economic system [1]. It is estimated that in 2017, the trading volume of China's sharing economy market was about 4920.5 billion yuan, of which 138.2 billion yuan was spent on knowledge and skills learning.

Sharing economy in knowledge and skills learning has developed vigorously, and paying-for-knowledge has become the mainstream mode. For the demand side, in the era of information explosion, desire for high-quality information has triggered strong motivation for learning. Paying-for-knowledge platforms integrate diverse knowledge contents and provide users with a way to improve themselves. For suppliers, the paying-for-knowledge platforms provide channels for publishing high-quality contents and liquidate their knowledge products and services. At the same time, the improvement and popularity of mobile payment also promote the development of paying-for-knowledge. In 2016, There was an outbreak of paying-for-knowledge in China. A large number of paying-for-knowledge platforms have emerged. By 2020, the scale of paying-for-knowledge industry will reach 23.5 billion yuan.

In the development of paying-for-knowledge, it also encounters twists and turns. For content demanders, most users are used to the free internet business model for a long time, so they have not yet formed a stable payment habit. For content providers, high-quality contents require investment of time, energy and even money. Some content producers face the dilemma that income can't cover outlay, which leads to the loss of content contributors of knowledge products. As far as the platforms are concerned, the internet demographic dividend has disappeared. Traditional business model that depends on large-scale users to achieve profitability encounters bottlenecks, which makes the outlook of paying-for-knowledge grimmer. Therefore, it is of great significance to study the influencing factors of users' willingness to pay for knowledge. The research results will contribute to

---

[*] Corresponding author. Email: jiangw@whu.edu.cn (Jiang Wu)

the retention of knowledge providers and activation of knowledge consumers, making knowledge products profitable, and ultimately promoting the sustainable development of paying-for-knowledge industry.

At present, user generated knowledge products have not been popularized in foreign countries, so there are few related researches. Domestic researches are also in early phase. Scholars study the influencing factors of users' paying-for-knowledge behavior mainly from the perspective of perceived value[2], trust, cost, social capital[3] of knowledge providers and so on. Previous studies have shown that among these factors, trust has the greatest impact on users' intention to pay for knowledge[4], but the specific mechanism of trust remains to be explored.

Knowledge products derive from social communities such as Zhihu and Weibo is one of the mainstream forms of paying-for-knowledge. Compared with the specialized paying-for-knowledge platforms such as Himalaya and I get, community platforms accumulate richer personal information and historical behavior data of knowledge providers. Before purchasing knowledge products, based on description of products, and attributes of suppliers, users can infer quality of this product, and further decide whether to purchase. On the basis of trust theory, this paper combines character trust and situational trust to construct the influence factors model of users paying-for-knowledge. We validate the model with crawled Zhihu-live data. The research results will help to understand user behavior of paying-for-knowledge in social communities, provide suggestions for knowledge providers and paying-for-knowledge platforms.

2. TRUST THEORY

The trust concept has been proposed in a number of fields, including management, information systems, marketing. In management science, Rousseau et al. define trust as "a psychological state that trustors are willing to expose their weaknesses and believe the service provider will fulfill its promises. Neither the intention nor the action of the trustee will harm the interests of the trustor." Trust can be considered as a way of assessing the transaction risk[5]. Trust has been found to be a key factor in many social and economic interactions with high levels of uncertainty and dependency[6].

It exists different forms of trust to address different types of problems and mitigate risks in certain conditions. Trust can be divided into different types, most of which are based on interpersonal trust. This kind of trust is closely associated with the intrinsic credibility of a trustee[7]. So, it is called character trust. Mayer et al[8] divides this kind of trust into three separate types: competence-based trust, benevolence-based trust and integrity-based trust. Competence refers to the ability to realize promises, which develops when the individual holds adequate knowledge, expertise, skills, leadership, and other characteristics in related domains. Benevolence is trustee's kind attitude that are sincerely concerned about customers' interests and have the motivation to fulfill their promises. And integrity is the adherence to a set of sound principles. But it is not easy to distinguish benevolence from integrity, because there is a correlation between them. Therefore, drawing on Das and Teng[9], this research identifies competence and benevolence as the core elements of character trust.

In addition to the trustees' characteristics, trust will also be affected by laws, regulations or other control systems in the trading environment, namely situational trust[10]. Specifically, situational trust mainly comes from institutional trust and quadratic trust. The former one occurs when a trustor believes that the trading environment has strong constraining force. Secondly, when there are commonly accepted norms in the trading network, trustees will as well strive to maintain these norms. Such maintenance includes punishing members who violate the rules or punishing members who tolerate the violations. Then, it will generate quadratic trust[11].

Trust is a core element in online transactions. It has been recognized as an important factor for consumers to purchase different types of products. In online Q&A communities, paying for knowledge takes place with both knowledge products and merchants being involved. We thus construct our research model from a

comprehensive perspective by including character trust and situational trust.

3. HYPOTHESIS DEVELOPMENT AND RESEARCH MODEL

3.1 Character trust and paying for knowledge
3.1.1 Competence trust

Competence trust is measured by consumers' perception of whether the knowledge providers have adequate expertise and skills to satisfy their needs. Previous researches have confirmed that competence-based trust have significant positive effect on consumers' purchase intention[6]. Similarly, in knowledge creation and transfer, competence-based trust is especially important for the recipient of tacit knowledge[12]. In online Q&A communities, users volunteer to answer questions they are interested in or good at. Generally speaking, if they provide more high-quality answers, they will attract more fans. The number of fans can reflect the overall knowledge level of content providers. In addition, knowledge products are knowledge sharing in specific areas. Consumers are inclined to have faith in products providers who have specialized knowledge[13]. So, consumers need to judge whether the supplier has expertise in related fields. If the knowledge supplier has answered related questions, it can help users to solve this problem. If past answers from a supplier are relevant to his or her current knowledge products, it indicates that the knowledge supplier has professional knowledge in this field. Under this circumstance, it is more likely for knowledge providers to provide high-quality knowledge products. In the light of this discussion, then, it is hypothesized that:

H1a: The overall knowledge level of providers has a significant positive influence on users' behavior of paying for knowledge.

H1b: The professional knowledge level of providers has a significant positive influence on users' behavior of paying for knowledge.

3.1.2 Benevolence trust

Benevolence can be interpreted as the belief that a trustee will take the welfare of trustors into account, even though he has no obligation to do so. For example, a supplier is likely to be trusted for his free contribution to communities. Researches indicate that benevolence of suppliers will significantly influence the purchase intention of consumers[14]. In online Q&A communities, users volunteer to answer a large number of questions, share experience and knowledge with others. If a knowledge provider actively answers other users' questions, it can be seen as altruistic behavior. Specially, interactive mechanism is one of the main characteristics of live-based knowledge products. Consumers can interact with suppliers to ask questions about live content, knowledge application, suggestions and so on. Frequent interactions mean suppliers are willing to help consumers understand the knowledge more deeply. McKnight and Kacmar[15] argue that active interaction indicates sellers' benevolent attitude, which contributes to developing trust. Although the quality of knowledge products is difficult to be evaluated before consumption, product description given by knowledge providers helps to comprehend the topic and content of knowledge products. Prior research shows that providing sufficient information is a key activity for enhancing consumers' judgment about the firm's competence and shaping a corporate image of integrity and benevolence[16]. The longer the description text of the product is, the more effective information it covers. It helps consumers to deepen their understanding of the product and reduce the uncertainty of the purchase behavior. Knowledge providers who are dedicated to give detailed product description in an active manner signal their good intentions. Therefore, we hypothesize that the following:

H2a: The community contribution behavior of providers has a significant positive influence on users' behavior of paying for knowledge.

H2b: The interactive behavior of providers in service has a significant positive influence on users' behavior of paying for knowledge.

H2c: The description length of knowledge products has a significant positive influence on users' behavior of paying for knowledge.

3.2 Situational trust and paying for knowledge

Situational trust originates from a trustor's calculation of transaction conditions. When there are environmental constraints, the trustor will be more inclined to trust merchants. Recent evidence suggests that online reviews can help consumers identify the credibility of product information. On the one hand, due to the existence of comment systems, when product quality is far from expectations, users can submit a negative review. Research shows that negative reviews have a great impact on consumers[17]. Knowledge providers will try to avoid negative reviews and provide knowledge products of higher quality. On the other hand, word-of-mouth generated from consumer reviews is an emerging independent product information resource with growing popularity and importance. It reduces the uncertainty of products quality and improves consumers' perceived credibility[18]. If a community has a fair rating system, the behavior of knowledge providers will be constrained by the community environment. By providing high-quality products, knowledge providers will be able to get higher product rating score and attract more consumers. So, we propose the following hypothesis:

H3: Consumers' rating score of knowledge products has a significant positive influence on users' behavior of paying for knowledge.

4.   RESEARCH DESIGN

4.1 Data corpus

Zhihu is the largest online Q&A community in China. Apart from the free knowledge sharing, Zhihu also provides contents such as Zhihu-live, e-books and online consulting, for which users need to pay a certain amount of money. Zhihu-live is a kind of live lectures. Hosts share their knowledge with paid audiences under a specific topic. There are 14 topics ranging from daily life to work. After eliminating records with missing values, this paper finally gets 3 376 live lectures, 1 328 knowledge providers and 23 7276 questions answered by all live hosts. On November 12, 2017 and December12, 2017, we crawled detailed information.

Figure 1 presents a snapshot of a Zhihu-live's homepage and a member's homepage. There are three types of information: live information, a host's personal information and feedback information. Live information, such as price, title and description, was provided by the host. This kind of information will not change in a short time. If a consumer is interested in this live or host, he can click on the link to the homepage of this host. His behaviors on Zhihu, including answers provided, personal profile and number of followers are provided. Feedback information refers to other users' responses to this live, such as rating score and comments.

Figure 1.   A snapshot of a Zhihu-live's homepage and a member's homepage

4.2 Variables description and measurement

As stated in section 3, there are one dependent variable and six independent variables. The indicators in the previous month are taken as independent variables, and the number of new participants in a live within one month is employed as dependent variables. Table 1 represents the variable description from our study.

Table 1.   Variable description

Dimensions	Variable	Measurements	Description
Dependent variable	SeatsAdd	SeatsAdd	The number of users attend a live in a month
Competence trust	Overall knowledge level	Follower	The number of followers of knowledge providers
	Professional knowledge level	Relevance	The maximum similarity value of Zhihu-live description and questions answered
Benevolence trust	Community contribution behavior	AnswerCount	The quantity of questions answered by knowledge providers
	Interactive behavior	MessageCount	The quantity of questions answered in the Zhihu-live lecture
	Description length of products	DescLen	The text length of the Zhihu-live description
Situational trust	Rating score	Score	The average rating score of the Zhihu-live

We get description texts of all Zhihu-live products and texts of all questions answered by live hosts. Firstly, we segment all the texts and remove the stop words. Then, we use Word2vec to train all the texts so as to represent every word into a vector. Meanwhile, the Zhihu-live description text is matched with the question text by the ID of live host. Then the cosine similarity between the two texts is calculated. Since the average number of answered questions is 234, this paper takes the maximum value to represent the relevance between questions and a knowledge product.

5.   ANALYSIS AND RESULTS

5.1 Summary statistics and correlation analysis

Summary statistics of those variables in this research are shown in Table 2. SeatsAdd is the dependent variable, which indicats the increase number of users participating in Zhihu-live within a month. Because the standard deviation of variables, including SeatsAdd, Follower, AnswerCount, MessageCount and DescLen is larger than normal standard, they are taken logarithmic transformation and then put into the regression model.

Table 2.   Summary statistics

	N	Min	Max	Mean	Std.Dev
SeatsAdd	3376	0	2011	29.78	87.16
Follower	3376	0	1464266	50573.36	121820.40
Relevance	3376	0	0.9538321	0.80	0.09
AnswerCount	3376	0	5418	234.02	76.32
MessageCount	3376	0	1404	125.76	76.32
DescLen	3376	74	1447	523.51	177.46
Score	3376	0	5	4.22	1.01

A correlation matrix of independent variables is examined, as shown in Table 3. VIF value is shown in the last line. The maximum correlation coefficient is 0.49, which indicates that there is no significant correlation between variables. All VIF values are less than 2, which indicates the absence of multicollinearity. So, it is suitable to construct the regression model.

Table 3. Correlation analysis

	1	2	3	4	5	6
1 Follower	1.00					
2 Relevance	0.07	1.00				
3 AnswerCount	0.03	0.04	1.00			
4 MessageCount	0.49	0.23	0.04	1.00		
5 DescLen	-0.09	0.07	0.09	-0.09	1.00	
6 Score	0.03	0.18	0.20	0.04	0.07	1.00
VIF	1.32	1.07	1.39	1.05	1.03	1.05

5.2 Estimation results

Because the dependent variable, SeatsAdd, is a count variable with its variance being significantly greater than mean, we use the negative binomial regression model to estimate coefficients in the model. The regression model is shown in Equation (1), in which category tag, price and number of days after a product's first release are taken as controlled variables. Since the tag of Zhihu-live is a category variable and contains 14 categories, we convert it into dummy variables. The result shows that dependent variable can be explained by these independent variables because pseudo R-square is 0.436.

$$LnSeatAdd = \beta_0 + \beta_1 LnFollower + \beta_2 Relevance + \beta_3 LnAnswerCount + \beta_4 LnMessageCount$$
$$+ \beta_5 LnDescLen + \beta_6 Score + \beta_7 Fee + \beta_8 Days + TagDummy_i + \varepsilon \tag{1}$$

The estimation result of Equation (1) are showed in table 4.

Table 4. Model parameters estimation

	Coefficient	Standard Error	p-value
LnFollower	0.084***	0.008	0.000
Relevance	0. 468**	0.165	0.005
LnAnswerCount	-0.061***	0.012	0.000
LnMessageCount	0.177***	0.020	0.000
LnDescLen	0.009**	.034	0.011
Score	0.151***	.014	0.000
Fee	-.003***	.001	0.000
Days	-0.002***	.000	0.000
TagDummy	√	√	√

*** p<0.001;**p<0.01;* p<0.05

The impact of competence-based trust on users' paying-for-knowledge-behavior includes two dimensions: overall knowledge level and professional knowledge level. The estimation result shows that LnFollower ($\beta=0.084$, p=0.000) has a significant positive influence on Zhihu-live participants. It indicates that knowledge celebrities can attract more users to pay for their knowledge content, and to some extent, paying-for-knowledge is a kind of fan economy. Consumers will refer to the knowledge level and social influence of knowledge providers when making knowledge payment decisions. The higher the knowledge skill level is, the more likely users will be to purchase knowledge products. Relevance ($\beta=0.468$, p=0.005) has a significant positive impact on Zhihu-live participants. It means that users will browse the history of question answering by the Zhihu-live hosts in the Q&A community to assist decision-making. The relevant questions are of great importance for consumers to estimate the professional level of knowledge providers. Users care about the knowledge level of knowledge providers, especially professional skills. Therefore, hypothesis H1a and hypothesis H1b are verified.

The impact of benevolence-based trust on users' paying for knowledge behavior includes knowledge contribution behavior, interactive behavior and the length of descriptive text. Contrary to expectation,

LnAnswerCount (β= 0.468, p = 0.005) has a significant negative effect on Zhihu-live participants. One possible explanation is that the more questions the knowledge supplier answers, the more information consumers can get from them. Under this circumstance, it is more likely for consumers to get enough information from free answers, thus reducing the willingness to pay for additional knowledge products. So, hypothesis H2a is not supported. LnMessageCount (β=0.177, p=0.000) and LnDescLen(β=0.009, p=0.011) have significant positive effects on Zhihu-live participants, supporting H2b and H2c. Interactive behavior in the process of knowledge sharing and detailed product descriptions contribute to the formation of benevolence-based trust, which is one of the most import factors in online transactions.

H3 estimates the effect of situational trust on consumers' willingness to pay for knowledge. It mainly includes the rating score of Zhihu-live. The results show that the Score (β = 0.151, P = 0.000) has a significant positive impact on Zhihu-live participants, supporting H3a. The purchase of knowledge products is similar to other commodities. Consumers evaluate product quality according to its rating score. Consumers are allowed to post their comments after consumption. However, it is up to them to decide whether or not to post a positive review. Participants increase with the increased rating score of Zhihu-live.

In conclusion, H1a, H1b, H2b, H2c, H3 are supported, and H2a is rejected. The competence-based trust, benevolence-based trust and situational trust all have positive effects on consumers' behavior of paying-for-knowledge. The purchase of knowledge products is not only influenced by the features of products, but also by the characteristics of knowledge providers.

6.   CONCLUSIONS AND IMPLICATIONS

Previous researches have indicated that trust is one of the most important factors in paying-for-knowledge. This paper explores the specific influence mechanism of trust. We conduct a data-driven study using real world data from Zhihu.com to estimate the effects of character trust and situational trust. We try to help understand consumer behavior in paying-for-knowledge industry.

Specifically, the key theoretical implications can be summarized into three aspects. First of all, it is quite possible that the turning point of the "free internet" era is coming. This research helps to understand a kind of online payment behavior. Secondly, previous researches about trust theory in information systems mainly include three aspects: competence, benevolence and integrity. This paper integrates situational trust in economics into it, and expands the concept of trust model. Finally, considering the characteristics of online Q&A communities, this paper considers the impact of historical answers on consumers' willingness to pay for knowledge by text mining. It provides a reference for the related researches on paying-for-knowledge and online Q&A community.

Our results provide several important managerial implications to promote the development of paying-for-knowledge in practice. There are four suggestions for knowledge providers. First, they should pay attention to build personal brand and enrich their knowledge and professional skills. Second, it is better for knowledge providers to answer relevant questions on related topics to demonstrate competence and gain trust from users. However, they need to strike a balance between the quantity and quality of answers. Because if consumers find the target information in historical answers, they wouldn't pay extra money for that. Third, providers should also provide more detailed information to potential consumers, which contributes to building trust, eliminating risk and ultimately leads to more orders. Finally, in the process of knowledge sharing, providers should better behave more actively to interact with consumers and solve their interested questions, otherwise, consumers will likely feel that the knowledge provider is not benevolent enough and may seek out a different product. For platform managers, they should pay attention to the perfection of customers' rights protection. It can improve consumers' confidence in the platform and community norms. The feedback

mechanism enhances situational trust from users.

ACKNOWLEDGEMENT

REFERENCES

[1] Cheng M. (2016). Sharing economy: A Review and Agenda for Future Research. International Journal of Hospitality Management, 57: p. 60-70.

[2] Zhao Xiangyu, Liu Zhouying, Song Shijie. (2018). Exploring the Influential Factors of Askers' Intention to Pay in Knowledge Q&A Platforms. Data Analysis and Knowledge Discovery, 2(08): p. 16-30(in Chinese)

[3] ZhaoYang, Yuan Xini, Li Luqi. (2018). The Impact Factors of Users' Paying Behavior for Knowledge on Social Q &A Platform Based on Social Capital Theory. Documentation,Information & Knowledge, (04): 15-23(in Chinese)

[4] Zhou Tao, Tan Qi. (2017), Research on the Behavior Mechanism of Knowledge Payment Users Based on Social Capital Theory. Journal of Modern Information, 37(11): 46-50(in Chinese)

[5] Griffiths N. (2005).Task Delegation Using Experience-based Multi-dimensional Trust. In: AAMAS '05 Proceedings of the fourth international joint conference on Autonomous agents and multiagent systems. New York: ACM Publications, 489-496

[6] Lu Y, Zhao L, Wang B. (2010). From virtual community members to C2C e-commerce buyers: Trust in virtual communities and its effect on consumers' purchase intention. Electronic Commerce Research & Applications, 9(4): p. 346-360.

[7] McKnight D H, Cummings L L, Chervany N L. (1998).Initial Trust Formation in New Organizational Relationships. Academy of Management Review, 23(3): p. 473-490.

[8] Mayer R C, Davis J H, Schoorman F D. (1995). An Integrative Model Of Organizational Trust. Academy of Management Review, 20(3): p. 709-734.

[9] Das T K, Teng B S. (1998). Between Trust and Control: Developing Confidence in Partner Cooperation in Alliances. Academy of Management Review, 23(3): p. 491-512.

[10] Shou Zhigang, Su Chenting, Yang Zhilin. (2008). How Retailer's Ability and Belevolence Affect the Relational Behavior of Suppliers: an Empirical Research Based on Trust Theory. Management World, (2): 97-109(in Chinese)

[11] Shou Zhigang, Su Chenting, Zhou Chen. (2007). Trust and Opportunistic Behavior in Business Circles. Business Management Journal, (11): 68-72(in Chinese)

[12] Levin D Z, Cross R. (2004). The Strength of Weak Ties You Can Trust: The Mediating Role of Trust in Effective Knowledge Transfer. Management Science, 50(11): p. 1477-1490.

[13] Ahn T, Ryu S, Han I. (2005). The impact of the online and offline features on the user acceptance of Internet shopping malls. Electronic Commerce Research & Applications, 3(4): p. 405-420.

[14] Ko D G. (2010). Consultant competence trust doesn't pay off, but benevolent trust does! Managing knowledge with care. Journal of Knowledge Management, 14(2): p. 202-213.

[15] Mcknight D H, Choudhury V, Kacmar C. (2002). Developing and Validating Trust Measures for e-Commerce: An Integrative Typology. Information Systems Research, 13(3): p. 334-359.

[16] Xie Y, Peng S. (2009). How to repair customer trust after negative publicity: The roles of competence, integrity, benevolence, and forgiveness. Psychology & Marketing, 26(7): p. 572-589.

[17] Lucking-Reiley D. (2007). Pennies from eBay: The Determinants of Price in Online Auctions. Journal of Industrial Economics, **55**(2): p. 223-233.

[18] Dan J K, Ferrin D L, and Rao H R. (2008). A trust-based consumer decision-making model in electronic commerce: The role of trust, perceived risk, and their antecedents. Decision Support Systems, 44(2): p. 544-564.