

Research on the Influencing Factors of College Students' Knowledge of Payment Intention in an Information Overload Environment

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Abstract

From the perspective of information overload, this study applies fuzzy set qualitative comparative analysis (fsQCA) to map the factors influencing college students' knowledge of payment intention, exploring the interdependent effects shaping their intention to pay. [Method/Process] Based on protection motivation theory and targeting university students, this research collected 215 valid responses through an online questionnaire and conducted data analysis using fsQCA 3.0 software. [Results/Conclusions] Findings reveal that within information overload environments, college Students exhibit heightened threat assessment levels, constituting a core determinant of payment intention. Notably, students demonstrate willingness to incur costs to mitigate adverse conditions, whereas their perceived degree of information overload does not serve as a primary factor influencing payment intention. [Innovation/Limitations] The study offers a novel perspective for explaining the internal mechanisms of payment intention in knowledge services, while also providing practical insights for enhancing payment rates and promoting the development of information services.

Key words: Information overload; Protection motivation theory; Knowledge of payment intention; fsQCA

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1. INTRODUCTION

With the rapid advancement of the internet and digital technology, the volume of information has experienced exponential growth. While massive data brings unprecedented convenience and opportunities, it also leads to information overload (Xiang, 2021). Against this backdrop, paid knowledge services have emerged and flourished as an efficient model for knowledge acquisition. By assigning market-based pricing to systematic and structured knowledge products and services, they help users reduce information filtering costs and provide learning content with higher value density, thereby serving as an effective strategy to cope with information overload.

College students represent both core users and a significant consumer force in the paid knowledge market (Su, 2025). Firstly, they are at a critical stage characterized by strong intellectual curiosity and a high demand for learning, with urgent knowledge needs in areas such as professional skill enhancement, qualification examinations, career planning, and personal interests. Secondly, as "digital natives," they are deeply embedded in the online environment. They are not only directly affected by information overload but also active participants in paid knowledge services. Their consumption attitudes have become increasingly rational and mature. While they are willing to pay for high quality content, financial constraints thus lead to more complex and cautious payment decision making processes. Therefore, investigating the knowledge payment behavior of college students in an information overloaded

environment carries strong representative significance and practical implications.

2. THEORETICAL BASIS AND LITERATURE REVIEW

2.1 Protection Motivation Theory

Protection Motivation Theory (PMT) is an important social cognitive theory initially proposed by Rogers (Rogers, 1975). It was originally developed to explain attitude change by analyzing the impact of fear appeals on cognitive appraisal and was further refined in 1983 with the introduction of reward components. The framework consists of three parts: information sources (personal and external factors), cognitive processes, and coping modes, with the core elements being cognitive processes and coping modes.

The cognitive process is divided into two appraisals: Threat appraisal includes perceived severity, vulnerability, and internal/external rewards of a behavior. Higher internal or external rewards or lower perceived threats may lead to maladaptive behaviors. Coping appraisal encompasses response efficacy (effectiveness of the behavior), self-efficacy (confidence in performing the behavior), and response cost (cost of performing the behavior). High efficacy perceptions and low costs promote behavioral decision making. When individuals have high confidence in their abilities and the behavioral cost is manageable, protection motivation is activated, ultimately leading to health-promoting behaviors. Guo et al. explored users' adoption intention of mobile health services from the perspective of threat and coping appraisals. Their results showed that perceived severity, perceived vulnerability, response efficacy, and self-efficacy were all significantly positively correlated with users' adoption intention (Guo, 2015).

2.2 Information Overload

Information overload (IO) refers to a situation where users have limited capacity to process the information they receive within social networks (Karr-Wisniewski, 2010). When information exceeds the brain's maximum capacity for processing, individuals become unable to efficiently absorb or handle incoming information. Prolonged exposure to information overload can induce a spectrum of adverse effects, ranging from discomfort and difficulties in concentration to memory decline. In severe cases, it may result in pronounced psychological or physiological disorders.

Lin et al. found that information overload can trigger adaptive coping strategies among mobile users to protect their own interests (Lin, 2021). Drawing on threat appraisal theory, Witte K suggested that in contexts of information overload, individuals confronted with a

massive volume of information of uncertain authenticity are prone to develop a cognitive bias in which they perceive themselves as more susceptible to being misled by low-quality information (Witte, 1996). In a study on cancer information avoidance, Chae J. (2016) also found that information overload reinforces an individual's perception of being vulnerable to harmful information.

2.3 Knowledge of Payment Intention

Knowledge of payment intention (KPI) refers to users' willingness to pay for online fragmented knowledge services driven by clear learning objectives (Huang, 2021). The knowledge of payment intention of online platform users is influenced by various factors, and scholars have conducted extensive research from perspectives such as perceived value, user evaluations, and platform recognition. Eggert A et al. (2022) found that consumers make purchase decisions aiming to maximize perceived value, which they consider the most critical factor driving payment behavior. Similarly, Kleijnen M et al. (2006) found that the perceived value formed by users toward digital products and services strongly explains their purchase intention. Zhu Guang et al. demonstrated that both cognitive trust (based on perceptions of the knowledge provider's capability, reliability, and expertise) and affective trust (reflecting user emotional attachment) significantly positively influence payment intention (Zhu, 2024).

Despite the rapid development of the knowledge payment market, existing studies have mostly focused on isolated influencing factors (perceived value, trust, or platform reputation) or treated information overload merely as a background variable. Few studies have specifically addressed the context of information overload or sufficiently revealed the synergistic effects of external informational pressure and internal user cognitive mechanisms on knowledge of payment intention. Furthermore, while numerous studies have investigated general user populations, less attention has been paid to the formation mechanism of knowledge of payment intention among university students, who are a group with high knowledge demands. In light of this, this study integrates existing research findings, situates the investigation within an information overloaded environment, employs protection motivation theory, and adopts fsQCA to explore the combinatorial factors and synergistic mechanisms influencing university students' knowledge of payment intention.

3. RESEARCH DESIGN

3.1 Scale Design

This study employs established mature scales, adapted and refined in the context of university students' knowledge

of payment intention. The antecedents of knowledge of payment intention include five variables: the measurement items for perceived information overload are derived from the work of Chen (2009); perceived severity is based on the scale developed by Hadjistavropoulos H D (2012); perceived vulnerability and response efficacy are adapted from Witte K(1996); and response cost draws on the scale validated by Safa (2015). The dependent variable, knowledge of payment intention, is measured using a scale from Song X B (2024).

After developing the initial questionnaire, a pilot test was conducted with 50 randomly selected university students. They were asked to provide feedback regarding the clarity, potential ambiguity, and fluency of the items. The questionnaire was revised accordingly to form the final version. The formal questionnaire employs a five-point Likert scale, where 1 represents “Strongly Disagree,” 3 denotes “Neutral,” and 5 indicates “Strongly Agree.”

3.2 Data Collection

The data collection for this study was conducted using the Wenjuanxing platform (<https://www.wjx.cn/>). A total of 230 questionnaire samples were initially collected. After excluding responses with abnormal completion times and highly patterned answers, 215 valid questionnaires were retained, resulting in a valid response rate of 93.5%.

Table 1
Reliability and validity test

	Cronbach's α	AVE	CR	IO	PS	PV	RE	RC	KPI
PIO	0.818	0.600	0.819	0.775					
PS	0.859	0.554	0.860	0.522	0.744				
PV	0.86	0.604	0.860	0.474	0.474	0.778			
RE	0.875	0.639	0.876	0.343	0.532	0.491	0.799		
RC	0.855	0.603	0.858	0.337	0.353	0.489	0.491	0.776	
KPI	0.840	0.643	0.844	0.266	0.284	0.301	0.489	0.301	0.802

Note: PIO - Perceived Information Overload; PS - Perceived Severity; PV - Perceived Vulnerability; RE - Response Efficacy; RC - Response Cost; KPI - knowledge of payment intention.

4.2 Data Calibration

Prior to conducting qualitative comparative analysis, the sample data must be calibrated. Since fuzzy-set values in fsQCA range between 0 and 1, the 5-point Likert scale data were transformed into values within this interval. Calibration of the variables involved assigning three anchor points based on the mean values of each antecedent variable: full non-membership (0), the crossover point (0.5), and full membership (1). The 5%, 50%, and 95% percentiles were used as thresholds for these anchors (Ragin, 2008). The resulting fuzzy membership scores for each variable are presented in Table 2.

Demographic characteristics of the valid sample indicated a nearly equal gender distribution among the university student respondents. The sample covered students from all academic years, including freshman (24.7%), sophomore (21.4%), junior (20.0%), senior (22.3%), and postgraduate students (11.6%), with relatively balanced representation across grades. In addition, regional distribution of the sample showed minimal variation.

4. DATA ANALYSIS

4.1 Reliability and Validity Analysis

The reliability and validity of the measurement scales were assessed using SPSS 24.0. As shown in Table 1, the Cronbach's α and composite reliability (CR) values for all constructs exceeded 0.8, indicating high internal consistency reliability. The average variance extracted (AVE) for each construct was greater than 0.5, demonstrating satisfactory convergent validity. Furthermore, discriminant validity was evaluated to ensure that the measurement items of different constructs were sufficiently distinct. The square root of the AVE for each construct was greater than its correlation coefficients with other constructs ($p < 0.05$), confirming adequate discriminant validity of the measurement model.

Table 2
Description of Anchor Point Threshold of Fuzzy Set

Variable	Full non-membership	Crossover point	Full membership
PIO	1.7	3.7	4.3
PS	2	3.8	4.4
PV	1.8	3.8	4.5
RE	1.8	3.8	4.5
RC	2.4	4.3	4.8
KPI	1.9	3.7	4.7

4.3 Necessary Conditions and Configurational Analysis

4.3.1 Analysis of Necessary Conditions

The results of the necessary condition analysis are evaluated through the measures of consistency and coverage. Consistency indicates the degree to which a condition variable is a subset of the outcome variable, while coverage reflects the extent to which the condition explains the outcome. Both indices range between 0 and 1. Generally, a condition is considered necessary when its consistency score exceeds 0.9 (Skaaning, 2011). As shown in Table 3, none of the five condition variables achieved a consistency level above 0.9. This indicates that none of them individually constitutes a necessary condition for influencing university students' knowledge of payment

intention, suggesting limited independent explanatory power. Therefore, further analysis of configurational effects of these conditions is warranted.

Table 3
Necessity test of single condition variable

Conditional variable	Consistency	Coverage
PIO	0.691	0.653
PS	0.710	0.682
PV	0.776	0.681
RE	0.749	0.729
RC	0.714	0.714

Table 4
Truth table (part)

PIO	PS	PV	RE	RC	Number	KPI	Raw consist.	PRI consist.	SYM consist.
1	1	1	1	1	30	1	0.817	0.633	0.661
1	0	1	0	1	15	1	0.805	0.353	0.353
1	0	1	0	0	10	0	0.767	0.210	0.212
1	0	1	1	1	9	1	0.885	0.664	0.664
1	1	1	1	0	9	1	0.852	0.562	0.586
0	0	1	0	1	8	1	0.833	0.358	0.359
0	0	1	0	0	8	0	0.771	0.203	0.203

4.3.2 Truth Table Construction

The truth table was constructed based on the calibrated fuzzy-set data matrix. This study investigates the influence of five condition variables on university students' knowledge of payment intention in the context of information overload. The frequency threshold for case counts was set to 2, and any configuration failing to meet this threshold was eliminated. In line with Ragin's recommendation that the minimum raw consistency threshold should exceed 0.75 (Ragin, 2008), and considering the natural breakpoint in the data distribution, a raw consistency level of 0.8 was adopted as the cutoff. Configurations with consistency values above 0.8 were coded as 1 (present), while those below were coded as 0 (absent). Following Boolean minimization, ambiguous or contradictory configurations were removed, resulting in the truth table presented in Table 4.

4.4 Results of the Fuzzy-Set Qualitative Comparative Analysis (fsQCA)

To better investigate the causal processes, the condition variables were categorized into core conditions and peripheral conditions. Core conditions are those that appear in both the parsimonious solution and the intermediate solution, while peripheral conditions appear only in the intermediate solution and can be substituted (Huang, 2021). The truth table (Table 5) was imported into fsQCA 3.0 for sufficiency analysis, yielding three

types of solutions: the complex solution, the parsimonious solution, and the intermediate solution. The intermediate solution was used to analyze the configurationally paths. The resulting combinations of condition variables are presented in Table 5.

Table 5
Configurationally Paths of Condition Variables

Variable	Configurationally Paths			
	1	2	3	4
PIO		●		⊗
PS	●			
PSP	●		●	●
CE				
CC		●	●	⊗
consistency	0.746	0.746	0.763	0.760
Raw coverage	0.600	0.526	0.603	0.357
Unique coverage	0.013	0.019	0.017	0.009
Overall solution coverage		0.913		
Overall solution consistency		0.684		

Note: ● indicates the presence of a core condition; ● indicates the presence of a peripheral condition; ⊗ indicates the absence of a core condition; ⊗ indicates the absence of a peripheral condition; space indicates that the condition may be either present or absent.

Table 5 presents four configurationally paths leading to a high level of payment intention. Each column represents

a distinct combination of conditions. The overall solution consistency is 0.913, and the overall solution coverage reaches 0.684, meeting the accepted thresholds for both metrics. This indicates that the four identified configurations possess strong explanatory power.

Configuration I consists of high perceived vulnerability and high perceived severity, both of which function as core conditions. This suggests that in an information overloaded environment, a high level of threat appraisal motivates students to adopt paid knowledge services to mitigate perceived threats, regardless of whether they perceive information overload itself.

Configuration II is characterized by high response cost as the core condition and high perceived information overload as a peripheral condition.

Configuration III features high response cost as the core condition, with high perceived vulnerability acting as a peripheral condition.

Configuration IV includes low perceived information overload and high perceived vulnerability as core conditions, supplemented by low response cost as a peripheral condition. This indicates that even when perceived information overload is low, users may still choose to pay for knowledge if they feel threatened, in order to achieve their goals.

4.5 Discussion of Findings

Based on Protection Motivation Theory (PMT), this study explores the formation mechanism of university students' knowledge of payment intention in an information overloaded environment, revealing the distinct roles of threat appraisal and coping appraisal. The results indicate that information overload, as an external contextual stimulus, significantly and positively influences the two core dimensions of threat appraisal, which are perceived severity and perceived vulnerability. Configurations I and IV corroborate PMT's theoretical proposition: when individuals are exposed to a negative information overloaded environment, they actively assess the severity of potential threats and their own susceptibility, thereby triggering subsequent behavioral decisions. Furthermore, perceived vulnerability plays a particularly prominent mediating role. This suggests that users' focus shifts beyond mere threat recognition toward a proactive process of evaluating threat likelihood and initiating self-protective actions. A prime illustration of this is the choice to procure paid knowledge, a strategy aimed at acquiring verified information to effectively mitigate potential risks.

Secondly, Configurations II and III highlight the influence of response cost within the coping appraisal dimension on payment intention. Specifically, when students believe that paid knowledge can effectively address their information filtering needs, their willingness to pay increases, even when monetary or time costs are involved. This finding reveals a core

logic underlying user decision-making: in information overloaded environments, payment intention is not solely driven by fear of threat, but rather by a rational trade-off between the functional value of the solution and the cost-benefit ratio. Individuals may bypass the traditional threat appraisal stage of PMT and proceed directly to behavioral decision-making.

Moreover, perceived information overload did not emerge as a significant factor affecting payment intention. This may be because university students have limited awareness of information overload or weaker information processing capabilities, preventing them from directly perceiving the overload. Nevertheless, the threatening environment caused by information overload remains an important condition fostering payment intention.

5. CONCLUSION

Based on Protection Motivation Theory (PMT) and using fuzzy-set Qualitative Comparative Analysis (fsQCA), this study reveals the synthetic formation mechanism of university students' knowledge of payment intention in an information overloaded environment, extending the application context of knowledge payment behavior. The findings show that the configurationally antecedents affecting knowledge payment can be summarized into two perspectives: threat appraisal and coping appraisal, which align well with PMT. Among these, high perceived vulnerability and high perceived severity serve as core conditions influencing payment intention, while within the coping appraisal dimension, response cost plays a major role. It is worth noting that students' ability to perceive information overload is relatively weak.

By uncovering the synergistic effects of threat appraisal and coping appraisal, this study offers novel theoretical insights into understanding knowledge of payment intention in information-rich yet overloaded contexts. To enhance students' willingness to pay for knowledge, educational efforts could be strengthened to raise their awareness of information overload. Knowledge platforms may collaborate with universities to provide information literacy training and develop a "Case Library of Information Overload Harms," using realistic scenarios to deepen students' understanding of the severe consequences of overload. In addition, algorithm driven personalized early warnings of information overload combined with data visualization tools could help enhance students' perceived vulnerability regarding their own limited information processing capabilities. Platforms may also adopt dynamic pricing strategies such as tiered membership systems for frequent users, converting one time payments into long term value investments to improve user loyalty.

However, the rapid evolution of digital technology and dynamic user behavior necessitate continuous updates to research paradigms, future studies should focus on how technology empowerment can promote the sustainable development of the knowledge payment ecosystem.

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