



How Do Technical Recommendability Work on Users' Excessive Social Media Use Behavior?

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Abstract. Excessive social media use behavior has profoundly influenced people's living habits. Starting from social media's technical recommendability, based on Affordance theory and SOR model, this study put forwards a research framework of "recommendability - information value and loss of control - excessive use behavior". In addition, this paper investigates the moderating roles of users' systematic cognitive model. Our empirical results showed that the recommendability of social media is positively correlated with users' excessive use behavior. Furthermore, information value and loss of control play mediating roles in the relationship between the them. Meanwhile, users' systematic cognitive model has different moderating effects on the roles of recommendability on information value and loss of control. This study gains an in-depth understanding of how social media recommendability influences users' excessive use behavior. Also, it has some significance for social media platform development and managing users' behavior.

Keywords: technology affordance; excessive use behavior; systematic cognitive model; information value; loss of control.

1 Introduction

With the development of digital technology and mobile terminal devices, social media has profoundly influenced people's communication modes and information access. However, the problem of excessive use behavior induced by utility and value has seriously affected the daily life of many users. According to statistics, in March 2024, the per capita monthly time spent on mobile Internet in China has reached 165.6 hours^[1]. The issue of excessive use behavior of social media has gradually drawn the attention of the academics, and it is necessary to explore the influence of social media characteristics on users' excessive use behavior.

At present, literature on the excessive use behavior of media mainly adopted I-PACE model^[2], SOR framework^[3] and SSO model^[4], while taking social affordance (such as visibility, persistence, relevance and editability) as important influencing factors^[4]. As one of the important technology affordance, recommendability enhances user satisfaction and stickiness by providing personalized and accurate information, and distributing information through algorithmic mechanisms. Thus, recommendability may

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have an important influence on excessive use behavior of media. However, the impact of recommendability has not been critically examined, which is a serious research gap. Additionally, there is still insufficient attention to the "dark side of information technology". The mechanisms, especially the dark mechanism how do recommendability work on the excessive use behavior need to be deeply explored. Moreover, the positive and negative impacts depend on users' personal perceptions, and different cognitive modes may produce different moderating mechanisms. Thus, systematic cognitive model may have a significant influence on the relationship between recommendability and the excessive use behavior.

Therefore, to fill the significant knowledge gap on the excessive use behavior of social media, this study based on Affordance theory, and SOR model to investigate the influence of social media recommendability. We also explore the mediating roles of information value and loss of control, and the moderating roles of users' systematic cognitive model.

2 Theoretical Background and Hypothesis Development

2.1 The Compatibility Between Affordance Theory and SOR Model

2.1.1 Technical Affordance.

The concept of "affordance" was first proposed by Gibson to explain the relationship between organisms and the elements that make up the environment^[5]. Subsequently, Norman introduced affordance into the study of technology and artifacts in 1998, focusing on the characteristic of how technology interacts with users using its properties^[6]. In the field of media technology studies, Hutchby analysed the significance of the development in media technology from the perspective of affordance^[7]. In recent years, scholars have specifically categorized media affordance from different perspectives, generally classifying it as visibility, editability, recommendability, and feedback. This study focuses on recommendability as a notable technological feature to enhance user stickiness, and explores the mechanism of its influence on users' excessive use behavior. Recommendability refers to the ability of social media to recommend information that may be of interest based on user profile. Specifically, it is manifested by collecting users' behavioral data, interest preferences and other information, and using advanced algorithmic models to recommend content that best meets users' personal preferences.

2.1.2 SOR Model.

Stimulus-Organism-Response (SOR) model originates from environmental psychology. The operation of the model included a series of intrinsic variable connections of the organism, which is widely used in the systematic analysis of human behavioral intention by focusing on the intrinsic emotional and cognitive factors of human beings. At present, the SOR model has been widely used in the fields of e-commerce, consumer behavior and gradually extended to social media field^[8]. It allows the impact of technical features on user experience to be studied in a parsimonious and structured way.

Based on SOR model and Affordance theory, this study examines the mechanism of social media affordance on users' excessive use behavior by taking recommendability as an external environmental stimulus, information value and loss of control as intrinsic variables to measure organism's cognition and emotion, and users' excessive use behavior as a response.

2.2 A Study of the Relationship Between Recommendability and Excessive Use Behavior

Social media recommendability provides personalized content to ensure that it matches users' interests. Strong emotional stimulation can stimulate users' intrinsic motivation to keep pursuing more stimulation, thus falling into a cycle of excessive use. In addition, algorithms are constantly adjusted and optimized based on the user's interests, behaviors and history, so that user can receive updated and diverse content. It is often difficult for them to control his or her time spent on the platform. Once they start browsing or engaging on the internet, it is easy to get caught up in endless scrolling and refreshing, thus leading to excessive consumption of time and attention.

Hence, we present the following hypothesis:

H1: Recommendability is positively associated with excessive use behavior

2.3 The Mediating Role of Information Value

First, this study argues that recommendability is positively related to information value obtained by users. The main reason is that recommendability usually uses advanced algorithmic techniques to provide users with personalized content, helping to filter out information that is useful to users when they are under the pressure of information overload. It can increase the relevance and attractiveness of the information, also makes it easier for users to find the content they are really interested in, thus saving them time in acquiring information.

Second, information value is positively correlated with users' excessive use behavior. Recommendability prompts platforms to collect users' feedback and ratings on recommended content as a way of evaluating the source of the recommended content, thus improving the efficiency of information and providing users with high-quality information. The increase in information value allows users to receive more content of interest to them, so they will devote more attention to relevant topics and increase the frequency and duration of social media use.

Therefore, the following hypotheses are proposed in this paper:

H2: Recommendability is positively correlated with information value

H3: Information value mediates the relationship between recommendability and excessive use behavior

2.4 The Mediating Role of Loss of Control

Loss of control refers to the feeling that people feel they have lost control and security in their lives or environments. First, this study argues that recommendability is positively related to users' sense of loss of control. Recommendability presents an idealised and immersive environment that reinforces how the user perceives the content itself. Moreover, the personalization bias of content tends to make users forget about the time of use, which may affect relationships in real life^[9]. On the other hand, the diversity of information provided by the media makes it possible for users to forget the core information they want to get and thus experience a sense of losing control.

Second, with the emergence of loss of control, users may spend more time than expected using social media, thus may develop a high degree of cognitive and behavioral preoccupation and repeatedly think about the content on social media even when they are not online. This preoccupation makes it difficult for users to extricate themselves, resulting in excessive use behaviors and reinforcing the user's dependence on social media.

Therefore, the following hypotheses are proposed in this paper:

H4: Recommendability is positively associated with loss of control

H5: loss of control mediates the relationship between recommendability and excessive use behavior

2.5 The Moderating Role of Systemic Cognitive Model

The systematic cognitive mode tends to use logic and reason to solve questions. It follows unchanging rules and boundaries and is a more conventional way of thinking. Existing research has shown that a person's information processing mode will reflect his primary cognitive mode. Depending on the context or nature of the task, it is possible to train individuals to use a particular cognitive mode^[10]. The systemic nature of cognition links the now, the adjacent possibilities, the implications for others and, potentially, for social and environmental change. Users with a systematic cognitive mode are more inclined to deal with problems rationally and will pay more attention to their own needs in the process of using social media. Specifically speaking, users with systemic cognitive model also pay attention to the quality of information and reduce the redundancy of it, which in turn enhances the relationship between recommendability and the value of information. In addition, under the influence of users' rational cognition, users will strictly control their personal time allocation and the scope of information content, which will weaken the relationship between recommendability and loss of control.

Therefore, the following hypotheses are proposed in this paper:

H6: system cognitive model enhances the relationship between recommendability and information value

H7: systemic cognitive modes weakens the relationship between recommendability and loss of control

3 Research Methodology

3.1 Data Collection and Sample

Our study used a questionnaire to collect data for testing the hypotheses presented in the previous section. The questionnaire design was mainly derived from well-established scales in the existing literature, which were adjusted according to the needs of the study. The original items from the English literature were strictly translated. After the pre-survey, the questionnaire content was revised based on the feedback from the respondents, and the form and content of the questionnaire were finalized.

The study was conducted on users, and the questionnaire was distributed by means of the Questionnaire Star online platform. By restricting the respondents to have used at least one social media application account, 150 users were selected for the survey, of which 43 users were found to be missing more than 50% of the total questionnaire items after the questionnaire was recovered and not adopted, and finally 107 valid questionnaires were obtained, with a recovery rate of 71%. The study further conducted a non-return bias test on the questionnaires, by comparing the early-returned samples with the late-returned samples in terms of gender, age, education level, etc. It was found that there was no significant difference between the variables, so the non-returned samples would not have a significant impact on the results of this study.

The demographic characteristics of the research sample are: the majority of the respondents are female (77.6%), the age of the respondents is concentrated in the range of 20-30 years old (64.2%), the education level of the respondents is concentrated in the bachelor's degree and the specialized degree (88.8%); in terms of the usage of social media apps, the majority of the respondents' average daily use of social media is in the range of 2-4 hours (41.1%) and more than 4 hours (32.7%), with a tendency of excessive use behavior.

3.2 Measurement

The scales used in this paper are based on well-established scales used in research studies, with appropriate modifications to incorporate the content of this paper. All scales were measured on a 5-point Likert scale, with 1 being "strongly disagree" and 5 being "strongly agree".

Social media recommendability. Referring to Zhang et al. study^[11], four question items were used for the metric.

Excessive use behavior. Referring to Hasan et al. study^[12], using 5 question items for the metric.

Information value. A scale developed by Zhang et al.^[13] was used to measure the degree of information value perceived by users in terms of whether the app provides them with different types of information.

loss of control. Referring to Hasan et al. 's study^[12], 5 question items were measured.

Systematic cognitive model. Referring to the Sagiv et al. study^[14], 5 question items were measured.

Control variables. Based on previous studies, gender and age of users were used as control variables. Among them, gender was measured using a dummy variable and age was measured based on its natural logarithm.

3.3 Reliability Validity Test and Factor Analysis

Based on the descriptive statistics of each variable, the correlation coefficient between any two variables is less than 0.5. Therefore, the data results are less likely to be threatened by multicollinearity.

The α -value of all indicators ≥ 0.7 , which indicates that the reliability of the measurement indicators is good. In addition, the factor loading of each indicator is greater than 0.7, and the AVE value is greater than 0.5, which indicates that the variables have a good aggregation validity. Lastly, the square root of AVE value is greater than the correlation coefficients of the rows and columns in which they are located, which indicates that there is a good differentiation validity between the variables.

3.4 Data Analysis and Results

This paper utilizes multiple linear regression to test the theoretical hypotheses presented in the study (Table 1). First, the relationship between recommendability and excessive use behavior is examined. We can see from Model 2, recommendability is positively related to excessive use behavior ($\beta=0.371$, $p < 0.01$), so hypothesis 1 is confirmed.

Table 1. Regression analyses results of the models

Variables	User excessive use behavior				Information value		loss of control	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Constant	-.006	-.002	-.002	-.002	-.002	-.003	.006	.006
user's age	.010	-.019	-.039	-.039	.064	.054	-.177	-.176
user's gender	-.029	-.010	.028	.028	-.117	-.120	.082	.083
recommendability		.371**	.259**	.232**	.349***	.279**	.235*	.243*
Information value			.320***					
loss of control				.591***				
systematic cognitive model						.395***		-.043
Recommendability* systematic cognitive model						.007		-.009
R ²	.001	0.136	.224	0.459	.139	0.291	0.078	0.080
R ² change		0.135	0.088	0.235		0.152		0.002
F value	.041	5.350**	7.294***	21.455***	7.294**	2.880	8.228***	1.730

Note: * represents $p < 0.05$ ** represents $p < 0.01$ *** represents $p < 0.001$

Second, the mediating role of information value and loss of control is tested. As shown in models 5 and 7, recommendability is positively related to information value ($\beta = 0.349$, $p < 0.001$) and loss of control ($\beta = 0.235$, $p < 0.05$). Therefore, hypothesis 2 and 4 can be confirmed. In addition, model 3 and 4 show that, both the coefficients of recommendability are lower than 0.349 and significant positive ($\beta_1 = 0.259$, $p_1 < 0.01$; $\beta_2 = 0.232$; $p_2 < 0.01$), when adding information value and loss of control respectively to

model 2. Hence, the results indicates that both of information value and loss of control play mediating roles on the relationship between recommendability and excessive use behavior, supporting hypothesis 3 and 5.

Finally, the moderating effect of systematic cognitive model was tested. Model 6 and model 8 were obtained by placing, systemic cognitive model, and its interaction term with the recommendability. From model 6, the coefficient of the interaction term between recommendability and systemic cognitive model was 0.007 but not significant, partially proving hypothesis 6. From Model 8, the coefficient of the interaction term between recommendability and systemic cognitive model was -0.009 but not significant, partially proving hypothesis 7.

4 Conclusions

Based on Affordance theory and SOR model, this study found that social media recommendability is positively related to users' excessive use behavior. Information value and loss of control play a mediating role in the relationship. Meanwhile, users' systematic cognitive model has different moderating effects. It enhances the relationship between recommendability and information value, while weakens the relationship between recommendability and loss of control.

From a theoretical perspective, this study may have three theoretical contributions. (1) It enriches the research of social media affordance by focusing on the impact of recommendability, which taking into account the influence of algorithms; (2) It simultaneously introduces information value and loss of control into the study of users' excessive use behavior, which deepens our understanding of the mechanism by which social media affordance affects users' excessive use behavior. Unlike existing studies that focus on positive mechnism, it enriches the research of "dark side of information technology" from both cognitive and affective dimensions. (3) Not all people are willing to actively reduce their social media usage behavior. Their willingness to do so may vary from person to person. In this study, individual cognitive patterns are introduced as moderating variables, which further enriches the contextual factors of social media affordance influencing excessive use behavior.

Practically, our findings provide some implications for users and the development of social media platforms. First, from the user's personal level, it can bring certain guidance and reference for the prevention of excessive use behavior, so that individuals can raise the awareness of media usage to control their own behavior more rationally, thus enhancing self-control and preventing distorted perceptions. At the same time, individuals can have a clearer understanding of recommendability and realize the information it may bring, so that they can maintain a skeptical attitude in the face of recommended content and learn to analyze whether information is truthful or not. Second, At the level of social media platforms, firms can learn which specific technical factors of social media are more likely to prompt users' willingness to use social media, that can enhance user stickiness. Moreover, they can effectively intervene and supervise

through algorithm adjustment for planning the development of technology and designing more reasonable algorithm mechanisms. Through such initiatives, they will develop steadily and benignly, so as to truly play the role of technology.

Several limitations of this study along with directions for future research need to be noted. First, this study focused on the technical recommendability, which is an technical characteristics of social media, to explore the antecedents of users' excessive use behaviors. It did not consider the differences that exist in other affordances, which may lead to different results. In the future, the relationship between other affordances (e.g., visibility, persistence, relevance, and editability) and users' excessive use behavior can be explored. Second, this study was conducted in the form of a questionnaire survey, and the sample's education level was concentrated in undergraduate and specialized fields, which may differ to a certain extent from the real population. Therefore, additional samples can be considered in the future to verify the generalizability of the results.

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