Intellectual Lineage and Future Prospects of Information Encountering Behavior Research: Postprint

Authors: Zhang Min, Liu Ying, Zhang Yan

Date: 2023-08-27T00:00:00+00:00

Abstract

[Purpose/Significance] This study conducts an in-depth systematic review analysis of information encountering behavior to promote academic innovation in this research field and application innovation in related information service domains. [Method/Process] Using CNKI and Web of Science as data sources, this paper adopts the systematic review method to analyze 41 most representative articles in this field. In the knowledge context research section, it systematically organizes and summarizes from the perspectives of theoretical models, research methods, and influencing factors; in the frontier prospect section, it decomposes the user information encountering process into three stages: pre-encountering, during-encountering, and post-encountering, and summarizes the research on post-encountering behaviors. [Results/Conclusions] Information encountering behavior is the result of the combined effects of information, individual, technology, and environment. Encountered information use research represents the current research hotspot, while information encountering research based on the information seeking process chain, mobile Internet-based information encountering research, objective data-driven information encountering research, and interdisciplinary information encountering cross-research constitute future feasible hot topics with significant research value.

Full Text

The Knowledge Context and Frontiers of Information Encountering Behavior Research

Zhang Min[1], Liu Ying[1], Zhang Yan[2]
[1]School of Information Management, Wuhan University, Wuhan 430072
[2]School of Public Policy and Management, University of Chinese Academy of Sciences, Beijing 100049

Abstract: [**Purpose/Significance**] This study conducts an in-depth systematic review of information encountering behavior to promote academic innovation in this research field and application innovation in related information services. [**Method/Process**] Using CNKI and Web of Science as data sources, this study employs systematic review methodology to analyze 41 representative publications in this field. In the knowledge context section, the paper systematically reviews and summarizes theoretical models, research methods, and influencing factors. In the frontier outlook section, the user information encountering process is decomposed into three stages: pre-encounter, during encounter, and post-encounter, with a summary of research on subsequent behaviors after encountering. [**Result/Conclusion**] Information encountering behavior results from the combined effects of information, individuals, technology, and environment. Research on the use of encountered information represents the current research hotspot, while future promising and valuable research topics include information encountering studies based on the information search process chain, mobile Internet-based information encountering, objective data-driven information encountering research, and interdisciplinary information encountering research.

[Classification Number] G203
Keywords: information encountering, knowledge context, frontier outlook

---

Users often unintentionally come across interesting or useful information that meets their information needs during information seeking or casual browsing. This experience is defined as information encountering [**?**]. With the rapid development of computer and network technology and the explosive growth of information, information encountering has become a common and important information acquisition method in daily life [**?**]. How to identify and guide user information behavior, continuously improve user experience, and thereby stimulate information consumption behavior has become a hot issue attracting considerable attention from both academia and industry. In view of this, studying user information encountering behavior and exploring its influencing factors and formation mechanisms holds significant academic value and practical implications. Currently, both domestic and international research in the field of information encountering has yielded relatively rich results. To comprehensively elaborate the knowledge system and academic frontiers of information encountering research, this study employs systematic review methodology to conduct a comprehensive review of existing literature, including collection, screening, organization, and analysis. The research conclusions will have positive implications for deepening theoretical research and practical applications of information encountering behavior.

To ensure the accessibility, reliability, and credibility of research data, this study conducted meticulous work in database selection, keyword determination, and research sample screening. Specifically, in the database selection process, CNKI

and Web of Science were selected as the primary data sources based on comprehensive analysis of factors such as academic resource collection volume, dynamic update speed, and paper download availability. In keyword determination, initial searches revealed that directly using keywords "information encountering" and "information encountering" in Chinese and English databases yielded very limited results. However, through literature mining methods, the keyword set was continuously enriched, and supplementary research was conducted based on new keywords. Ultimately, "information encountering," "encountered information," "non-linear information," and other keywords were used for subject searches in the CNKI database to achieve comprehensive and unbiased retrieval and acquisition of public literature. Keywords including "information encountering," "information encounter," "encountered information," "serendipitous information," "incidental information acquisition," "accidental/fortuitous discovery of information," "casual information gathering," "serendipity in seeking," and "opportunistic/contingent acquisition of information" were used for subject searches in Web of Science. Regarding search period settings, no start time limit was imposed, but the search cutoff date was set to May 30, 2018. After deduplication, 60 literature samples were obtained, including 29 Chinese samples and 31 English samples.

In the research sample screening process, the 60 literature items were browsed in full text, and weakly relevant items were eliminated by comprehensively considering factors such as thematic relevance, journal quality, author credentials, and citation rates. Chinese samples were primarily selected from CSSCI-indexed literature, with additional consideration given to journal impact factors, citation rates, and author research levels. English samples were preferably selected from SCI and SSCI-indexed literature, mainly considering journal impact factors and citation rates. Additionally, the rigor of paper writing was considered, and samples with inadequate argumentation were removed. After completing all these steps, 41 literature items were finally selected as research samples.

2 Knowledge Context of Information Encountering

2.1 Analysis of Information Encountering Theoretical Models

Given the significant impact of search behavior on user information needs, traditional linear information retrieval behavior models are insufficient to comprehensively explain user information behavior, making research on information encountering theoretical models widely valued. A.E. Foster [**?**] first proposed the non-linear information retrieval behavior model in 2004, marking the beginning of the shift from linear to non-linear information retrieval research. Characterized by unexpectedness and unpredictability, this model quickly became a hot topic in information management research. Based on literature review, commonly used models in domestic and international information encountering research can be summarized into four categories: information encountering process models, information encountering occurrence models, information encountering perception models, and information encountering cognitive models.

In research on information encountering process models, S. Erdelez is the most representative scholar, constructing a process model including five steps: noticing, stopping, examining, capturing, and returning [**?**]. When users accidentally notice interesting information, they first interrupt their ongoing information seeking behavior to evaluate the usefulness of the encountered information, then capture useful information for future use, and finally return to their initial search task. Kurata [**?**] expanded on S. Erdelez' s research and proposed the model shown in Figure 1 [Figure 1: see original paper], arguing that after users complete information evaluation during the examination stage, they may engage in sharing, using, or storing behaviors. After encountering occurs, users may choose to "end" or "return" to their original information seeking task.

In research on information encountering occurrence models, M.P.E. Cunha [**?**] focused on information encountering in organizational environments and proposed the occurrence model shown in Figure 2 [Figure 2: see original paper]. This model includes four components: precipitating conditions that occur by chance, searching for preset problems, bisociation, and unexpected discovery of solutions to different problems. Among them, precipitating conditions include temporal contingency, active learning styles, and active social relationships. Bisociation refers to the unexpected inspiration people can gain from one problem when accidental connections are discovered. When users search for solutions to preset problems, they attempt to break away from current knowledge to gain new inspiration, which increases learning opportunities. With the stimulation of precipitating conditions, bisociation occurs, potentially leading to the unexpected discovery of solutions to other problems.

In research on information encountering perception models, J. Lawley and P. Tompkins [**?**] proposed the perception model shown in Figure 3 [Figure 3: see original paper] from a perceptual perspective. This model divides the information encountering perception process into five stages: "E-1" preparation stage, "E" encounter occurrence stage, "E+1" initial awareness of information' s potential role stage, "E+2" reconfirmation of encountered information value stage, "E+3" clarifying encounter value and deciding subsequent behavior stage, and "E+4" estimating the effects and impacts of information encountering. Among these, the three parts "E+1," "E+2," and "E+3" are cyclical and repetitive.

In research on information encountering cognitive models, O.D. Bruijn and R. Spence et al. [**?**] focused on opportunistic browsing behavior and proposed the cognitive model shown in Figure 4 [Figure 4: see original paper]. Starting from visual or auditory-based content perception, each meaningful content item (such as objects, phrases, and scenes) triggers rapid activation of corresponding concepts in conceptual short-term memory (CSTM). However, if this content is not selected for retention in a more durable memory form (such as working memory), it will be quickly forgotten. In the information encountering cognitive model, CSTM exhibits four important characteristics: (1) rapid activation of meaningful representations when encountering information; (2) activation of these representations and retrieval of additional related information from long-

term memory; (3) related information retrieved from long-term memory may be associated with previous failed or prematurely terminated search behaviors, thereby attracting user attention and preparing for appropriate action; (4) the entire process of user attention to related information occurs with little or no conscious awareness.

These models describe the occurrence process and user perception and cognitive processes of information encountering from different levels and perspectives. Among them, information encountering process models, perception models, and cognitive models can complement each other at the individual level. When users accidentally notice certain information, they first interrupt their ongoing information seeking behavior and repeatedly evaluate the encountered information until they form a clear recognition of its value. At this point, the encountered information activates the individual' s short-term memory and prompts them to retrieve additional related information from long-term memory. Users then share, use, or store useful information and choose to forget useless information. The information encountering occurrence model emphasizes information encountering in organizational environments, where different domains are connected by some commonality. When an organization is solving preset problems, it may accidentally find solutions to other problems due to active learning by organizational members or sharing by others.

2.2 Analysis of Information Encountering Research Methods

Quantitative research, qualitative research, and mixed-methods research are commonly used research methods in current social science fields [**?**]. Mixed-methods research refers to the inclusion of both qualitative and quantitative research methods in a single study [**?**]. Some studies also integrate two or more types of research methods without restricting methodological origins and foundations, forming multi-method research. Therefore, mixed-methods research can be considered a special type of multi-method research. After reviewing the research methods used in literature samples, it was found that most studies have abandoned single research methods in favor of multi-method research. Among them, "questionnaire survey + user interview" and "questionnaire survey + situational experiment" combinations are most common. Representative literature in this field and their research methods are shown in Table 1 .

In terms of research population selection, foreign literature has conducted more in-depth analysis on specific age groups and regional groups. For example, C.C. Marshall and S. Bly [**?**] explored user information encountering and sharing in different contexts such as home and workplace; S.C. Ross [**?**] analyzed readers' information encountering during reading processes based on in-depth interviews with 194 readers; K. Williamson [**?**] selected 202 elderly people and discussed the role of information encountering from an ecological perspective; S. Panahi et al. [**?**] used 24 physician users on social media as research samples to explore their information encountering and tacit knowledge sharing behaviors; Á. Pálsdóttir [**?**] randomly selected 1,000 citizens aged 18 to 80 from Iceland's national registry

and investigated their information encountering behaviors through surveys. In contrast, domestic literature has relatively single research population selection, requiring more in-depth analysis.

2.3 Analysis of Information Encountering Influencing Factors

Since the concept of information ecology was first proposed in the 1980s, scholars have often used it to express ecological concepts and the relationship with increasingly complex information environments. As a theory studying the coordinated development of people, information technology, and social environments, information ecology refers to the sum of a series of interrelationships supported by information resources within a specific information space, using information technology as a means to achieve a balanced state between information people and the information environment [**?**]. The four core elements of information people, information, information environment, and information technology constitute the main components of an information ecosystem [**?**].

Information encountering is a special information acquisition method in the information ecosystem. In 1999, S. Erdelez, an influential scholar in the field of information encountering, first divided influencing factors into four components: information users, information itself, information environment, and information needs [**?**]. Subsequently, scholars conducted systematic research based on this framework [**?**, **?**]. In recent years, with the rapid development of information technology, information encountering research has gradually shifted from traditional offline contexts to online contexts, with domestic and international researchers beginning to focus on how information technology affects the probability of information encountering and post-encounter information behaviors [**?**, **?**, **?**]. Based on the above analysis, information encountering is a process in which information people interact with information resources using information technology in a certain information environment, simultaneously influenced by information people, information, information environment, and information technology. Therefore, this study analyzes influencing factors of information encountering from the perspective of information ecology theory, dividing them into four dimensions: information, information people, information environment, and information technology, as shown in Figure 5 [Figure 5: see original paper].

2.3.1 Information People Factors Information people are the main subjects of information encountering behavior from the information ecology perspective. Demographic variables such as gender and cultural background, as well as individual characteristics, encounter frequency, search style, and information needs, can all affect subjects' information encountering behavior. Figure 6 [Figure 6: see original paper] shows the analytical framework for information people factors in information encountering research.

In terms of demographic variables, literature has confirmed the influence of factors such as gender and major on information encountering. K. Williamson [**?**] analyzed the information needs and sources of Australian elderly people

and found that age positively stimulates elderly people' s attention to health information, and they are more likely to encounter needed information through traditional media such as newspapers. Li Ruyin and Deng Xiaozhao [?] found that compared to women' s leisure and entertainment contexts, men are more likely to experience information encountering in task contexts. Du Xue and Liu Chunmao [?] found that science majors and employed personnel are more likely to experience information encountering behaviors. Lou Yinyin [?] found that education level affects users' probability of information encountering.

Regarding individual characteristics of information subjects, literature has confirmed the influence of factors such as personality traits, information literacy, and learning motivation on information encountering. J. Heinström [?] found that energetic personalities and active learning styles facilitate information encountering behaviors. K.N. Stewart and J. Basic [?] found that information literacy affects university students' information encountering behaviors and processing of encountered information. T. Jiang et al. [?] found that individual information sensitivity, search expertise, and user curiosity can all affect information encountering behaviors. Wang Zhijin et al. [?] believed that user personality, motivation, and mood can all affect information encountering. Jiang Guanqun [?] believed that extroverted personality positively correlates with individuals' acceptance of external information, and extroverted readers are more prone to information encountering. Yang Yü and Huang Yeman [?] found that personality traits, information literacy, and emotional state all significantly and positively affect information encountering conditions.

In terms of encounter frequency, S. Erdelez [?] classified users into non-encounterers, occasional encounterers, encounterers, and super-encounterers based on their understanding and frequency of information encountering. Non-encounterers rarely experience information encountering; occasional encounterers believe information encountering depends on luck and tend to concentrate during information seeking; encounterers have more information encountering experiences but have not yet recognized the connection between information encountering and information acquisition; super-encounterers have unusual cognition of information encountering, and frequent encountering prompts them to actively strengthen this behavior.

Regarding search style, J. Heinström [?] divided information users' search styles into three types: fast surfing, broad scanning, and deep diving. Fast surfing refers to users who expect to find needed information quickly with minimal effort; broad scanning refers to users who tend to collect various related information extensively; deep diving refers to users who are skilled at selecting appropriate search methods and accurate screening criteria. Research results differ regarding the impact of search style on information encountering. For example, J. Heinström [?] believed that searchers pursuing high-quality information rarely experience information encountering, and broad scanning users who invest less effort do not increase their information encountering probability. However, Tian Lizhong and Yu Bi? [?] found that broad scanning searchers are

more likely to experience information encountering. Given this, more in-depth exploration is needed in sample segmentation and experimental rationality.

In terms of information needs, C.J. Lu [?] believed that both problem-related and interest-related information needs affect users' information encountering. Pan Shuguang [?] and Yu Bi? [?] believed that users' potential and unclear information needs affect information encountering, which in turn further clarifies their own needs. Both problem-related and interest-related information needs can increase users' probability of information encountering, thereby affecting their utilization behaviors after information acquisition.

2.3.2 Information Factors Information is the bond connecting people with people, people with environment in the information ecosystem and is also an important factor in information encountering. When acquiring information, users are influenced by factors such as information relevance, quality, and presentation. As a form of information acquisition, information encountering is also affected by these factors to a certain extent. Discussion of information factors reveals the value of information encountering to some extent. Figure 7 [Figure 7: see original paper] shows the analytical framework for information factors in information encountering research.

Regarding information relevance, S. Erdelez [?] divided information into two categories: interest-related and problem-related. Problem-related information can be further subdivided into three types: related to past problems, current problems, and future problems. S. Pontis et al. [?] found that information relevance affects the interaction mode between users and pushed information. T. Jiang et al. [?] found that some users only pay attention to information related to current problems, while others notice information unrelated to them out of curiosity. Yuan Hong et al. [?] and Mao Zhenpeng [?] believed that the relevance of digital information titles is an important information factor affecting information encountering.

In terms of information quality, information quality in a broad sense includes content reliability, timeliness, accuracy, and source reliability. Higher-quality information can attract more user attention during information identification and facilitate post-acquisition utilization. T. Jiang et al. [?] found that online information quality and sources are important factors affecting user information encountering. S. Pontis et al. [?] found that information wording and sources directly determine some users' willingness to click on pushed information links. Tian Lizhong et al. [?] and Mao Zhenpeng [?] confirmed the impact of information source reliability on information encountering in the Chinese context. Yuan Hong et al. [?], Yang Yü et al. [?], and Jiang Guanqun [?] respectively explored the impact of information quality on information encountering in mobile digital, social network, and new media contexts.

Regarding information presentation, information presentation in a broad sense refers to the way information is presented to users through various media in dif-

ferent states, mainly including information salience and information diversity. Information salience is manifested as conspicuous appearance and prominent location. When users search for information, highly salient information is more likely to catch their eye, thereby increasing the probability of being encountered. Research by T. Jiang et al. [**?**] and Tian Lizhong et al. [**?**] both indicated that information with prominent appearance or location can significantly improve information visibility, thereby attracting user attention and triggering information encountering. The diversity of information content, form, and sources can provide users with more types of choices and better meet their information requirements. Yang Yü and Huang Yeman [**?**] found that information salience in social networks significantly affects user information encountering conditions, while information diversity has no significant effect.

2.3.3 Information Environment Factors Both natural and social environments where human information activities occur belong to the category of information environment. The information environment in the context of information encountering refers to the sum of factors affecting information subjects and information media, including external conditions and contexts where encountering behaviors occur. Although environmental factors are one of the basic elements affecting information encountering, relevant research fields have not yet systematically classified and analyzed them. Existing research mainly focuses on information encountering behaviors in different environments such as learning and work, with less attention paid to exploring environmental characteristics that affect information encountering. C.C. Marshall and S. Bly [**?**], S.C. Ross [**?**], and X. Zhou et al. [**?**] respectively studied the impact of daily life environments, reading environments, social environments, physical environments, and time on information encountering. This study decomposes the information environment into three categories based on attribute differences: physical environment, social environment, and task environment, as shown in Figure 8 [Figure 8: see original paper].

Regarding the physical environment, academia generally believes that designed physical environments are more likely to facilitate information encountering, but there is no consensus on which specific physical attributes (such as structure, display, and dwell time) affect information encountering. T. Jiang et al. [**?**] found that interface usability is a potential factor affecting encountering. Mao Zhenpeng [**?**] found that environmental factors such as mobile terminals and network bandwidth significantly affect user satisfaction with mobile digital information seeking behaviors. S. Pontis et al. [**?**] and G. Kefalidou and S. Sharples [**?**] found that location affects users' information encountering experiences.

In terms of the social environment, academia generally believes that social environmental factors prompt users to help others around them pay attention to needed information while searching, thereby increasing the probability and utilization efficiency of encountered information. K. Williamson [**?**] found that family members and friends are the main information sources for elderly groups,

and interpersonal relationships play an important role in user information acquisition. Zhou Pei et al. [?] found that interpersonal relationships have inducing or blocking effects on user information encountering. X. Zhou et al. [?] found that diverse interpersonal relationships are more likely to produce information encountering experiences. Additionally, as shown in the information encountering occurrence model, organizational-level information encountering requires certain facilitating conditions. An open and free organizational atmosphere can effectively promote information transfer and sharing among organizational members, thereby generating information encountering. Compared with Western societies, Chinese society as a "high power distance country" makes information encountering less likely to occur in communication between employees and leaders, and the organizational environment affects organizational information encountering to a certain extent [?].

Regarding the task environment, academia generally believes that task contexts affect users' mentality and perception, thereby affecting the probability of information encountering. Yuan Hong et al. [?] explored information encountering in both task-based searching and non-task browsing contexts. Pan Shuguang [?] explored encountering behaviors in four contexts: information retrieval, browsing, information interaction, and knowledge innovation. Time pressure is a sense of urgency users feel when retrieving information and is a major influencing factor in task contexts. Research by T. Jiang et al. [?] and S. Webber [?] found that in time-abundant, relaxed environments, users' emotions are relatively stable, they can distribute their attention to other information, thereby expanding information sources and facilitating the discovery of potentially useful information, thus promoting information encountering.

2.3.4 Information Technology Factors Information technology refers to retrieval, processing, and communication technologies involved in information generation, transfer, storage, and exchange. With the development of the Internet and big data, computers and mobile phones have gradually become information media supported by information technology. Information encountering behaviors are no longer limited to traditional media such as libraries. The development of information technology affects information encountering to a certain extent. This study decomposes information technology into four categories based on attribute differences: social media technology, personalized recommendation technology, hypertext technology, and hypermedia technology, as shown in Figure 9 [Figure 9: see original paper].

Regarding social media technology, C.J. Lu [?] found that frequent information interaction in social networks makes information sources and destinations multidirectional and information flow rates high-speed, which promotes information encountering to a certain extent. S. Panahi [?] pointed out that social network platforms collect and filter user data to recommend potentially valuable information to users, thereby triggering information encountering.

In terms of personalized recommendation technology, this technology analyzes

and models users' interests, hobbies, and behaviors, and provides "personalized" and "customized" services based on analysis results [**?**]. While personalized recommendation technology improves users' search efficiency, it also reduces the possibility of users encountering other information. C. Lutz et al. [**?**] explored whether algorithmic filtering brings homogenization and poor user experience, and based on survey data from 1,173 German Internet users, found that user satisfaction on social media is positively correlated with information serendipity. O.D. Bruijn and R. Spence [**?**] similarly believed that excessive use of personalized recommendation technology causes individuals to miss much potentially useful information.

Regarding hypertext technology, network reading based on this technology has gradually become popular, causing traditional print media to be gradually replaced by digital information dissemination technology. Hypertext reading is a non-linear process of following links, where users read fragmented rather than whole-text information [**?**]. The uncertainty of various links leads to uncertainty in reading procedures, direction, attention, and understanding [**?**]. During hypertext reading, although users may get "lost," they may also encounter useful or interesting information.

In terms of hypermedia technology, this technology adds multimedia information such as pictures and animations to the pure text basis of hypertext. The hypermedia environment features rich information resources, flexible organizational structures, and high operational interactivity [**?**]. In hypermedia learning environments, there are numerous "seductive details" that can divert user attention but are irrelevant to learning. When learners deviate from their original intention and notice new content, they experience unexpected surprise effects (serendipity effect) and distraction problems (distraction problems), which also generate "information encountering." However, numerous studies indicate that not all information technology impacts on information encountering are positive and require appropriate control.

2.4 Construction of Information Encountering Knowledge System Framework

After systematically analyzing existing research, this study summarizes the research framework of domestic and international information encountering behavior, as shown in Figure 10 [Figure 10: see original paper]. Overall, the research approach to information encountering first identifies research questions based on target groups, then conducts further research according to existing theoretical models and research gaps.

As shown in Figure 10, the field of information encountering behavior research has formed a clear analytical framework. The basic process involves: comprehensively analyzing existing research, extracting involved theoretical models, identifying unexplored areas as sources of innovation, and conducting further research. It is not difficult to find that in existing information encountering

research, foreign studies are more detailed, specific, and abundant, mainly focusing on refined research for different demographic groups. Domestic research is relatively concentrated, mostly using university teachers, students, and library users as research samples. Existing model constructions, such as process models, occurrence models, perception models, and cognitive models, have laid a solid foundation for future in-depth research on information encountering. Meanwhile, qualitative research, quantitative research, and their combinations have formed a rich methodological system. Notably, early literature on information encountering mostly discussed influencing factors from three aspects: information, environment, and individuals. With the deepening influence of information technology, it has emerged as another important factor affecting information encountering behavior. Additionally, post-encounter information behavior, as a key link in value realization, has received less attention in current research and deserves further investigation.

3 Frontiers and Prospects of Information Encountering Behavior Research

3.1 Research Frontiers

Currently, most research focuses on the occurrence of information encountering and factors influencing its occurrence, neglecting the value realization of encountered information after occurrence. However, information encountering is a dynamically occurring process. From the information encountering process model perspective, after examining encountered information, users generate subsequent behaviors such as sharing, using, and storing. As the final link in the information encountering process, research on subsequent behaviors can not only explore utilization pathways and value of encountered information and help guide users to properly utilize information encountering, but also supplement existing research in this field [**?**]. Therefore, research on the utilization of encountered information has gradually become a research frontier in this field. This paper reviews research on encountered information utilization, establishes a systematic analytical framework as shown in Figure 11 [Figure 11: see original paper], and conducts in-depth analysis and discussion on encountered information management methods and value realization.

3.1.1 Research on Encountered Information Management Methods

The accidental and unordered nature of encountered information makes it difficult for users to obtain through active searching on one hand, and once missed, difficult to re-encounter on the other. Therefore, research on sharing and storage methods for encountered information is particularly important, which is uncommon in most information behavior research. C.C. Marshall and S. Bly [**?**] investigated information encountering in daily life and found that people save encountered information through clipping to ensure re-encountering at appropriate times. Clipping also ensures the integrity of encountered information for prompting recipients when needed, effectively solving the preservation and

management problems of encountered information. Given that network tools have brought great convenience to information management, "favorites," "sticky notes," and "links" have become more commonly used management aids. Some scholars have focused on this issue, such as K.N. Stewart and J. Basic [**?**], who believed that university information literacy courses need to further improve students' abilities to manage and retrieve encountered information using network tools.

3.1.2 Research on Encountered Information Value Realization The value of user encountering experiences can only be realized after information is utilized, but existing research pays little attention to the specific value of encountered information. Only a few scholars have investigated users' psychological characteristics during encountered information utilization through surveys and interviews to analyze its value. Regarding sharing of encountered information, C.C. Marshall and S. Bly [**?**] found that sharing encountered information can help users establish common awareness and strengthen social connections through common interests or values. S. Erdelez [**?**] interviewees indicated that they share encountered information that interests both themselves and others, as well as information useful to other users but not interesting to themselves. Research on use and storage of encountered information indicates that information related to past problems can help users solve outstanding puzzles, information related to current problems can help users make decisions, and information related to future problems can increase users' knowledge reserves. Additionally, Pan Shuguang [**?**] explored the mechanism by which encountered information helps users clarify and satisfy their information needs. Tian Lizhong et al. [**?**] explored academic problem-solving information encountering and found that encountered information can help researchers solve problems and increase their knowledge reserves. A. Foster and N. Ford [**?**] research indicated that the value of encountered information sources should not be underestimated.

3.1.3 Research on Influencing Factors of Encountered Information Utilization Although there is substantial research on influencing factors of information encountering, there is scarce in-depth analysis of factors influencing encountered information utilization. Unlike common information acquisition behaviors in information systems, given the coincidental and non-purposeful nature of encountered information acquisition, research on influencing factors of encountered information utilization can not only strengthen understanding of the information encountering value chain but also represent a further improvement of research in this field. In recent years, some scholars have attempted to summarize factors influencing encountered information sharing, use, and storage. Yuan Hong and Wang Zhipeng [**?**] found that most users choose to immediately use or save encountered information, while high-encounter users are more willing to share after encountering, and users' sharing of encountered information is greatly influenced by platform functions. Li Ruyin et al. [**?**] found that friendship need and achievement need promote students' sharing of encountered

information. C.C. Marshall and W. Jones [**?**] found whether to save encountered information depends on information importance and users' information processing capabilities.

3.2 Research Prospects

Through comprehensive review and analysis of existing literature, although current research on information encountering behavior has made considerable progress, there remain some research gaps and deficiencies for future research to address. Future research can be expanded in the following aspects:

3.2.1 Information Encountering Research Based on Information Search Process Chain Information encountering is an unexpected gain in users' information seeking process. Although existing research recognizes that information encountering is a dynamically occurring process [**?**], research on information encountering from the perspective of the entire information search chain remains lacking. Questions such as at which stage of the information search process chain users are more likely to experience information encountering and what characteristics information encountering has at different stages are worth further exploration. Therefore, in future research, researchers can track users' information search processes through simulation models to explore dynamic occurrence patterns of information encountering at different stages of information search.

3.2.2 Information Encountering Research Based on Mobile Internet The rapid development of mobile terminal technology has made handheld devices including mobile phones and tablets the main channel of information sources [**?**]. The mobile Internet better embodies the "people-oriented" concept of the information age. Its location-based, trajectory-based, and context-based mobile personalized recommendation systems can not only help users search for needed information faster and better but also facilitate information encountering. However, current research on information encountering mainly focuses on offline physical environments and online computer environments, with limited research on information encountering in mobile device environments. Therefore, the impact of hardware factors, software factors, and user behavior habits in mobile Internet contexts on information encountering requires further research.

3.2.3 Objective Data-Driven Information Encountering Research Most existing information encountering research uses common social science methods such as questionnaires, interviews, and experiments to collect data. Survey subjects need to independently judge the occurrence of information encountering, inevitably mixing researchers' and subjects' subjective consciousness [**?**]. With the continuous integration of interdisciplinary fields, more methods originally applied in clinical medicine are being used in user psychological and behavioral research to obtain reliable data that are difficult or impossible to

obtain using traditional tools. Applying neuro-information system research methods to information encountering research can obtain more objective and credible data than traditional tools in some ways, and objective data-driven information encountering research will bring breakthrough progress to this field.

3.2.4 Interdisciplinary Information Encountering Cross-Research Information encountering research initially focused on offline physical environments such as libraries and bookstores. Although more scholars have shifted their focus from offline to online channels, research breaking through the limitations of information system disciplines is relatively lacking. Given that rich application scenarios all have the possibility of information encountering and produce unexpected value—for example, J. Wang et al. [**?**] found that information encountering often leads consumers to make unplanned purchases when studying online consumers' actual purchase information decisions—it is evident that information encountering behavior is not only a research topic in information systems but can also be extended to marketing and advertising research. In future information encountering research, multi-perspective and multi-disciplinary research topics are valuable directions.

References

[1] ERDEEZ S. Information encountering: it' s more than just bumping into information[J]. Bulletin of the American society for information science and technology, 1999, 25(3): 26-29.

[2] ROSS S C. Finding without seeking: the information encountering in the context of reading for pleasure[J]. Information processing & management, 1999, 35(6): 783-799.

[3] FOSTER A E. Nonlinear model of information-seeking behavior[J]. Journal of the society for information science and technology, 2004, 55(3): 228-237.

[4] ERDEEZ S. Investigation of information encountering in the controlled research environment[J]. Information processing & management, 2004, 40(6): 1013-1025.

[5] Kurata. Re-examination of user behavior models for information encountering: research on information encountering on the web[J]. Library and information science, 2006(55): 47-69.

[6] CUNHA M P E. Serendipity: why some organizations are luckier than others[EB/OL]. [2018-07-23]. https://papers.ssrn.com/sol3/papers.cfm?abstract_{id}=882782.

[7] LAWLEY J, TOMPKINS P. Maximising serendipity: the art of recognising and fostering unexpected potential—a systemic approach to change[EB/OL]. [2018-07-23]. http://www.cleanlanguage.co.uk/articles/articles/.224/1/Maximising-Serendipity/Page1.html.

[8] BRUIJN O D, SPENCE R. Serendipity within a ubiquitous computing environment: a case for opportunistic browsing[C]//International conference on ubiquitous computing. Berlin: Springer, 2013: 15-23.

[9] ZHU Qinghua, ZHAO Yuxiang. Theoretical exploration and application of mixed methods research in information science[J]. Journal of the China Society for Scientific and Technical Information, 2013, 32(12): 1236-1247.

[10] WILLIAMSON K. Discovered by chance: the role of incidental information acquisition in an ecological model of information use[J]. Library & information science research, 1998, 20(1): 23-40.

[11] HEINSTRÖM J. Psychological factors behind incidental information acquisition[J]. Library & information science research, 2007, 28(4): 579-594.

[12] KUKKA H, KOSTAKOS V, OJALA T, et al. This is not class: everyday information seeking and encountering in smart urban spaces[J]. Personal & ubiquitous computing, 2013, 17(1): 15-27.

[13] STEWART K N, BASIC J. Information encountering and management in information literacy instruction of undergraduate students[J]. International journal of information management, 2014, 34(2): 74-79.

[14] PÁLSDÓTTIR Á. The connection between purposive information seeking and information encountering[J]. Journal of documentation, 2014, 66(2): 224-244.

[15] YANG Yü, HUANG Yeman. Research on influencing factors of user information encountering behavior in social network environments[J]. Digital Library Forum, 2017(6): 65-72.

[16] LOU Yinyin. Research on information encountering phenomenon in medical university libraries: taking Tianjin Medical University Library as an example[J]. Library Work and Study, 2017(3): 88-92.

[17] GUO Haixia. Investigation and research on information encountering in web browsing[J]. Journal of Intelligence, 2013(4): 47-50.

[18] YUAN Hong, WANG Zhipeng. Research on information encountering phenomenon in digital library utilization[J]. Library and Information Service, 2014, 58(17): 104-111.

[19] MAO Zhenpeng. Investigation and guidance service countermeasures of mobile digital information seeking behavior based on information encountering: taking mobile digital library users in Qingdao, Shandong Province as an example[J]. Research on Library Science, 2015(8): 45-50.

[20] DU Xue, LIU Chunmao. Survey experimental study on individual characteristics of influencing factors of online information encountering[J]. Library and Information Service, 2015, 59(11): 119-126.

[21] LI Ruyin, DENG Xiaozhao. Research on influencing factors of encountered information sharing behavior among university graduate students[J]. Information Studies: Theory & Application, 2016, 39(11): 84-88.

[22] MARSHALL C C, BLY S. Sharing encountered information: digital libraries get a social life[C]//ACM/IEEE joint conference on digital libraries. New York: ACM, 2004: 218-227.

[23] MIWA M, EGUSA Y, SAITO H, et al. A method to capture information encountering embedded in exploratory web searches[EB/OL]. [2018-07-23]. http://www.informationr.net/ir/16-3/paper487.html.

[24] JIANG T, LIU F, CHI Y. Online information encountering: modeling the process and influencing factors[J]. Journal of documentation, 2015, 71(6): 1135-1157.

[25] PANAHIS S. Information encountering on social media and tacit knowledge sharing[J]. Journal of information science, 2016, 42(4): 539-550.

[26] MCCAY-PEET L, TOMS E G. The process of serendipity in knowledge work[C]//Proceedings of the third symposium on information interaction in context. New York: ACM, 2010: 377-382.

[27] ZHOU Xiaoying, CAI Wenjuan. College students' online health information seeking behavior patterns and influencing factors[J]. Information and Documentation Services, 2014(4): 50-55.

[28] PONTIS S, KEFALIDOU G, BLANDFORD A, et al. Academics' responses to encountered information: context matters[J]. Journal of the Association for Information Science & Technology, 2015, 66(8): 1883-1903.

[29] TIAN Lizhong, YU Bi?. Research on influencing factors of researchers' information encountering[J]. Information Science, 2013(4): 71-77, 85.

[30] TIAN Mei. Grounded analysis of influencing factors of encountered information sharing behavior in web browsing[J]. Library and Information, 2015(5): 117-122.

[31] MAKRI S, BLANDFORD A. Coming across information serendipitously –Part 2: a classification framework[J]. Journal of documentation, 2012, 68(5): 706-724.

[32] YUAN Hong, ZHU Yuanyuan. Research on consumer information seeking efficiency in social media environments[J]. Information Science, 2014(11): 62-70.

[33] FOSTER A, FORD N. Serendipity and information seeking: an empirical study[J]. Journal of documentation, 2003, 59(3): 321-340.

[34] ERDEEZ S, BASIC J, LEVITOY D D. Potential for inclusion of information encountering within information literacy models[J]. International journal of information management, 2011, 31(6): 15-19.

[35] LEWICKI P, HILL T, CZYZEWSKA M. Nonconscious acquisition of information[J]. American psychologist, 1992, 47(6): 796-801.

[36] ZHANG Qian, DENG Xiaozhao. Literature review on encountered information utilization[J]. Library and Information Service, 2014, 58(20): 138-144.

[37] WANG Wentao, XIE Yangqun. Review of information encountering models[J]. Library and Information Service, 2014, 58(21): 130-135.

[38] TIAN Mei, ZHU Xuefang. Cultivation of university students' information encountering ability based on current information literacy models[J]. Library and Information Service, 2015, 59(17): 41-46.

[39] ZHANG Yue, HU Cuihong. Research on influencing factors of information encountering process[J]. Information Research, 2017(6): 15-19.

[40] WANG Xiwei, LI Jiaxing, GUO Yu, et al. Research on influencing factors of mobile group-buying APP information adoption behavior: analysis based on information ecology perspective[J]. Library and Information Service, 2015, 59(7): 31-38.

[41] WANG Xiwei, LIU Duo. Research on elements and evaluation index construction of enterprise information ecosystem[J]. Library and Information Service, 2010, 54(16): 22-25.

[42] STEWART K N, BASIC J. Information encountering and management in information literacy instruction of undergraduate students[J]. International journal of information management, 2014, 34(2): 74-79.

[43] WANG Zhijin, HAN Zhengbiao, ZHOU Peng. Research on non-linear information seeking behavior[J]. Library Tribune, 2011, 31(6): 225-231, 281.

[44] JIANG Guanqun. Discussion on how to promote readers' information encountering in the new media era[J]. Library Research, 2015, 45(5): 116-118.

[45] HEINSTRÖM J. Fast surfers, broad scanners and deep divers—the influence of personality and study approach on students' information seeking[J]. Journal of documentation, 2005, 61(2): 228-247.

[46] LU C J. Accidental discovery of information on the user-defined social web: a mixed-method study[D]. Pittsburgh: University of Pittsburgh, 2012.

[47] PAN Shuguang. Research on information encountering in different contexts[J]. Information Research, 2012(8): 15-18.

[48] YU Bi?. Empirical analysis of information encountering concepts and characteristics: taking researchers as an example[J]. Journal of the China Society for Scientific and Technical Information, 2012, 31(7): 759-769.

[49] ZHOU X, SUN X, WANG Q, et al. A context-based study of serendipity in information research among Chinese scholars[J]. Journal of documentation, 2018, 74(3): 526-551.

[50] KEFALIDOU G, SHARPLES S. Encouraging serendipity in research: designing technologies to support connection-making[J]. International journal of human-computer studies, 2016, 89(5): 1-340.

[51] ZHOU Pei, HUANG Chunyan. Meta-ethnographic analysis of information encountering research[J]. Library and Information Service, 2014, 58(14): 115-120.

[52] WEBBER S. Blended information behavior in second life[J]. Journal of information science, 2013, 39(1): 85-100.

[53] SUN Xin, WANG Yonggu, QIU Feiyue. Research on personalized recommendation system for online learning resources based on collaborative filtering technology[J]. China Distance Education, 2012(8): 78-82.

[54] LUTZ C, PIETER H C, MECKEL M. Online serendipity: a contextual differentiation of antecedents and outcomes[J]. Journal of the Association for Information Science & Technology, 2017, 68(7): 1698-1710.

[55] ZHU Zhiyu. Research on network hypertext reading: based on survey analysis of college students' network reading behavior[J]. Library Work and Study, 2011(10): 116-119.

[56] ZHOU Xian. On works and hypertext[J]. Foreign Literature Review, 2008(4): 13-24.

[57] DIAO Chunting. The impact of learning tasks, cognitive style, and self-regulation on hypermedia learning[D]. Wuhan: Central China Normal University, 2012.

[58] ERDEEZ S. Information encountering: an exploration beyond information seeking[D]. New York: Syracuse University, 1995.

[59] MARSHALL C C, JONES W. Keeping encountered information[J]. Communications of the ACM, 2006, 49(1): 66-67.

[60] CHENG Shiwei. Research on adaptive user interface design for mobile devices based on context awareness[D]. Hangzhou: Zhejiang University, 2009.

[61] CHEN Qirong, CAO Zhiping. Scientific basic methodology[M]. Shanghai: Fudan University Press, 2004.

[62] WANG J, ERDEEZ S, JAMES T. Online consumer information encountering experience for planned purchase and unplanned purchase[C]//Proceedings of the 2011 iConference. Wuhan: Scientific Research Publishing Inc, 2011: 794-795.

Author Contributions:

Zhang Min: Determined research topics and formulated research plans.
Liu Ying: Conducted literature review, data analysis, and wrote the initial draft.
Zhang Yan: Responsible for paper revision, polishing, and English translation.

The conference announcement at the end of the original document has been omitted as it is not part of the academic paper content.

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