Factors Influencing Information-Seeking Behavior
ปัจจัยที่มีอิทธิพลต่อพฤติกรรมการแสวงหาสารสนเทศ

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Abstract

The aim of this study is to investigate factors affecting information-seeking behavior of users' information needs in different contexts of needs and situations of environments. A conceptual framework based on Wilson (1981), Wilson (1994), Ellis (1989), Kuhlthau (1993), Marchionini (1995), Johnson (1997), and Liu and Yang (2004) is employed to analyze influencing factors and barriers that users may encounter in their information needs while accessing, seeking, and using information.

The major findings indicate that three factors influencing the information-seeking process consist of those related information seekers, the contexts of needs (information sources), and the manner of interaction with the search systems. However, the information seekers have played the most important role in information-seeking all situations. This is in accordance with results from recent information-seeking research which analyzed information needs from the user perspective, as opposed to the system perspective.

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With the advent of mobile devices, the information seekers can access information sources anytime and anywhere. Although it is a challenge to study users' behavior in the context of new technologies, the researcher recommends that the models be applied and tested with the new innovative paradigm. Moreover, the researcher suggests other models for doing empirical future research.

Keywords: Information-seeking behavior, Information need, Information seeker, User-centered approach, Paradigm

บทคัดย่อ

วัตถุประสงค์ของการศึกษาครั้งนี้ เพื่อค้นหาแสวงหาปัจจัยที่มีผลกระทบต่อพฤติกรรมการแสวงหาสารสนเทศของผู้ใช้ ที่ต้องการสารสนเทศในบริบทที่แตกต่างกัน ผู้วิจัยใช้ 7 ตัวแบบพฤติกรรมการแสวงหาสารสนเทศ (1) วิลสัน (1981) (2) วิลสัน (1994) (3) เอลลิส (1989) (4) คัลเธา (1993) (5) มาร์ซิโอนีนี (1995) (6) จอห์นสัน (1997) และ (7) หลิวและหยาง (2004) เป็นกรอบแนวความคิดเพื่อการวิเคราะห์ปัจจัยและอุปสรรคที่มีอิทธิพลต่อผู้แสวงหาสารสนเทศขณะที่กำลังดำเนินการค้นหาสารสนเทศที่ต้องการ

ผลการวิเคราะห์พบสามปัจจัยที่สำคัญประกอบด้วย (1) ผู้แสวงหาสารสนเทศ (2) บริบทที่ต้องการสารสนเทศ และ (3) การปฏิสัมพันธ์กับระบบการค้นหาสารสนเทศ อย่างไรก็ตาม ผู้แสวงหาสารสนเทศเป็นปัจจัยที่มีบทบาทสำคัญมากในการแสวงหาสารสนเทศ และผลการศึกษาดังกล่าวมีความสอดคล้องกับงานวิจัยด้านการแสวงหาสารสนเทศอื่น ๆ โดยเน้นผู้ใช้เป็นศูนย์กลางซึ่งตรงข้ามด้านระบบสารสนเทศ

ด้วยความเจริญก้าวหน้าของเทคโนโลยีโทรศัพท์มือถือ ผู้แสวงหาสารสนเทศสามารถเข้าถึงแหล่งสารสนเทศได้ทุกที่ทุกเวลา การศึกษาวิจัยเกี่ยวกับพฤติกรรมของผู้ใช้ในบริบทของเทคโนโลยีใหม่ ๆ เป็นสิ่งที่ท้าทาย ผู้วิจัยจึงได้เสนอแนะว่าตัวแบบพฤติกรรมต่าง ๆ เหล่านี้ มีความจำเป็นที่ต้องมีการปรับปรุงและทดสอบเพื่อให้สอดคล้องกับการเปลี่ยนแปลงกระบวนทัศน์ของผู้ใช้และนวัตกรรมใหม่ ๆ

นอกจากนี้แล้วผู้วิจัยได้เสนอแนะตัวแบบพฤติกรรมเพิ่มเติมสำหรับการทำวิจัยเชิงประจักษ์ในอนาคต

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1. Introduction

First, the researcher covers the history of information seeking from its origin and the paradigm shift from a system-centered approach to a user-centered approach. Second, the researcher provides definitions of models and models of information-seeking behavior in information science: (1) Wilson's model (1981; 1994), (2) Ellis's model (1989), (3) Kuhlthau's model (1993), (4) Marchionini's model (1995), (5) Johnson's model (1997), and (6) Liu and Yang's model (2004). Third, the researcher builds a conceptual framework for analyzing the factors influencing information-seeking behavior including summaries and perspectives concerning information-seeking behavior.

2. History of information seeking

The development of modern information seeking can be traced back to nearly 50 years ago. A major event for information seeking was the 1958 Conference on Scientific Information (Ingwersen & Jarvelin, 2005). It evolved from information retrieval in terms of a system's focus to human-centered approach. From 1960 to the mid-1980's, research in information seeking applied survey type studies on information seeking in institutional contexts. These early studies focused on information system viewpoints.

The researchers mainly conducted in the framework of the information systems and system needs. Choo and Auster state that the

research in the field of information seeking behavior focused on a system-centered approach (as cited in Case, 2007). The research resulting from studying information seeking behaviors of users concluded that the system-centered approach regularly failed to satisfy the need of user. Therefore, from1986 onward was a period of reorientation in information-seeking research. The literature focusing on systems-orientation approach was shifted toward user needs.

3. Definitions of models

Generally, model represents entities in many forms of relationships, but the relationships depend on the contexts of entities. For example, the statistical model of a simple regression shows relationships between dependent variable (Y) and independent variable (X). This model also has a linear equation relationship to explain cause and effect of Y and X as symbol (Y = a+bX); an *a* is a constant value, and a *b* is the value of coefficient correlation.

Bates (2005) states that information-seeking behavior model not only represent in diagrams displaying relationships, but it also can be described in a sentence (p. 4). Human beings have many different activities and their behaviors are complex and hard to understand. To respond seekers' information needs, many researchers in the field of information science create models to represent, explain and understand seekers' information-seeking behavior. Wilson (1999) points out that

> "A model may be described as a framework for thinking about a problem and may evolve into a statement of the relationships among theoretical propositions. Most models in the general field of information behavior are of the former variety: they are statements, often in the form of diagrams

that attempt to describe an information-seeking activity, the causes and consequences of that activity, or the relationships among stages in information-seeking behavior. (p. 250)"

4. Models of information-seeking behavior in information science

The primary purpose of models in information behavior studies is to create a relationship between the theoretical proposition, the factors affecting the process of information seeking and satisfying needs (Malki, 2005). There are numerous models of information-seeking behavior in information science. Seven models are presented here: 1) Wilson's (1981, 1981 revised, as cited in Wilson, 1999); 2) Wilson's (1994); 3) Ellis's (1989); 4) Kuhlthau's (1993); 5) Marchionini's (1995); 6) Johnson's (1997); and 7) Liu and Yang's (2004).

4.1 A conceptual framework

Based on these models and the reviewed literature, a conceptual framework is depicted in Figure 1 with arrows representing causal relationships.

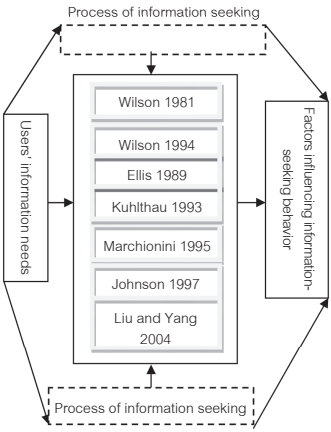

Figure 1 Seven models of information-seeking behavior represented in a conceptual framework

This conceptual framework is proposed for analyzing the factors influencing information-seeking behavior. The researcher begins discussing Wilson's first model (1981) and others will be discussed subsequently.

4.2 Wilson's model (1981)

Wilson developed a series of models that have been validated in the practice of information seeking research (Malki, 2005). Wilson might be the first researcher to present the concept of information seeking-behavior (Thorsteinsdottir, 2005). Wilson's 1981 model consists of twelve components starting with the "information user" (Case, 2007, p. 123) and shows the relationship of information–seeking behavior and information needs, use, transfer, and exchange as shown in Figure 2.

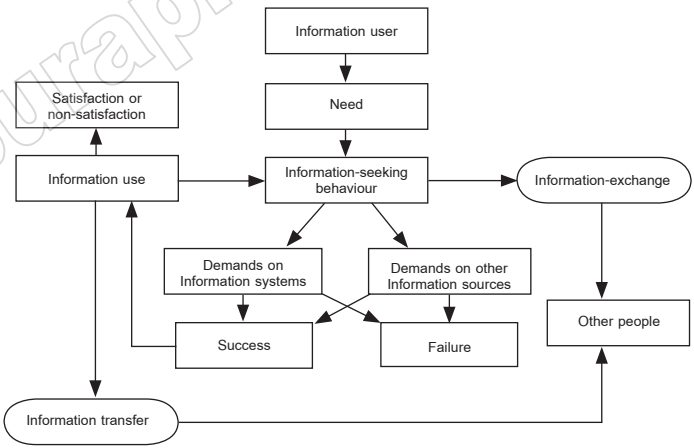

Figure 2 Wilson's model of information behavior (Wilson, 1999, p.251)

However, information need is a consequence of a need perceived by an information user. In response to information need, the user initiates a search for information sources: replace formal or informal information sources or services (Wilson, 1999). The outcome of the "process of seeking" or "accessing information sources" is either failure or success. Therefore, the user's information needs can be measured in terms of satisfaction or dissatisfaction. Moreover, this model also details the relationship between information-seeking behavior of user and other people to exchange information.

That is, individuals themselves can be both channels and sources of information (informal) in several situations. For example, in a traditional way, the user comes to ask the reference librarian in the library, but in an electronic environment, the user accesses remote information sources to seek information or chats online with the reference librarian (Case, 2007).

4.3 Wilson's 1981 revised model

Wilson's second model has been modified in 1994 from his origin model 1981, which consists of three components: context of information needs, barriers, and Ellis's eight activities in 1989 his model– starting, chaining, browsing, differencing, monitoring, extracting, verifying, and ending (Wilson, 1997). Users' information needs relate to person context, social context, and environment context.

Wilson (1997) states, "the personal information needs consist of physiological, affective, and cognitive state" (p. 552). He also points out that the context of information needs can be information sources cause the barriers to information-seeking behaviors as shown in Figure 3.

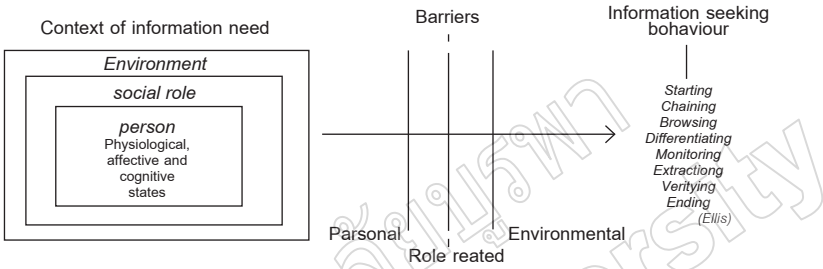

Figure 3 Wilson's model of information behavior (Wilson, 1999, p.252)

The barriers or intervening variables are composed of personal barriers (emotional variables, educational variables, demographic variables), social or role-related barriers (interpersonal variables), and environmental barriers (economic variables, sources characteristics) (Wilson, 1997, p. 556).

Furthermore, Wilson (2005) also proposes that information-seeking behavior as problem-solving process is related to other stages. Therefore, the information seeker employs several strategies to "move through the problem solving stages of problem recognition, problem identification, problem resolution, and solution statement" (Wilson, 2005, p. 35).

4.4 Ellis' model (1989)

Ellis proposes a model of information-seeking behavior rooted in information retrieval system. The original model focuses on empirical research by academic social scientists (Ellis, 1989). The purpose of this model is to improve the design of the information retrieval system in online environment (Ellis, 2005). This model uses the term "features" or activities rather than "stages" (as cited in Wilson, 1999). It also has a set of six information-seeking activities. These activities are described and defined as follows (Ellis 2005):

• *Starting*- activities characteristic of the initial search for information

• *Chaining*- following chains of citations or other forms of referential connection between material

• *Browsing*- semi-directed searching in an area of potential interest

• *Differentiating*- using differences between sources as a filter on the nature and quality of material examined

• *Monitoring*- maintaining awareness of developments in a field through the monitoring of particular sources

• *Extracting*- systematically working through particular sources to locate material of interest.

Furthermore, Ellis states that "interaction of the features in any individual information seeking pattern will depend on the unique circumstances of the information seeking activities of the person concerned at that particular point in time" (as cited in Wilson,1999). This means that seeker's information-seeking activities do not occur in a sequence of activities for searching the information with different persons or with the same person at different times. However, the original model has been developed and applied for studying others groups of researchers such as English literature researchers, physicists, chemists, and engineers (Ellis, 2005).

4.5 Kuhlthau's Model of Information Search Process (1993)

Kuhlthau (1993) developed a model of information-seeking behavior called Information Search Process (ISP), which based on construct theory and incorporates the attributes of different stages of cognitive (thoughts), affective (feelings), and physical (actions) behaviors of the individual information searcher into each stage when facing a situation

where seekers must search for information to complete a task. The six stages of this model consist of: 1) task initiation, 2) topic selection, 3) focus exploration, 4) focus formulation, 5) information collection, and 6) presentation, as shown in Figure 4.

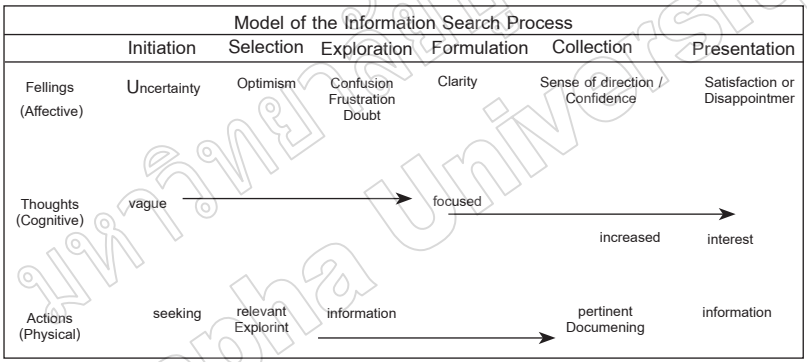

Figure 4 Kuhlthau's Model of Information Search Process (Kuhlthau, 2004, p.82)

The Kuhlthau model was originally designed for users of the traditional library in an educational environment. She has conducted empirical studies of students' information-seeking behavior in libraries (Kuhlthau, 1994). At the same time, she has developed a series of models and those models have been tested in many studies concerning students and information seeking. For instance, she conducted a small-scale qualitative study of high school seniors who were assigned research papers. Meanwhile, other researchers applied her model to study information- seeking behavior of end-users in the physical world.

They found the ISP model to be good for describing and understanding the patterns of thoughts, feelings, and actions individual go through when faced with a task involving an information-seeking component. Nevertheless, this model has been tested in both qualitative

and quantitative empirical studies in the context of the physical environment including the virtual environment. Byron and Young (2000) examined the applicability of the ISP model in the context of virtual learning. This study confirms that students in a virtual learning environment, regardless of level of computer skill, exhibit the stages indicated by the ISP model.

4.6 Marchionini's Model of Information Seeking Process (1995)

Marchionini proposes a model of the information-seeking process applicable in electronic environments. In his model, the information seeking process is composed of eight sub processes that develop in parallels: 1) recognize and accept information problem, 2) define and understand the problem, 3) choose a search system, 4)formulate a query, 5) execute search, 6) examine results, 7) extract information, and 8) reflect/ iterate/stop as shown in Figure 5.

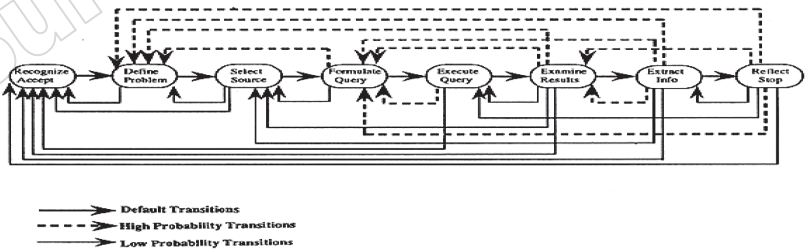

Figure 5 Marchionini's Model of Information Seeking Process

Information seeking of this model begins with the recognition and acceptance of the problem and continues until the problem is resolved. It is also both systematic and opportunistic (Marchionini, 1995, p. 49). Furthermore, this model includes a set of factors that accounts for several elements encountered on the human information seekers. Those factors include: information seeker, task, search systems, domain, setting, and search outcomes. Each of these factors is viewed as an element or concept

to be managed by an information seeker as information seeking progresses (Marchionni, 1995).

The first step is to recognize and accept an information problem driven by two types of motivation consisting of internal and external motivations. The second step is to define and understand the problem as a task, with properties that allow progress to be judged, and then an information seeker needs to determine a general strategy to be used for subsequent steps depending on knowledge of task domain.

The third step is to choose a search system based on an information seeker's experience with the task domain, personal knowledge. Also, it can utilize multiple systems in the attempt to solve the task. In this step, some professionals can conduct searching in this domain and are able to predict where relevant information could be found. The fourth step is to formulate a query that involves matching and understanding of the task to a selected search system. The fifth step is the query formulated in, and then a search is executed.

The sixth step is to examine results returned from the query, which are intermediate outcomes that must be examined by the information seeker in order to make progress toward the completion of the task. The seventh step is the extracting information by judging information for relevance, and the eighth step is to reflect or stop with queries and result sets.

4.7 Johnson (1997)'s model proposes a Comprehensive Model of Information Seeking (CMIS)

Johnson proposes a model CMIS applicable in health environment. This model also consists of two parts: 1) seven elements-demographics, direct experience, salience, beliefs, characteristics, utilities, and actions-, and 2) three factors-antecedent factors, information-carrier factors, and information seeking actions as shown in Figure 6.

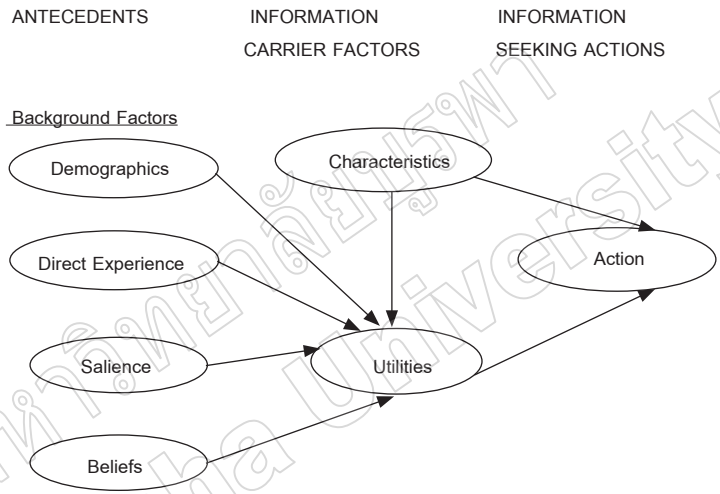

Figure 6 Johnson's Comprehensive Model of Information-Seeking

The purposes of this model are to study how individual information seeking and to analyze motivating force for information-seeking actions, which are caused by antecedent factors and information-carrier factors. First, the antecedent factors, which provide the initial motivating force for individual to seek information to meet his or her information needs, consist of four elements: 1) demographics, 2) direct experience, 3) beliefs, and 4) salience (Johnson, Donohue, Atkin, & Johnson, 1995).

These four elements can be classified into two main groups: the first group is background factors, which is the demographics (e.g., gender, age, ethnicity, education, occupation, and wealth), and direct experience with the information sources (e.g., databases, libraries, people). The second group is personal relevance, which has two elements: salience and beliefs. The salience depends on the level of degree of knowing and understanding the topics or perceiving of information to a problem that he or she faces (as Evans and Clark cited in Johnson et al., 1995).

The individual's beliefs about the outcomes of information seeking are important, useful, invaluable, and relevant to their information needs. Therefore, these beliefs make individuals themselves more confident to achieve their goals and to resolve their problems. If they cannot believe themselves that they can make with the problems, then they would be impeded by the information seeking (Johnson et al., 1995).

Second, the information-carrier factors-characteristics and utilities-deal with channels selected and used by seekers. Not only do the seekers select the channels of information sources based on their needs but also they prefer choosing the channels with which they are familiar (Case, 2007). Therefore, these two factors can determine information-seeking action, which lead seekers to find the right sources of information and channels (Malki, 2005).

4.8 Liu and Yang (2004)'s model of distance-education students' information-seeking process

Liu and Yang (2004) propose a model of distance-education students' information- seeking process as shown in Figure 7.

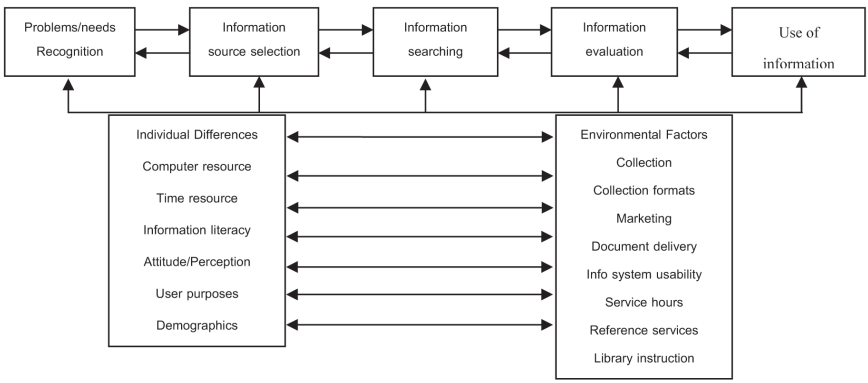

Figure 7 A Model of Distance-Education Students' Information-Seeking Process (Liu &Yang, 2004, p.25)

Liu and Yang (2004) believe “that the distance-education students’ information selection and usage is a reciprocal, interactive process, involving multilateral communication and individual difference” (p. 25). This model also consists of two components: (1) the five steps of the classic of the process of information seeking (problem/need recognition, information source selection, information searching, information evaluation, and use of information), and (2) factors influencing needs and information-seeking behavior (individual differences and environment factors).

The purpose of this model is to determine the principle factors that are useful for students’ decision processes of selecting and using their information sources in the context of distance education. Moreover, they have verified their model with students in the distance-education environments. They can classify four factors affecting access and use of information sources: physical information sources support, online information sources support, matching individual learning qualities, and geographical and temporal convenience. In the next section, the researcher compares and contrasts the reviewed models.

5. Analyze the factors influencing information-seeking behavior

5.1 Compare and contrast these models

All seven models of information seeking-behavior reviewed in the literature. They focus on users’ information needs. Therefore, the researchers employ a user-centered approach to develop their models. These models are classified by context of need, interaction, and stages or components as shown in Table 1.

However, the researcher found that some models have some distinct characteristics, while others have sharing communalities. In this case, the researcher discusses the characteristics of these models: disciplines, barriers, and interactions.

In terms of discipline bases, Wilson, Ellis, Kuhlthau, Marchionini, and Liu and Yang's respective models develop from the literature of information studies while Johnson's model develops from the field of communication. In terms of the barriers, these models have several aspects of barriers.

5.2 The discussed barriers of these models

Wilson's 1981 first model is in the context of user's information needs. This model is the broader general model and it does not indicate that document as sources of information but it refers to the "system", "sources", and "people" (Case, 2007). Wilson's 1981, revised first model points out barriers or intervene variable-personal barriers, social or role-related barriers, and environmental barriers-that prevent information seekers from the real access to information.

For the same reasons, Wilson's barrier variables in his models can be compared with factors discussed in Marchionini's, Johnson's, and Liu and Yang's models. In these three models, factors can affect users' information needs or the outcomes, which the outcomes can be measured in terms of satisfaction or relevance. Machionini explains that seeker encounters eight factor-information seeker, task, search systems, domain, setting, and search outcomes-while he or she seeks information in electronic resources to meet his or her information needs. Johnson also indicates two factor-antecedent factors, information-carrier-factor-affecting information seeking actions. As well as, Liu and Yang indicate two factor-Individual difference, and environment factor-influencing information selection and use.

More than that, the researchers focus on different interactions that influence seeker's information-seeking behavior. Wilson's, Kuhlthau's, Marchionini's, and Liu and Yang's models view information seeking as process, whereas Ellis's and Johnson's models view information seeking as

entity (thing) and action respectively. As a result, these models can be classified three types of the interactions.

5.3 Approaches of interactions with systems

Similarly, Wilson's, Marchionini's, and Liu and Yangs' models focus the approach of interaction with systems on problem-solving into the information-seeking process. By contrasting these three models in terms of interaction, Kuhlthau's model focus on information-seeking meaning process, Ellis's emphasizes information-search strategies, and Johnson's concentrates on information-seeking actions.

Ellis's model is different from Kuhlthau's model in that Kuhlthau's model proposes user's information-seeking behavior as stage. She also explains information-seeking behavior as a holistic view. Furthermore, each stage of information seeking consists of three elements: cognitive, physical and affective. The process of seeking information occurred in a series of stages as well. Whereas Ellis and Johnson do not view user's information-behavior as stages, Ellis reviews information-seeking behavior as activities or elements. Johnson also explains that information-seeking behavior of each activity separates the others. This means that the user may do the activities that may occur in random sequences with different users or with the same users at different times (Cases, 2007).

Johnson views information-seeking behavior as actions. The antecedent factors and the information-carrier factors motivate individual force for seeking information. These two factors also determine seekers to seek the right sources of information and channels. This means that information-seeking action moves in a chain-like sequence in one direction (Case, 2007). Next section, to sum up, these models are important to be applied to empirical research in their own fields and others.

6) Summaries and perspectives concerning information-seeking behavior

In this study, the researcher built a conceptual framework for understanding and analyzing the information-seeking behavior of users' information needs. The researcher also compared and contrasted stage models of interdisciplinary information-seeking behavior based on seven reviewed models as shown in Table 1. These models are similar to other models' information behavior in that they are based on empirical research, have been tested and can be applied to conduct research.

Wilson's model is employed for conducting research in the field of library and information science both physical and online environment, education, health and others. Ellis's model can apply for conducting research in library and other fields such as physics, chemistry, and engineering. Kuhlthau's model not only focuses on conducting research in a physical library; but it also can be applied for conducting research in an online library and a distance learning environment.

Marchionini's model is better than other models for conducting research in electronic resources environment and it has been also tested in a digital library and an engineering environment. Johnson's model focuses on the context of communication: individual, group, and organization. The last model is Liu and Yang's. They create their model for studying users in distance learning environment.

Furthermore, based on the findings in this study, three factors were found to affect the information-seeking process. These factors include the variations related to the individual information seeker, the context of need, and the manner of interaction with the search system. Of the factors having the effect, the information seeker was the most important determinant of information-seeking behavior. This might be due to individual differences and needs across all levels of the information seeking process.

The contribution of this study should increase our understanding of information-seeking behaviors of users' information needs. The researcher believes that the findings could make an important theoretical implication of this study based on models in information seeking. Therefore, the researcher proposes a new model of information-seeking behavior for doing research in the future by adding two constructs: core factors and evaluation as shown in Figure 8.

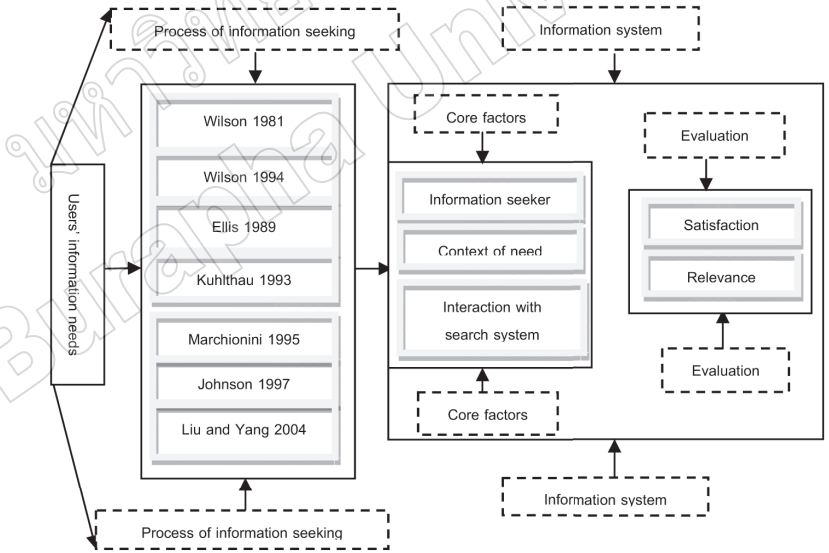

Figure 8 A new model of information- seeking behavior

Furthermore, future studies of information seeking should be conducted with the users of innovative information systems related to mobile technologies and Social Online Public Access Catalog (SOPAC). In addition, the models that are applied to the new technological paradigm should be tested to confirm that they can be a good fit for research in an area of information-seeking behavior. In addition to these models, the

researcher suggests that scholars in the field of information seeking should consider Roger's Diffusion of Innovations Theory to extend the research in this area because his model studies how to adopt the social innovation and predict users' behavior. Another model should be Technology Acceptance Model (TAM) that studies users' behavioral intention to use new technologies. Studying user behavior in information seeking, adoption, and acceptance can strengthen the development of models' information-seeking behavior. Thus, knowing and understanding of users' information seeking can help people in information technology to design better information systems that facilitate information retrieval and meet users' information needs.

TABLE 1 COMPARING SEVEN THE REVIEWED MODELS OF INFORMATION-SEEKING BEHAVIOR

Title of model	Contexts of needs	Interaction	Phases or components	Number of factors
Wilson's Model of Information Behavior (1981)	Physical and online environment	Problem-solving process	1. Information user 2. Need 3. Information-seeking behavior 4. Demands on information systems 5. Demands on other information sources 6. Informationexchange 7. Other people 8. Success 9. Failure 10. Information transfer 11. Information use 12. Satisfaction or non-satisfaction	12

Title of model	Contexts of needs	Interaction	Phases or components	Number of factors
Wilson's Model of Information Behavior (1994)	Professional users, social role, and environment	Problem-solving process	Add three barriers to the original model (1981) 1. Personal factor 2. Social factor 3. Environmental factor	12
Ellis's Model of Information Behavior (1989)	IR system	Activities	1. Starting 2. Chaining 3. Browsing 4. Differenting 5. Monitoring 6. Extracting 7. Verifying 8. Ending	8
Kuhlthau's Model of Information Search Process (1993)	Library	Seeking-meaning process	1. Initiation 2. Selection 3. Exploration 4. Formation 5. Collection 6. Presentation	6
Marchionnini's Model of Process Information-Seeking (1995)	Electronic Environment	Problem-solving process	1. Recongnize 2. Define&understand the problem 3. Choose a search system 4. Formulate a query 5. Execute search 6. Examine results 7. Extract information 8. Reflect/iterate/stop Six factors : 1. Information seeker 2. Task 3. Search system	

Title of model	Contexts of needs	Interaction	Phases or components	Number of factors
			4. Domain 5. Setting 6. Search outcomes	8
Johnson's Model (1997)	Communication	Actions	1. Demographics 2. Direct experience 3. Salience 4. Beliefs 5. Characteristics 6. Utility 7. Action Three factors 1. Antecedent factors 2. Information carrier 3. Information seeking actions	7
Liu and Yang (2004)	Distance learning	Problem-solving process	1. Problem/need recognition 2. Information source selection 3. Information searching 4. Information evaluation 5. Use of information Two factors 1. Individual difference 2. Environment factors	5

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