Modelling the Information Seeking and Use Process in the Workplace: Employing Sense-Making Approach

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Introduction

This paper reported a qualitative study into the information seeking and use process of eight auditors and eight engineers in their workplace contexts. (This doctorate research project has also studied eight architects, however, the analysis and findings have not been completed and are not reported here). The aim of this research project is to empirically develop a model, referred to as information seeking and use process model (or ISU process model), that can meaningfully reflect real-life practice. This model would have implications for information professionals involved in the management of information services, systems design and information literacy education.

Methodology

Participants

The two groups of participants were eight auditors and eight engineers working in Singapore. They have between one to five years of working experience in their profession. Auditors and engineers were chosen firstly, because they have long been recognised as "knowledge workers" who have to access, use, evaluate and generate large amount of information at work. More importantly, auditors' and engineers' respective professional associations have highlighted that their professions require people who are competent in seeking, using and managing information. Therefore, the author decided to study them to get a rich insight into how people seek and use information in the workplace.

Using quotes taken from the interview transcripts, the major role of the auditors being interviewed is "to ensure that internal controls in the audited companies are in place and adequate, and that established company policies are being followed, and no frauds are taking place." The major role of the quality engineers being interviewed is "to ensure that the products being manufactured are up to specified standards and achieve customer satisfaction."

Scope of the study

This study focused on how auditors and engineers seek and use information in answering questions they have in mind, in the course of completing their "audit assignments" and "engineering projects". This is based on the assumption that the questions people have can reflect their information needs at that particular moment in time.

Data Collection

The verbal protocol was the method used to collect data. Data was collected using in-depth unstructured interviewing. All interviews were conducted individually with each participant. Each interview lasted for approximately ninety minutes. The procedure for conducting interviews consisted of a warm-up session, in-depth interviews and a brief post-interview sharing session. First, the participants were informed of the aim of the study. Then, the participants were invited to sign a consent form for participation before the actual interview took place.

Each interview started with asking the participants to think of one or more specific projects that they have completed. The participants were then encouraged to share with the researcher the various stages that they have gone through in order to complete their work. This interviewing method is informed by Dervin's (1983) Micro-Moment Time-Line Interview, which she has put forward in applying the Sense-Making approach to study information needs and uses. The exact wording of the questions depended on the flow of each interview, the main questions were, with reference to a particular stage that the participants have shared:

1. What questions flash through your minds in this particular stage of the project?
2. What strategies do you use to get answers to your questions? Why do you choose to use this strategy?
3. What problems do you have in getting answers?
4. How does each answer help (or fail to help) you to carry on with your tasks?
5. What is your feeling at this stage?

The 90-minute interviews were conducted in a highly unstructured format. When sharing their experience, participants referred to different projects and to different stages in completing projects in no specific order. The researcher, thus, had to note down the main stages of the different projects being mentioned, and ask follow up questions.

Data Analysis

The interview dialogues were transcribed and analysed, both manually and with the assistance of a qualitative data analysis software titled NUD-IST. The categories (referred to as information seeking and using situations or "ISU situations") derived in the present study are developmental in nature. The categories emerged from the data, were modified, refined or abandoned as the analysis proceeded.

First, the researcher read each transcript and singled out all "ISU situations" that participants perceived they are involved in. These "ISU situations" were either directly mentioned by the participants (e.g. "I am trying to confirm") or inferred by the researcher from the answers shared by the participants. Then, each identified "ISU situation" was carefully compared against each other, to ensure that each situation carried a unique meaning. The categories continued to be refined until all the identified "ISU situations" were stabilised. They were then used as a framework to identify information behaviour associated with each situation. During the data collection and analysis process, the researcher avoided assigning categories based on prior literature, so as to ensure the trustworthiness of the outcome.

Preliminary Findings

The information seeking and using (ISU) process model developed in this study is made up of seven critically different situations that participants experienced in their workplaces. The seven ISU situations included (See Diagram 1):

(1) ***Task Initiating Situation***: this is the situation when participants perceive they have a new task to work on;

(2) ***Focus Forming Situation***: this is the situation when participants perceive they have to gain a better understanding of how they should go about carrying out their tasks or solving problems;

(3) ***Ideas Assuming Situation***: this is the situation when participants are forming ideas about how to carry out their tasks or to solve problems;

(4) ***Ideas Confirming Situation***: this is the situation when participants are trying to confirm the ideas they have assumed;

(5) ***Ideas Rejecting Situation***: this is the situation when participants encounter conflicting information or they cannot get the answers they need to confirm their assumed ideas;

(6) ***Ideas Finalising Situation***: this is the situation when participants are trying to seek formal consensus to finalise their ideas;

(7) ***Passing on Ideas Situation***: this is the situation when participants are presenting ideas to targeted audience.

Diagram 1: Seven Information Seeking and Using (ISU) Situations in the Workplace

Task Initiating Situation	Focus Formulating Situation	Ideas Assuming Situation	Ideas Confirming Situation	Ideas Rejecting Situation	Ideas Finalising Situation	Passing on Ideas Situation

The seven situations form an important framework for identifying information behaviour (which include physical, cognitive and affective aspects of information seeking and use activities) distinctively associated to each ISU situation. A snapshot of the analysis is presented in Diagram 2.

Diagram 2: Examples of the Relationship Between Situations and Information Behaviours

Situations	Choice of info sources	Info Relevance Judgement	Info organising strategies	Info presentation strategies	Feelings	Definition of info
Task initiating	* specific info sources given by boss	* accept easily	* mental	* to gather info	* doubtful * fear	* data, events, physical items, figures, words
Focus Formulating	* easily accessible, general source * low persistency in using one source	* accept easily	* mental	* to gather info	* ok	* raw data which can be applied

Ideas assuming	* general and specific sources	* more careful evaluation	* jot notes * make photocopies	* to gather info	* worried	* raw data which can be applied
Ideas Confirming	* specific source * authority source	* Compare against expectation, common sense, standards, information gathered from other source	* jot notes * make photocopies	* to gather info	* worried	* evidence, testing results, facts, reasons
Ideas Rejecting	* specific source * double check sources being used * authority source		* jot notes * make photocopies	* to gather info	* pressured * frustrated	* evidence, testing results, facts, reasons
Ideas Finalising	* specific source * authority source	* double confirm ideas	* start deleting irrelevant info	* to get feedback & consensus	* relax	* feedback, consensus
Passing on Ideas				* to pass on new knowledge & findings	* relax	* personal knowledge, value-added filtered information

The second major finding of this study is the correlation between each situation and the following aspects:

1. ***Use and choice of information sources***: participants use easily accessible, general information sources (e.g. magazines and Internet) in Focus Formulating Situation. Their persistence in using any information source is low. However, in Ideas Confirming and Ideas Rejecting Situation, people turned to use specific and authoritative information sources.
2. ***Information relevance judgement criteria***: participants "pick up" or "accept what people tell them" in Task Initiating and Focus Formulating Situations. And in Ideas Confirming and Ideas Rejecting Situations, they use more stringent criteria such as comparing data they gathered against: (1) expectation they have formed; (2) common sense; (3) standards and specifications; and (4) information gathered from various other sources. In Ideas finalising situation, the criteria are relaxed when they only need senior and authoritative parties to double-confirm ideas.
3. ***Information organisation strategies***: in most situations, participants would like to organise information mentally in their heads. However, in Ideas Confirming and Ideas Rejecting Situation, physical ways to organise information (e.g. jot notes, make photocopies) are pointed out by participants as important.
4. ***Information presentation strategies***: in most situations, the participants presented background information to the information sources (e.g. boss and colleagues-in-charge), aiming at getting relevant answers. In Ideas Finalising Situation, they presented information with an aim to get feedback and

consensus. In Passing on Ideas Situation, they aim at passing on new knowledge and findings they have to the targeted audience.

5. ***Feelings***: participants feel doubtful and fearful in the Task Initiating Situation. They get more worried in Ideas Assuming Situation and Ideas Confirming Situation, as they are unsure whether ideas can be confirmed. Their feeling is mostly negative in the Ideas Rejecting Situation, and described as pressurised and frustrated. In Ideas Finalising and Passing on Ideas Situations, they start to feel relaxed.
6. ***Definition of information***: in Task Initiating and Focus Formulating Situations, "information" is referred to as data, events, physical items, figures, words etc. In Assuming Ideas Situation, information becomes "those raw data which can be applied". In Ideas Confirming and Rejecting Situations, "information" is evidence, testing results, facts and reasons. In Ideas Finalising Situation, "information" is feedback and consensus from boss and clients. And in Passing on Ideas Situation, "information" is personal knowledge, assets, value-added and filtered management information.

The third major finding of this study suggested that ISU process in the workplace does not follow any specified sequential order. Instead, people moved between these seven ISU situations in multi-directional paths. This coincides with earlier findings conducted in the school environment by Kuhlthau (1993) and the theoretical information seeking model in the workplace derived from literature review (Leckie et al., 1996).

Implications and Significance of Findings

The major difference of the ISU process model developed in this research, when compared to previous information seeking research findings and models, is that this research has highlighted the always-moving nature of the process of human information seeking and use. Instead of presenting ISU process as a static model, consisting of a number of different stages, and arguing that there are many exceptions and that people may not experience the stages in a linear manner, the author has taken an alternative perspective.

The ISU process model developed here, being informed by Sense-Making methodology, is made up of seven ISU situations, and it is a non-linear model (i.e. people move in-between these situations in no specified order). This non-linear model suggests that although it is impossible to pre-determine what ISU situations (and in what order these situations) will be experienced, it is possible to associate distinctive sets of information seeking and use behaviours with different ISU situations. In this sense, the process of human information seeking and use is systematic, and thus human information seeking and use behaviours are predictable.

By directly addressing the dynamic nature of human information seeking and use, the model is able to suggest answers to challenges such as: Why don't people go through the ISU process step-by-step as prescribed in various models? Why is there no statistically significant correlation between participants' individual differences (e.g. age, years of experience) and ISU process? (Baldwin & Rice, 1997) Why does participant X demonstrate inconsistent behaviour in seeking and using information at different times? The answer, as presented in the model, is that the different situations people perceived they are involved in, could be a powerful predictor of people's physical, cognitive and affective information behaviour at that moment in time and space .

Taking this alternative perspective, this model does not rule out the validity of traditional information seeking models, presented mostly linearly. Rather, the traditional models are argued to be "limited", in that they only present one (probably

an exceptionally smooth and systematic process) among the many possible processes that people can experience when seeking and using information. This model, on the other hand, is more comprehensive, in that it can also explain information behaviours that are traditionally considered as an "exception", "looping back" or "iterative" (Kuhlthau, 1993; Cole, 1997; Eisenberg & Berkowitz, 1990; Cheuk, 1998).

Last, but not the least, this model can improve our understanding of the long lists of information needs and information seeking behaviour, which have been derived from various contexts in the past few decades. Rather than being satisfied with existing research findings which suggest that people belonging to certain unit, in general, use a standard set of information seeking behaviours. This model has attempted to transcend current understanding by exploring what information seeking behaviours are being used in different situations, thus, making it possible the better to predict human information seeking and use behaviour.

Conclusions

Employing the Sense-Making Approach, has a number of implications for the study of information seeking and use. Sense-Making asks researchers to look at the micro-time moment when people have information needs. It also asks researchers to understand how do people define the situations (at the micro-time moment when they have information needs). It proposes that human information seeking and using behaviour is responsive to the situations. Many studies, including the preliminary findings of this study, have confirmed this.

Employing Sense-Making Approach, on the other hand, ask researchers not to only focus on identifying "what" information behaviour, information sources, information strategies people use. It asks researchers to study "why" and what lead people to behave in particular ways. With this understanding, it is possible to design information services and systems which can fully support people’s movement through the dynamic process of information seeking and use.

In terms of practical implications, the ISU process model suggests that, for example, educators may need to re-think whether students should be taught to follow a "right" path to seek and use information. Systems designers may need to design information systems which can communicate with users, especially about which situations information users' perceived they are in when they log into the system, and thus suggest appropriate information sources, search functions and features pertaining to that situation.

This exploratory study was, nevertheless, constrained by the limited number of workplaces and participants being studied. The ISU process model in the workplace is tentative. Follow-up studies could contribute to a refined model by studying employees involved in different workplaces. The author has chosen to proceed from here, with the study of architects as the third professional group.

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