

## Information Seeking Behaviour Factors: A Measurement Model

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**Abstract**— Graduate students are active information seekers. Their experiences with information seeking range from novices to experts. Graduate students' understanding of the needed information and the different types of information sources accessible are essential for them to search for the required information effectively and efficiently. Previous studies concluded that insufficient knowledge about information seeking behaviour is one of the factors that contributed to failure in searching for useful information. This paper discuss about a study conducted to evaluate a measurement model of information seeking behaviour factors, which is a part of the methods used to develop Research Information Seeking Behaviour Model. The data was collected through survey method by using web-based questionnaire. The measurement model was validated using Structural Equation Modeling with AMOS 16.0. Eight factors were extracted from exploratory factor analysis and labeled as preliminary research needs, data research needs, printed information sources, electronic information sources, media information sources, library information search, electronic information search and information use. Results of the assessment of model fit showed that all the relevant measurements fit a value that exceeds the value recommended by previous researchers. In conclusion, the measurement model provides a reasonably good fit and suitable for the development of Research Information Seeking Behaviour Model.

**Keywords**- *information seeking behaviour, information retrieval, graduate student, research, model*

### I. INTRODUCTION

The growth of the Internet and World Wide Web (Web) enable information to be obtained from around the world at any time. Despite such advancement, research related to information retrieval showed that graduate students faced difficulties in locating and retrieving the required information effectively in order to support their research. This is because, they are unaware of the facilities and various sources of information available that can be utilized to find the required information.

Academic libraries are the first place that graduate students should visit when seeking for information. They contain a variety of information sources such as books, journals, theses, working papers, conference articles and research reports that can be used to support research. In addition to academic libraries, more information is available electronically on the Web. Although the Web is one of the options for getting the required information, graduate students often experience some difficulties when searching

for information using the Web such as the inability to obtain the required information. In seeking information effectively and efficiently, it is very important for graduate students' to understand their information needs and the different types of information sources that can be used. The approach involved in retrieving the relevant information or also known as the information seeking behaviour should begin with identifying the needed information. This is followed by selecting the appropriate sources of information and finding the required information by using selected strategies. However, there are graduate students who are unfamiliar with this approach.

This paper discusses past research on information seeking behaviour, its concepts and the development of a measurement model in an attempt to develop Research Information Seeking Behaviour Model.

This paper consists of six sections. In this section, the research background has been introduced. Section two describes the statement of problems, followed by section three which discusses the information seeking behaviour and its concepts. Then, section four describes the research methodology used in the study. Section five discusses the results of the study. The final section will conclude the paper.

### II. PROBLEM STATEMENT

In the process of seeking information, knowledge gaps will motivate graduate students to search for information based on their needs with the aim to increase their knowledge or solve certain problems. However, some students have difficulty in finding the information that meets their information needs [1, 2]. In addition, Shanahan [3] stated that several students also faced difficulties in searching for the required information. The problem must be addressed and emphasis should be given on a study about information seeking behaviour.

Limberg and Sundin [4] briefly discussed on the insufficient studies on students' information seeking behaviour who are the information users in the field of education. Furthermore, some students have low knowledge on information seeking behaviour and needs to improve more on knowledge about the processes of searching for information [5, 6]. Accordingly, the study of students' information seeking behaviour must be focused and enhanced so that students can use it as a guide in finding the necessary information to accomplish their research [7]. Yi [8] also highlighted the importance of the study on information seeking behaviour and the potential utilization of

the findings in the development of information retrieval systems.

### III. INFORMATION SEEKING BEHAVIOUR CONCEPTS

Information seeking behaviour is due to the specific information needs and knowledge gaps within an individual. To fulfill these gaps, each individual must pay more attention to their insufficient knowledge and try to find the relevant information to meet their information needs [9]. In general, information seeking behaviour could be defined as a behaviour which comprises of information needs as well as information search, selection and use of information relevant to the identified needs.

Williamson et al. [10] stated that information seeking behaviour includes information needs, the use of information sources to retrieve information and ends with the use of the retrieved information. This is in accordance with the study conducted by Majid and Kassim [11] who define information seeking behaviour as a broad term comprising of a set of actions such as information needs identification, searching for information, selecting information and using the retrieved information to satisfy the information needs identified earlier.

The information seeking behaviour activities perform by an individual in a working environment of an organization as reported by Ikoja-Odongo and Mostert [12] includes the determination of information needs, searching and using the needed information [12].

On the other hand, the method chosen by students to find and use information is defined by Kakai et al. [13] as activities that include searching for information based on their needs to complete assignments, prepare for group discussions and write a research paper. Therefore, information seeking behaviour for students involves the process of identifying information needs, finding, selecting, evaluating and using the retrieved information.

Previous researchers have developed a few models related to information seeking behaviour studies. Some of the models are Information Search Process Model, Ellis's Behavioural Model of Information Behaviour and Wilson's Model of Information Behaviour. Information Search Process Model is a six stages model by Kuhlthau which includes feelings, thoughts and actions attributes into the stages of the model. Unlike Information Search Process Model, Ellis's Behavioural Model focuses on six characteristics for seeking information. The six features of Ellis's Behavioural Model are called starting, chaining, browsing, differentiating, monitoring and extracting. Those characteristics provide a basis for the design of information retrieval system. Several elements in Wilson's Model of Information Behaviour are not present in Information Search Process Model and Ellis's Behavioural Model. Wilson's Model of Information Behaviour includes stress/coping, risk reward and social learning theories as activating mechanism that motivates an individual to search for information.

In the context of this study, the term information seeking behaviour is used to refer to the processes of identifying the needed research-based information, using information

sources to search for the required information, information search processes and using the required information in satisfying research needs. Fig. 1 shows the information seeking behaviour concepts identified in this study.

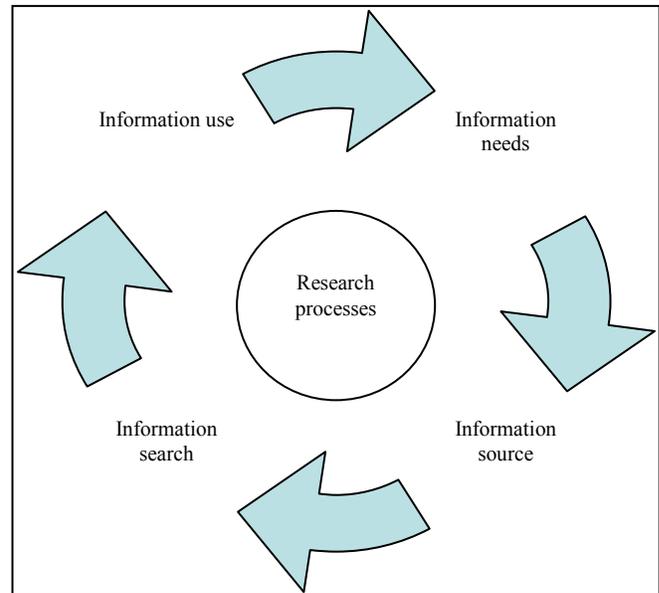


Figure 1: Information seeking behaviour concepts

#### A. Information needs

Information needs are actions taken by individual in finding relevant information for the purpose of fulfilling their knowledge gaps [14, 15]. According to Salim [16], information needs is the need to search for information in response to a need or interest, and is usually in the form of tasks to meet all required requirements for a task to be performed.

Information needs can also be considered as a future goal to be achieved [17]. Furthermore, information needs are the needs that cause individuals to find the required information resulting from their awareness on their insufficient knowledge [12]. Halder et al. [18] defined information needs as the desire to acquire knowledge in order to reduce the knowledge gap during problem solving process in academic environment.

Information needs in the context of this study is graduate students' need for research-based information which will enable them to carry out and complete their research project within its timeframe.

#### B. Information source

In the process of finding information, graduate students need to search for the required information by using a selection of information sources. According to Dempsey and Russel [19], the term information sources means sources of information such as books, Web, journal articles, proceedings, research reports and databases. Graduate

students must select and use the most appropriate information sources that will enable them to find the needed information. Thus, they need to understand the capability of the information sources in order to select the most suitable information sources.

The growth of information technology has made a positive impact on Web usage in searching for information. Several studies have revealed that students prefer to use the Web as one of the information sources in finding information [20, 21]. The Web can be classified as an electronic information source. Other than electronic information source, information sources identified in this study include printed information source and individual information source. Each information source has its own characteristic and information contained within it.

In the context of this study, information source is the source of information that contains information relevant to graduate students' information needs. It is based on their feedback about the types of information sources used to obtain information for their research project.

### C. Information search

The term information search is one of the concept associated with information seeking behaviour studies. The process of searching for information is a decision made by an information searcher to satisfy his or her needs [22]. Therefore, the information search processes is an important process which aligned with information needs' concept identified earlier in this paper.

A research done by Salim and Ming [23] defined information search as an activity performed in order to acquire relevant document. However, Salim and Ming [23] stressed that the success of searching for the relevant document depends on many factors such as information skills strategy to locate information from various information sources.

Graduate students must be aware of various types of information sources available so as to search for the required information effectively. It is worthwhile for them to use more than one information source for searching purposes so that the percentage of finding relevant information successfully is higher than using only one information source. By finding the information which is relevant with their information needs, they will be able to use the information as needed by them.

For this study, information search is a process conducted by graduate students to obtain information for use in their research. The way they acquire the information is based on their feedback about the methods used to obtain information for an initiated research project.

### D. Information use

Information use is an activity that occurred after the processes of searching for information. As Meho and Haas [24] stated in their article, "Information use is a behaviour that leads an individual to the use of information in order to meet his or her information needs". Therefore, the term information use indicates the use of information to satisfy graduate students' need of information.

Bartlett and Toms [25] highlights the need to understand how information was used to accomplish certain task because based on their findings, information use has received less attention by researchers. In their article, Bartlett and Toms [25] also suggested that it is essential to consider what happens with an information acquired from information search processes and how the information is applied to accomplish a specific task. Therefore, the processes of using an information can also be considered into two different perspectives as suggested by Bartlett and Toms [25].

In the context of this study, information use refers to graduate students' behaviour in the use of information acquired from the information searching processes in order to satisfy their research needs.

## IV. RESEARCH METHODOLOGY

This study used survey method for data gathering. Graduate students involved in research environment and need to find different types of information for the research. Therefore, the selected sample for this study comprises of graduate students at Faculty of Information Science & Technology (FTSM) and Faculty of Engineering & Built Environment (FKAB), Universiti Kebangsaan Malaysia.

The instrument used in this study was a set of questionnaire which was developed to identify graduate students' information seeking behaviour. The construct developed for the instrument were mainly derived from literature reviews and interviews with experts. Web-based questionnaire was developed and distributed for the survey. It was distributed through FTSM and FKAB graduate students' mailing lists with the permission from the faculty.

## V. RESULTS AND DISCUSSION

The survey involves 193 graduate students, comprising of 103 females and 90 males. The majority of the respondents were between 20 to 29 years old ( $n=98$  or 50.8%) and the majority were Malays ( $n=114$  or 59.1%). Most of the respondents were Masters' students ( $n=106$  or 54.9%).

Factor analysis method was used to statistically analyze the data in this study. Exploratory factor analysis (EFA) was used to explore the relationship between the variables and then followed by confirmatory factor analysis (CFA) to tests the hypothesis in this study.

Prior to performing factor analysis, the Cronbach's Alpha between the measured items should be calculated in advance. According to Page and Meyer [26], the Cronbach's Alpha values between the items should be greater than 0.700 before the factor analysis can be carried out. Then, to evaluate the suitability of data for factor analysis, Bartlett's Test of Sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was conducted to test whether there is a correlation between the items. Bartlett's Test of Sphericity must be significant ( $p<0.500$ ) before the factor analysis can be perform. In addition, the KMO index value should also exceed 0.600 [27, 28].

A. Exploratory factor analysis

Initially, Cronbach's Alpha was used to measure the reliability coefficient for information seeking behaviour items. The reliability coefficient was found to be 0.922. The Bartlett's Test of Sphericity was significant and the KMO value was 0.806, exceeding the recommended value of 0.600.

Then, principal axis factoring method with promax rotation was used. Results of the analysis showed that there were two items having measure of sampling adequacy (MSA) value less than 0.500. Thus, the items with MSA value less than 0.500 have been removed. Next, six items with no loading and twelve cross-loadings items were removed.

The final result of the factor analysis showed that the Bartlett's Test of Sphericity was significant with the KMO value at 0.843. The remaining information seeking behaviour items were loaded into eight factors with the eigenvalues more than 1.000, as shown in Table 1.

Table 1: Factor analysis results

Factor	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	8.207	27.356	27.356
2	3.328	11.093	38.449
3	2.334	7.779	46.228
4	2.186	7.286	53.514
5	1.850	6.165	59.679
6	1.658	5.525	65.205
7	1.126	3.753	68.958
8	1.029	3.430	72.387

Extraction Method: Principal Axis Factoring.

The eight factors extracted from the factor analysis were defined and labeled as shown in Table 2. As presented in Table 2, the eight factors resulting from the factor analysis are consistent with all the concepts of information seeking behaviour identified in this study.

Table 2: Information seeking behaviour factors

Concept	Factor	Label
Information needs	1	Preliminary research needs
Information source	2	Printed information sources
Information search	3	Library information search
Information needs	4	Data research needs
Information use	5	Information use
Information search	6	Electronic information search
Information source	7	Electronic information sources
Information source	8	Media information sources

Then, reliability analysis was conducted on all of the extracted factors to determine the reliability of the extracted factors. The results of the analysis is presented in Table 3. It shows that almost all of the factors extracted during factor analysis produced Cronbach's Alpha values above 0.700. The outcomes of the reliability analysis indicates that the eight extracted factors through factor analysis were consistent and reliable. Therefore, these factors were used in developing a hypothesis model of information seeking behaviour factors in this study.

Table 3: Reliability analysis results

Factor	Label	No of variables	Cronbach's Alpha value
1	Preliminary research needs	5	.930
2	Printed information sources	6	.854
3	Library information search	4	.617
4	Data research needs	3	.888
5	Information use	3	.830
6	Electronic information search	4	.857
7	Electronic information sources	3	.794
8	Media information sources	2	.805

B. Confirmatory factor analysis

This section explains the CFA performed to statistically test the significance of a hypothesis model of information seeking behaviour factors. The proposed hypothesis model, hypothesizes that i) responses to information seeking behaviour were explained by eight factors; ii) each item has a nonzero loading on the targeted factor and zero loading on other factors; iii) the eight factors were correlated; and iv) the error terms were uncorrelated. The proposed hypothesis model was tested using Structural Equation Modeling (SEM) with AMOS version 16.0. The hypothesis model as shown in Fig. 2 was analyzed by using first order CFA.

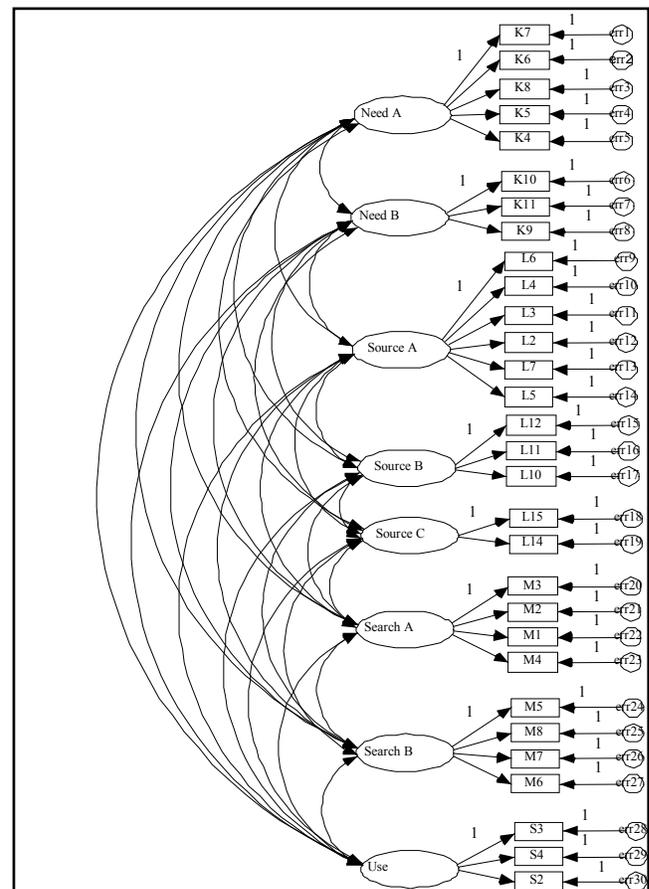


Figure 2: Hypothesis model of information seeking behaviour factors

The presence of three factor and error covariance's cross-loadings was detected and one of the cross-loadings was removed throughout the model evaluation. Afterward, model respecification was conducted. Next, a proposed measurement model of information seeking behaviour factors as shown in Fig. 3 was evaluated.

The measurement model produced the  $\chi^2$  value of 446.052 with 347 degrees of freedom. The  $p$  value associated with this result is 0.000. AMOS was successful in estimating all model parameters, thereby resulting in a convergent solution.

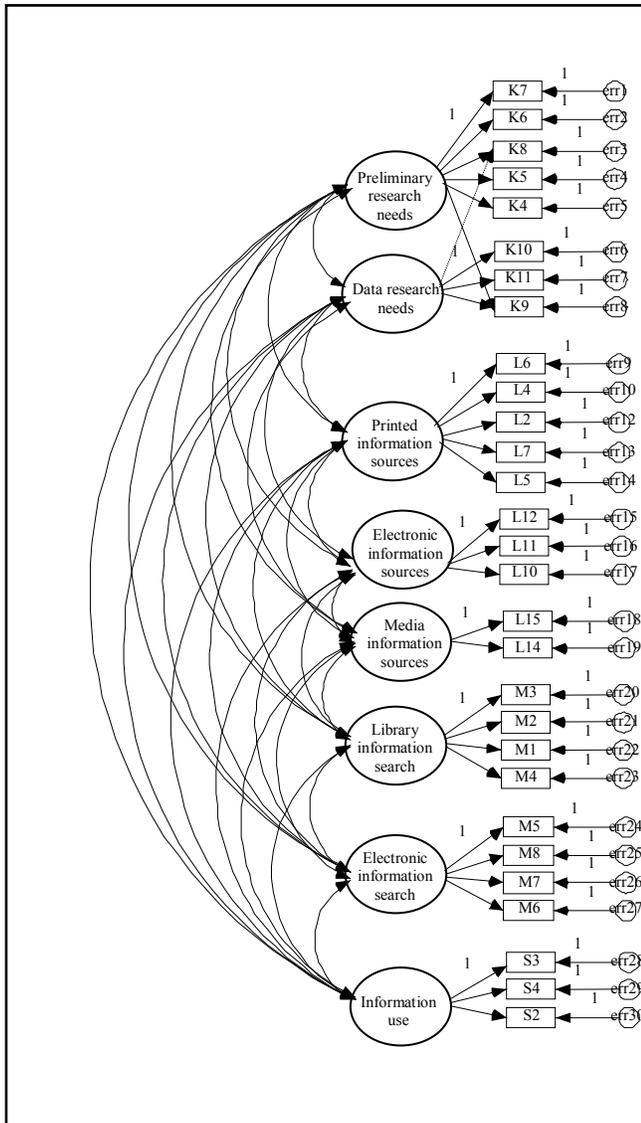


Figure 3: Measurement model of information seeking behaviour factors

Finally, the measurement model was confirmed for fitness with the data by observing several fit indices. Table 4 presents the results of goodness-of-fit measures conducted.

Table 4: Goodness-of-fit measures

Fit measures	Recommended value	Measurement model fitness measure	Conclusion
$\chi^2/df$	$\leq 3.00$ acceptable [29, 30]	1.285	Acceptable
RMSEA	$\leq 0.050$ good fit [31]	0.043	Good fit
TLI	almost 0.950 good fit [32, 33]	0.950	Good fit
CFI	$> 0.900$ acceptable [30, 33, 34]	0.957	Acceptable
SRMR	$< 0.080$ acceptable [33]	0.062	Acceptable

Results of the assessment of model fit showed that all the relevant measurements fit a value that exceeds the value recommended by previous researchers. The results indicate that the measurement model of information seeking behaviour factors provides a reasonably good fit and suitable to be used in the development of Research Information Seeking Behaviour Model.

## VI. CONCLUSION

This paper discussed a study which was conducted to develop and validate a measurement model of information seeking behaviour factors. Survey method was used for data collection. The proposed hypothesis model was assessed using SEM with AMOS version 16.0. The eight factors resulting from the factor analysis were consistent with all the concepts of information seeking behaviour identified in the study. The study concludes that the measurement model of information seeking behaviour factors provides a reasonably good fit. Therefore, it was used in the development of Research Information Seeking Behaviour Model.

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