CHAPTER 4: RESEARCH DESIGN AND METHODOLOGY

In Chapter 3 it was described why the model depicted in Figure 3.3 is a viable model to study relevance judgements made by users during work task and search task performance. This chapter will describe the methodology used in order to test various aspects of the model. The research questions will be restated, and the testing of the research questions will be described in terms of the methods of data collection, the rationale behind and the structure of the questionnaires employed, the editing and analysis of the data, as well as some comments on the limitations of this method of testing.

4.1. Defining the research question

As stated in Chapter 1, the main research question that will be addressed can be formulated as follows:

> *How useful, in terms of understanding relevance, is it to define relevance types by means of relations between elements in the process of information transfer?*

In order to answer this question, the generally accepted categorization of relevance types by Saracevic (1996) have been analysed in detail in terms of the attributes inherent in relevance judgements after which a modified relevance model have been constructed. The questionnaires of which the construction will be described in this chapter, will be used to test various aspects of this model empirically. The following sub-questions are also addressed:

1. *Is this categorization of relevances a viable way of typifying relevance types?*

Before any empirical work could be done, it had to be established that the model, as depicted in Figure 3.3 (Chapter 3) is a viable way to typify relevance types. Utilizing previous empirical data and "back-mapping" to the

model, as described in Chapter 3 is assumed to answer this research question.

2. *To what extent does the nature of the work task influence the application or non-application of documents in work task fulfilment?*

The empirical data collected represent at least three different work tasks. This will be utilized to answer this particular research question.

3. *Which types of relevance judgements are made during the process of seeking for information (search task) and which are made while using information (work task)?*

The hypothesis related to this question could be stated as follows:
The *modelling process* would seem to indicate that the relevance types of pertinence and topicality might feature to a larger extent within the search process, especially if the search task is monitored over a single session (please note: as *based on the modelling process, not the empirical data*). Situational relevance and socio-cognitive relevance might be more important measures of relevance during the performance of the work task, as time-dependency plays a greater role in this task.

4. *To what extent are the identified relevance types "nested"? In other words, are certain relevance judgements by definition included within other types of relevance judgements?*

From the stratified model of relevance types by Saracevic (1996), as well as Borlund's studies (2000), it would seem that some authors in the field view relevance types as inherently "nested". It could be argued, for instance, that if an information object is judged relevant on a cognitive level, it should also be relevant on a topical and algorithmic level. The assumption for this study is that this is not necessarily true. It is quite possible that an information object may be judged as relevant on, for example, a situational level, but not relevant on a topical level. It is assumed that relevance types are distinct, and may sometimes be nested, but not as a rule.

5. *To what extent are affective relevance judgements made in conjunction with the other relevance types?*

Affective relevance is a very subjective issue and in the model described in Chapter 3, identified as a separate and very different dimension of relevance type (as opposed to Saracevic who views affective relevance on the same scale of relevances as the other subjective relevance types). It is assumed in this study that affective relevance judgements may be made together with other types of subjective relevance judgements.

6. *Does socio-cognitive relevance exist separately from cognitive relevance?*

The model as described in Chapter 3 is the first of its kind to include the concept of socio-cognitive relevance, and criticism of this inclusion is mainly due to the fact that the relevance model is based on Ingwersen's model of cognitive information transfer. It is held (Hjørland, 2002) that the Ingwersen model is firmly rooted in the cognitive school of thought, and as such the model is not suitable for application regarding issues dealing with *social cognition* (see also Section 3.7). This sub-question will therefore serve to establish whether there is in fact a type of relevance that may be termed socio-cognitive relevance and whether it can be viewed as distinct from the other types of subjective relevances.

4.2. Construction of the questionnaire

Questionnaires are complex data collection instruments. General guidelines provided by Bless and Higson-Smith (1995) were employed to draft the questionnaire. The guidelines employed in this study were based on preliminary research by Oosthuizen (2001). The final questionnaires used in the empirical study are included in Appendix A.

4.2.1. Length of the questionnaire

Authors on research methodology (Bless & Higson-Smith, 1995; Neuman, 1997) emphasise that the length of the questionnaire should not be daunting to the respondent. This particular questionnaire had three sections containing 9, 24 and 25 questions respectively:

Section A had to be completed only once, in order to establish the context within which relevance judgements were being made;
Section B, however, had to be completed for every document used; and
Section C for every document at least partially read and then not used.

The number of questions that had to be answered by each respondent therefore depended on the number of documents utilized to various degrees by the respondents within a particular information use situation.

This could breach the general guidelines regarding length of questionnaire construction, but in the final analysis of the questionnaire it was decided that this was the only way to elicit responses valid and reliable enough to test the research questions.

4.2.2. Language and vocabulary

When constructing questionnaires, the language and vocabulary used in the questionnaire should be adapted to a level where the respondent would understand and feel comfortable with the language use. The respondents of this questionnaire were students, academics and professional persons, and the type of language used (in terms of understanding) was not really perceived as an issue. Domain-specific language use was also not a problem, as most of the respondents were researchers on an advanced level within a particular domain.

4.2.3. Wording of the questions

Bless & Higson-Smith (1995) state that in the wording of questions, the following should be taken into account: questions should be simple and short, worded unambiguously, easily understood, and should avoid double-barrelled and leading questions.

In constructing this questionnaire, it was endeavoured to follow these guidelines. Due to the length of the combined questionnaires, this was a particularly important issue – it had to be made as easy as possible for the respondents to complete the questionnaire.

4.2.4. Sequence of the questions

When constructing questionnaires, it is important that the initial questions should put the respondent at ease, and should therefore be either general or factual in nature. Later questions then move to be more specific.

Section A of this questionnaire is the contextualisation of the information use situation. The initial questions deal with facts, such as the name and date of the conference (in the case of conference papers), or the degree course and topic of the thesis (in the case of theses and research essays). The later questions in section A deals with specific and personal perceptions of the users' state of knowledge as well as the intended audience's understanding of the topic.

Sections B and C also follows this sequence by starting off with factual information regarding the particular document being evaluated before moving to questions regarding perceptions and value judgements.

4.2.5. Types of questions

It is possible to use a variety of question types when constructing a questionnaire – this include factual questions, opinion questions, state of action questions and questions about acts in the past or present (Neuman, 1997). These questions can be open-ended or closed, and it is also possible to use scaled responses. The question type is dependent on the type of data required by the researcher.

In this case both open-ended and closed questions (mostly fixed response through tick boxes) were utilized. Open-ended questions were typically utilized to ensure that respondents are not forced to supply incorrect answers if a suitable option was not represented in the tick boxes, as well as to ensure that a statement of opinion is not forced where there is none. Other fixed responses were required through the use of itemised rating scales and summated scales.

4.2.6. Question content and selection

The questions asked in this questionnaire relate to the identified research questions. All the necessary issues were identified and it was established which questions were needed to obtain the necessary data. The technique utilized to identify redundant questions was the variable-question matrix (Powell, 1997). Variable-question matrices are used to ensure that all necessary variables are covered in sufficient detail for the researcher's data requirements. The questions are listed as columns and the variables influencing the relevance judgements on the user (in this case derived from Table 3.7) as rows. The matrices are illustrated in Tables 4.1 and 4.2 for Sections B and C of the questionnaire respectively.

Table 4.1. Variables to questions matrix: Section B

	Question numbers in Section B of the questionnaire																						
Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Scope/Depth/ Specificity	Bibliographic details of the document	X	Degrees of usefulness	Importance in terms of formulation of focus	X	X								Influences of other people on what users read and use				Affective issues regarding font type, font size, layout of document, colours used in document and writing style					Check question for questions 3 and 4: importance in terms of work task	Was the judgement made during work task or search task?
Accuracy/ Validity		X														X								
Accessibility/ Availability		X																						
Clarity					X											X	X							
Currency																X								
Tangibility		X			X																			
Expertise		X					X																	
Presentation/ Format		X															X							
Quality		X									X	X												
Author		X							X							X								
Viewpoint Congruence		X			X			X		X			X			X	X							
Novelty		X			X											X								
Algorithmic		X																						
Topicality		X																						

Table 4.2. Variables to questions matrix: Section C

	Question numbers in Section C of the questionnaire																							
Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Scope/Depth/ Specificity	Bibliographic details of the document	Stage of search task when relevance judgement was made.	X	X												Influences of other people on what users read and use				Affective issues regarding font type, font size, layout of document, colours used in document and writing style.					Was the judgement made during work task or search task?
Accuracy/ Validity								X										X						
Accessibility/ Availability			X																					
Clarity			X															X	X					
Currency							X											X						
Tangibility			X		X																			
Expertise			X						X															
Presentation/ Format																			X					
Quality						X							X	X										
Author											X							X						
Viewpoint Congruence			X							X		X			X			X	X					
Novelty			X															X						
Algorithmic																								
Topicality			X																					

4.3. The questionnaire

Initially, the specific research issues which were to be investigated were listed. Several empirical studies of user relevance judgements have been done in the past, and it is a long recognized fact that there are a variety of factors that influence relevance judgements in information seeking and use. In this study, the user relevance criteria identified by Barry & Schamber (1998) and Vakkari & Hakala (2000) were selected to review and to analyse the categories of user criteria identified when judging relevance. These two studies were then combined and mapped to the relevance model as described in Chapter 3. The extended table derived in Chapter 3 (Table 3.7) was then used to code the questionnaires as indicated in Table 4.3 below, with topicality and algorithmic relevance added.

Table 4.3. Codes used for relevance types in questionnaires

Criteria	Pertains to...	Relevance type	Code
Scope/Depth/ Specificity	Information need (background or specific)	Cognitive	1
	Usefulness (sufficient detail/depth)	Situational	2
Accuracy/ Validity	Usefulness (accuracy, correctness and validity related to a work task)	Situational	3
	Organisational or social environment (acceptable or suitable)	Socio-cognitive	4
Accessibility/ Availability	Must be accessible and/or available within a work task or situation	Situational	5
	Emotions of frustration or satisfaction	Affective	6
Clarity	Information presented clear enough to satisfy need	Cognitive	7
	Usefulness in terms of problem solving within research focus	Situational	8
Currency	Current/recent in terms of personal information need	Cognitive	9
	Current/recent in terms of work task/situation	Situational	10
Tangibility	Extent to which information relates to real needs with regard to proven information, hard data, facts and figures	Cognitive	11
	Work task and socio-organizational environment (require hard data, e.g. decision-making)	Situational Socio-cognitive	12 13
Expertise	User's own state of knowledge with regard to the information need	Cognitive Situational	14 15
	Author's expertise - both in terms of the work task and acceptability in organizational environment	Situational Socio-cognitive	16 17
Presentation/ Format	Usefulness of format or presentation style for a particular work task	Situational	18
	Socio-organizational acceptance	Socio-cognitive	19
	Emotions (frustration, satisfaction, aesthetics, etc.)	Affective	20
Quality	Usefulness in terms of reliability and standards of quality within a particular work task	Situational	21
	Emotional response (anger, frustration, elation, etc.)	Affective	22
	Socio-organizational acceptability	Socio-cognitive	23
Author	Emotional response (like or dislike, professional or personal relationship with the author)	Affective	24
	Socio-organizational acceptability	Socio-cognitive	25
Viewpoint congruence	Consistent with or supported by other information in the field	Socio-cognitive	26
	Emotional response (anger, satisfaction, etc.). Agreement with user's point of view	Affective	27
	Information need (supports current state of knowledge)	Cognitive	28
Novelty	Information need (enhances current state of knowledge)	Cognitive	29
Algorithmic	Machine matching	Algorithmic	30
Topicality	Aboutness	Topicality	31

The table below (Table 4.4) tabulates the relevance criteria against the relevance types in order to show where each of the identified numbered elements in Table 4.3 may be mapped. The numbers underneath the text in each cell correspond to the numbers in the last column of Table 4.3. In the table below, algorithmic relevance and topicality have not been indicated.

Table 4.4. Relevance criteria within relevance types

Relevance Type / Criteria	Cognitive Relevance	Situational Relevance	Socio-Cognitive Relevance	Affective Relevance
Scope/ Depth/ Specificity	Information Need (background or specific) 1	Usefulness (sufficient detail/depth) 2		
Accuracy/ Validity		Usefulness (accuracy, correctness and validity related to a work task) 3	Acceptable or suitable within an organisational or social environment 4	
Accessibility/ Availability		Must be accessible and/or available within a work task or situation 5		Emotions of frustration or satisfaction 6
Clarity	Information presented clear enough to satisfy need 7	Usefulness in terms of problem solving within research focus 8		
Currency	Current/recent in terms of personal information need 9	Current/recent in terms of work task/situation 10		
Tangibility	Extent to which information relates to real needs with regard to proven information, hard data, facts and figures 11	Work task and socio-organizational environment (require hard data, e.g. decision-making) 12 13		

Relevance Type / Criteria	Cognitive Relevance	Situational Relevance	Socio-Cognitive Relevance	Affective Relevance
Expertise	User's own state of knowledge with regard to the information need 14 15	Author's expertise - both in terms of the work task and acceptability in organizational environment 16 17		
Presentation/ Format		Usefulness of format or presentation style for a particular work task 18	Socio-organizational acceptance 19	Emotions (frustration, satisfaction, aesthetics, etc) 20
Quality		Usefulness in terms of reliability and standards of quality within a particular work task 21	Socio-organizational acceptability 22	Emotional response (anger, frustration, elation, etc) 23
Author			Socio-organizational acceptability 25	Emotional response (like or dislike, professional or personal relationship with the author) 24
Viewpoint congruence	Information need (supports current state of knowledge) 28		Consistent with or supported by other information in the field 26	Emotional response (anger, satisfaction, etc). Agreement with user's point of view 27
Novelty	Information need (enhances current state of knowledge) 29			

The specific types of data needed to examine these issues were identified and thereafter the questions were formulated. The research issues were therefore not modified to fit the questions, but the questions were formulated around the research issues.

It is important to note that the questionnaire calls for much more data than required to answer the research questions. The reason for this is that future research will be conducted using this data. For the purpose of this thesis, only the answers to some of the questions will be utilised in order to justify the proposed model (as depicted in Figure 3.3) and the related research questions dealing with the model.

The questionnaire consisted of three sections:
Section A (9 questions) was completed only once by each respondent and serves as a contextualisation of the relevance judgements. Here the respondents had to indicate in which socio-organizational domain the work task originated and was completed.

Section B (24 questions) tries to establish why users found a particular document relevant. This section of the questionnaire had to be completed for every relevant document that was usable to such an extent that is was included in the bibliography of the conference paper or thesis.

Section C (25 questions) had to be completed for every document that was retrieved and at partially least read, but for some reason not used to such an extent that it had to be included in the bibliography. The reason for including this section was to establish why users don't use some documents, and also to try and establish at what stage in the research process the users decided that a particular document was not relevant to the work task.

The three sections of the questionnaire are discussed in more detail below, but it is important to realize that the different sections and the questions

should not be viewed in isolation. The questionnaire has an interrelated nature where responses in one section are needed to analyse responses in another. Evaluation of documents used and regarded as relevant as well as documents read and regarded as non-relevant are needed to build a case for or against the validity of a particular relevance type.

4.3.1. Section A: context of information seeking and use

Section A consists of general questions relating to either the conference paper and the conference, or the topic of the respondents' thesis or research paper and the context in which it was written. The purpose of this section is fourfold:

- To ease the respondent into the process by asking non-threatening, factual questions
- To establish the context of the questionnaire for the respondent
- To establish the context of the respondent's own research
- To elicit the necessary factual information.

The necessary factual information includes, for example, the topic of the paper. This information is needed to evaluate the validity of topicality as a manifestation of relevance. The question regarding the primary focus of the paper is necessary because identifying documents either used or not used in relation to the focus of the paper can give an indication of the basis of the relevance judgements made by the respondent. The questions pertaining to the state of knowledge before and after the completion of the paper are likewise necessary to establish the subject knowledge of the respondent's regarding their own research.

4.3.2. Section B: documents used to complete the work task

Section B consisted of 24 questions to be answered for each document used and cited. It is assumed that these documents represent information objects

that were judged relevant by the respondent. It is also assumed that the entire document has been read. The aim of this section of the questionnaire was then to determine if the basis of these relevance judgements corresponds to the manifestations of relevance as identified in the relevance model presented in chapter 3. Each of the questions will be discussed below in order to indicate the function of the question in the questionnaire. Where applicable, numbers in brackets refer to the numbers in the cells (relevance criteria within relevance types) in Table 4.4.

Question 1: Bibliographic details of the document

The first question recorded the bibliographic information for each of the documents. Respondents had to either write the full bibliographic details of the information object used, or attach a copy of the bibliography to Section A and cross reference the records to Section B and C of the questionnaire.

Question 2: Why did you use this document?

This question remains more general than the later questions in accordance with the guidelines for questionnaire construction. In order to avoid bias, the term "relevance" was not used in the questionnaire. The question "Why did you use this document?" therefore actually refers to the reasons for the document being judged relevant. This particular question tries to establish according to which of the relevance categories the document is being judged.

The underlying assumption of this question (question 2) is that if the respondent only used the document because the topic of the document matched the topic of the query (30), a strong case can be built for the validity of topical relevance (31) if a statistically significant number of respondents provide this response.

If the majority of responses indicate that documents were perceived as being relevant based on the relations between the information object and the user's current cognitive state (28) and/or the socio-cognitive acceptability of use (26)

and/or the usefulness of the document for a particular work task (3), then a clearer understanding of the existence of these relevance types can be obtained. Response option 3 ("This document supports my approach to the topic" – (28)), for instance, deals with the respondent's current state of knowledge or cognition. If the respondent perceived the retrieved document as being relevant because it supports the current state of knowledge (congruent viewpoints), then it could indicate that the relevance type defining a relation between the user's state of knowledge and the information objects (where the judgements are content dependent) is a valid construct. However, it has to be analysed in conjunction with the responses to the rest of the questionnaire. It could, for instance, happen that a strong case for the validity of cognitive relevance be made here, but that later in Section C of the questionnaire the respondent indicates that although a document contained information that was not previously known to him/her (novelty), the document was still not perceived as relevant. Cases like these have the potential to throw more light on the way respondents make their relevance judgements in terms of the relative importance of identified factors in the context in which respondents find themselves at specific points in time.

Response option 5 in question 2 relates to accessibility of the information object (5). The relation inherent to situational relevance is between the work task at hand and the information objects. Under normal conditions of information use it can be presumed that the document will not be judged relevant if it is not useful for completion of the work task. However, if the affective responses of frustration or worry about not finding anything come into play, the document might then be judged useful. In the same way, as the time limits become a crucial factor, a document that might, under other circumstances, not have been judged useful, can become useful if nothing else can be found. Therefore, an affirmative response to option 5 taken in isolation, might mean that the document was useful, but viewed in conjunction with other options, might be an indication of affective relevance and the influence of time-constraints on the user. Vakkari and Hakala (2000) also

concluded that relevance judgements are dependent on the stage of the information seeking and use process. Once again, this analysis cannot be conclusive without regard for the responses to the rest of the questionnaire.

Options 4 ("The viewpoint of this document is in accordance with the approach of the conference theme" – (26)) and 6 ("I know the work of this author" – (24)) pertain to the manifestation of socio-cognitive relevance. In option 4 the conference is the socio-organizational environment in which the work task takes place. The cognitive model of information transfer as proposed by Ingwersen (1996), indicates that the socio-organizational environment of the user influences of the cognitive space with regard to the work task, current cognitive states, problems or goals, uncertainty, information need and information behaviour. If the information behaviour (using document) only takes place because of perception of the respondent regarding what is right and necessary within the conference context, then a strong case can be built for the validity of socio-cognitive relevance type (indicating a relation between a situation, task or problem at hand as perceived in the socio-cultural context and the information object). Furthermore, option 6 may indicate that the socio-cognitive relevance type is possibly valid based on the fact that the author's work is used because it known (i.e. acceptable within the academic environment in which a respondent functions). It may, however, also be seen as an affective relevance judgement if it can be shown, together with the response to Question 9, that there is an emotional like or dislike of, or professional or personal relationship with the author.

It can be seen from the discussion that the question 2 is necessary for the comparative analysis of the further responses provided by the respondents.

Question 3: How useful was this document to you?

This question is a three point scale trying to quantify the usefulness of the information object. The concept of usefulness is described as a criterion for

success of situational relevance (see Table 3.2.) in Saracevic's (1996) manifestations of relevance. If the document was judged relevant and very useful, then it could be an indication of validity of this manifestation of relevance. On the other hand, if it was perceived as being not useful in this regard, then analysis should focus on what basis it was used. Investigation of this issue could throw more light on the cognitive process involved in relevance judgements, and the relative importance of the other proposed manifestations of relevance. This can only be done if the responses in total are analysed.

Question 4: How important was this document in the formulation of the focus of your research problem?

In the same way as above, if the respondent indicates in Question 4 that the document was not really important for the formulation of research problem, but it was still judged relevant to use, it provides a basis for examining the function of the document. This may lead to the identification of the other aspects influencing the relevance judgement (obviously this will be based on all other responses regarding used and not used documents).

The categorization of the degrees of relevance is "very useful", "fairly useful" and "not really useful". This is similar to the categorization used in the INEX (2002) (Initiative for the Evaluation of XML Retrieval) relevance assessment guide ("marginally relevant", "fairly relevant" and "highly relevant"). The option for totally "irrelevant" was not included in this question, since it was assumed that if the document was used to such an extent that it was included in the bibliography, it would at least have some degree of relevance to the work task.

Question 5: In what way was the document useful to you?

This question deals mostly with the satisfaction of the information need. To a lesser extent, it also serves a check for questions 2, 3 and 4. Analyses of responses to this question will indicate the validity of cognitive relevance (1, 7,

11, 28, 29), situational relevance relating to usefulness in terms of problem solving (8) and socio-cognitive relevance relating to viewpoint congruence (26) within the field of research. This question tries to show the importance of novelty in relevance judgements, as well as to provide an indication of the relation between the information need and the information object.

Question 6: Scope of the document in terms of research

This question is a three point scale trying to establish the specificity of the document in relation to the work task. This is measured by the usefulness, in terms of sufficient detail or depth (2), for the work task to be performed.

Question 7: How would you rate the expertise of the author?

This question relates to the perception of the subject knowledge of the author or creator of the information object. A four point scale ranging from "expert knowledge" to "very little knowledge" was used. The question regarding (the perception of) the author's knowledge may be seen as either a judgement of situational (16) relevance (acceptability in terms of the work task) or socio-cognitive (17) relevance (acceptability in terms of the socio-organizational environment in which the work task originated).

Question 8: How do you feel about the viewpoint of the author as expressed in the document?

The intention of this question is to find out to what extent the author's point of view agrees with the user's point of view in terms of the work task to be performed. This is a four point scale measurement of cognitive relevance in terms of viewpoint congruence (28).

Question 9: Relating to the author of the information object

This question tries to establish the relationship between the user and the author of the information object. The options and related relevance characterization is as follows:

"I am familiar with the author's work" (25): this option is an indication of socio-organizational acceptability of the author.

"I know the author personally" (24): an affective or emotional response, like or dislike of the author, or an indication of a personal or professional relationship with the author.

"I have used the author's work before in my research" (16, 17): an indication of the author's expertise, both in terms of the user's work task and the acceptability of the author within a particular socio-organizational domain.

"I will consider using this author's work again in future" (28): this option may be seen as an indication of a viewpoint congruence between the author and the user, measured in terms of cognitive relevance.

Question 10: The viewpoint of this document will be viewed favourably by my peers

This question requires a yes/no answer. If the answer is affirmative, it is an indication that the document will be well received within a particular socio-organizational domain, and is consistent with or supported by other information in the field (26).

Question 11: The academic standard of this document will be viewed favourably by my peers

This question also requires a yes/no answer, but differs from the previous question in the sense that the quality of the document is judged within a particular socio-organizational domain, rather than the point of view expressed in the document. If the answer is affirmative, it will indicate acceptability within a socio-cognitive relevance type (23).

Question 12: This document conforms to my own academic standards

In this question, the quality of the document is judged, once again on a binary level as in the previous question. In this case, however, it is not judged within a particular domain, but on the personal level of the user of the document. The document is regarded within the context of usefulness in terms of

reliability and standards of quality within a particular work task or situation (21).

Question 13: I agree with the viewpoint of the document

This question is the personal version of Question 10. The user is asked to judge the viewpoint of the document, but this time on a personal level – does the respondent as individual agree with the viewpoint of the document? This may be interpreted that the information need is addressed due to the fact that the document supports the current state of the user's knowledge (28).

Questions 14-16: Did you ask any other person's opinion about the information content of this document? If "yes", did this person influence your opinion of the document, and if "yes" again, in what way were you influenced?

The first question in isolation does not refer to any particular relevance judgement, but if the respondent answered "yes" to this question, he had to indicate in Question 15 whether this person's opinion had an influence on the respondent's view of the document. If the answer was affirmative again, the respondent was given an option in Question 16 to describe in what way he was influenced. The assumption is that the reasons given in the open-ended Question 16 may relate to any of the subjective relevance types.

Question 17: Relating to the terminology used in the document

This question tries to establish the user's responses to the terminology used in the document. The options and related relevance characterization is as follows:

"The terminology is known to me" (7): if the terminology is known to the respondent, it may be an indication that the information was perceived to be presented in a manner clear enough to satisfy the information need.

"The terminology was not known to me before I read this document" (7): if the terminology was not known to the respondent prior to reading the document, it may be an indication that the information has a novelty value, but it may also

indicate that the user found the information not presented clear enough to satisfy the information need. Both interpretations leads to a cognitive relevance judgement.

"The terminology is similar to the terminology used in other documents in the field" (19): if the terminology is in accordance with other documents in the field, it may be interpreted that there is a socio-organizational acceptance of the information object related to a particular work task.

"I use the same terminology" (28): if the respondent indicates that he uses the same terminology, it may be seen as supporting the user's current state of knowledge in terms of satisfying the information need.

"I will consider using terminology introduced by this document in future (28, 29)": this may be interpreted that the user already used the terminology and will continue to use it in future, but it might also mean that new terminology was introduced and that the user has learnt something new. In this case the information need is addressed in that the current state of knowledge was enhanced.

Questions 18-22: Font type, font size, layout, colours and writing style of the document

In answer to these five questions respondents were offered the choice of selecting either "was easy to read" or "irritated or frustrated me". These are all typical affective relevance judgements relating to the presentation or format of the information object (20).

Question 23: How important would you rate this particular document for your work task?

This question relates to the usefulness in terms of the work task and on a secondary level is also a built-in check question relating to Questions 3 (usefulness) and 4 (importance in terms of focus of research problem). The respondents were given the task of rating the importance of the document in the completion of the research project on a three point scale.

Question 24: At what stage in your research did you decide that this document might be useful?

The purpose of this question is to establish when the document was judged as relevant – during the search task, or during the work task performance. If the respondents selected the option "When I started my literature review" it is coded as *search task*. If any of the other three options were selected ("When I started writing the paper", "Halfway through the writing process" or "After I changed the focus of my paper"), it is coded as *work task*.

4.3.3. Section C: documents retrieved and read, but not used

Section C consisted of 25 questions to be answered for each document retrieved, obtained and at least partially read, but not used to such an extent that they were cited in the bibliography of the respondent's research project. Where it was assumed for Section B of the questionnaire that the entire document was read, in Section C respondents had to indicate how much of the document was read before it was decided that the document is not relevant. The aim of this section of the questionnaire was to determine why users reject some documents, even though some of the documents might be useful up to a certain point. Each of the questions will be discussed below in order to indicate the function of the question in the questionnaire. Where applicable, numbers in brackets refer to the numbers in the cells (relevance criteria within relevance types) in Table 4.4. Please note that some of the questions in Section C are exactly the same as in Section B. In these cases, the descriptions from Section B are repeated for the benefit of the reader.

Question 1: Bibliographic details of the document

The first question recorded the bibliographic information for each of the documents retrieved, but not cited. As in Section B, respondents had to either write the full bibliographic details of the information object used, or attach a copy of the bibliography to Section A and cross reference the records to Section C of the questionnaire.

Question 2: How much of the document did you read before you decided that it was probably not useful?

This question tries to establish whether the user had made a decision about the usefulness of a document based on metadata only, parts of the document or the entire document. Relating the answers to this question to the answers supplied in question 3a and 3b (usefulness of document), might give an indication of the cognitive state of the user at various stages of the information seeking process. If only the title, keyword and abstract were read, the respondent could make inferences regarding the "aboutness" of the document. This guides analysis of responses towards topicality and its manifestations in relevance judgements. On the other hand, if some parts or the entire document were read, the issues of topicality as well as issues pertaining to the situation, socio-cognitive context, affection and cognition come into play.

Question 3: All the documents in this section was not cited. However, some of them might have been useful to a certain degree. If the document was useful, but it was not cited, please answer 3a and 3b. If you read the document or parts of the document and it was not useful at all, please answer 3b only.

Question 3a makes provision for the case stated above where the document was not potentially used but could still have been useful, perhaps it has satisfied an information need (e.g. for background information) or helped in providing focus for the work task. Knowing how the document was useful is necessary to separate responses about documents that were actually still judged relevant and documents that were not judged relevant. This categorization of documents is necessary for a comparative analysis that should provide answers to the question on how and why users judge some documents relevant and others not. Question 3b is therefore necessary to reliably categorize documents in this way, and then once categories have

organizational domain, and is consistent with or supported by other information in the field (26).

Question 13: The academic standard of this document will be viewed favourably by my peers

This question also requires a yes/no answer, but differs from the previous question in the sense that the quality of the document is judged within a particular socio-organizational domain, rather than the point of view expressed in the document. If the answer is affirmative, it will indicate acceptability within a socio-cognitive relevance type (23).

Question 14: This document conforms to my own academic standards

In this question, the quality of the document is judged, once again on a binary level as in the previous question. In this case, however, it is not judged within a particular domain, but on the personal level of the user of the document. The document is regarded within the context of usefulness in terms of reliability and standards of quality within a particular work task or situation (21).

Question 15: I agree with the viewpoint of the document

This question is the personal version of Question 10. The user is asked to judge the viewpoint of the document, but this time on a personal level – does the respondent as individual agree with the viewpoint of the document? This may be interpreted that the information need is addressed due to the fact that the document supports the current state of the user's knowledge (28).

Questions 16-18: Did you ask any other person's opinion about the information content of this document? If "yes", did this person influence your opinion of the document, and if "yes" again, in what way were you influenced?

The first question in isolation does not refer to any particular relevance judgement, but if the respondent answered "yes" to this question, he had to

indicate in Question 17 whether this person's opinion had an influence on the respondent's view of the document. If the answer was affirmative again, the respondent was given an option in Question 18 to describe in what way he was influenced. The assumption is that the reasons given in the open-ended Question 18 may relate to any of the subjective relevance types.

Question 19: Relating to the terminology used in the document

This question tries to establish the user's responses to the terminology used in the document. The options and related relevance characterization is as follows:

"The terminology is known to me" (7): if the terminology is known to the respondent, it may be an indication that the information was perceived to be presented in a manner clear enough to satisfy the information need.

"The terminology was not known to me before I read this document" (7): if the terminology was not known to the respondent prior to reading the document, it may be an indication that the information has a novelty value, but it may also indicate that the user found the information not presented clear enough to satisfy the information need. Both interpretations leads to a cognitive relevance judgement.

"The terminology is similar to the terminology used in other documents in the field" (19): if the terminology is in accordance with other documents in the field, it may be interpreted that there is a socio-organizational acceptance of the information object related to a particular work task.

"I use the same terminology" (28): if the respondent indicates that he uses the same terminology, it may be seen as supporting the user's current state of knowledge in terms of satisfying the information need.

"I will consider using terminology introduced by this document in future (28, 29)": this may be interpreted that the user already used the terminology and will continue to use it in future, but it might also mean that new terminology was introduced and that the user has learnt something new. In this case the information need is addressed in that the current state of knowledge was enhanced.

Questions 20-24: Font type, font size, layout, colours and writing style of the document

In answer to these five questions respondents were offered the choice of selecting either "was easy to read" or "irritated or frustrated me". These are all typical affective relevance judgements relating to the presentation or format of the information object (20).

Question 25: At what stage of your research did you decide that this document might not be useful?

The purpose of this question is to establish when the document was judged as not relevant – during the search task, or during the work task performance. If the respondents selected the option "When I started my literature review" it is coded as *search task*. If any of the other three options were selected ("When I started writing the paper", "Halfway through the writing process" or "After I changed the focus of my paper"), it is coded as *work task*.

The discussion provided above is intended as a sufficient explanation of the questionnaire for the purposes of this study. There exists a wide range of possible responses and it is impossible to capture all of it in this thesis. It should, however, provide an indication of the following:

- The rationale behind the questionnaire construction;
- The measures of internal validity and reliability built into the design;
- The interrelatedness of the questions; and
- The aim of the questionnaire and its relation to the theoretical assumptions and the research questions.

4.4. Sample design and sampling methods

Due to the relative small size of the possible population, stratified purposive sampling (Patton, 1990) was done in order to illustrate characteristics of particular subgroups of interest and facilitate comparisons. The sample consisted of 33 respondents, answering questions regarding 467 documents

in total. There were four work tasks represented: masters and doctoral theses, class assignments, journal articles and conference papers. The latter two were later collapsed to one type of work task for statistical analysis as they were deemed the same (type of) work task. These particular work tasks were chosen, because it represents a spectrum of research activities – undergraduate, advanced and expert research. The complete table is represented below, and a summary table is presented in Section 5.1. in the next chapter.

Table 4.5. Questionnaires completed

Respondent number	Work task	Number of documents evaluated
1	Doctoral thesis	24
2	Doctoral thesis	15
3	Doctoral thesis	16
4	Conference paper	14
5	Doctoral thesis	16
6	Masters dissertation	26
7	Masters dissertation	19
8	Journal article	27
9	Conference paper	18
10	Doctoral thesis	22
11	Masters dissertation	30
12	Conference paper	10
13	Doctoral thesis	30
14	Masters dissertation	7
15	Doctoral thesis	18
16	Journal article	26
17	Masters dissertation	19
18	Class assignment	6
19	Class assignment	6
20	Class assignment	6
21	Class assignment	6
22	Class assignment	6
23	Class assignment	6
24	Class assignment	6
25	Class assignment	6
26	Class assignment	6
27	Class assignment	6
28	Class assignment	6
29	Class assignment	6
30	Class assignment	6
31	Class assignment	6
32	Class assignment	6
33	Masters dissertation	40
	Total	467

The inclusion of different work tasks were necessary, as part of the research design was to compare relevance judgements within work task domains. All the respondents were performing research within the field of information technology, mostly within information science and informatics. All respondents came from a research domain, as the introduction of commercial domains would have resulted in too many variables. The subjects were chosen on the grounds that they have just finished their research project. This was necessary because it was important that all the subjects had to be at the same stage of information use in their work task. This issue will be discussed in more detail in Chapter 5.

Due to the length of the questionnaire, it was explained to the respondents beforehand that it would take at least 2 hours of their time to complete the questionnaires. Respondents were given two weeks to complete the questionnaires. Participation was completely voluntary and respondents were not paid for participating in the research. All the participants who indicated that they were willing to participate, completed some questionnaires – detail of figures are summarised in Table 4.5. Undergraduate students had to, as part of their assignment, use at least six sources, and this is the reason for the uniformity of the number of sources used for the class assignments.

4.5. Data collection methods

Data were collected through structured self-administered questionnaires. For detail on the process of constructing these questionnaires, see Section 4.2 above.

The questionnaires were pre-tested on a group of second year information science students. Their work task consisted of a class assignment: writing a research essay on pre-defined topics over a period of six weeks. After the pre-test, some questions were rephrased, since some students noted that these questions were vague, but in general, not many changes were necessary.

4.6. Data capturing and data editing

The questionnaires (except for Section A) were pre-coded as far as possible according to the codes as listed in Table 4.4. (See also Sections B and C of the questionnaires in Appendix A). Post-coding of the open-ended questions was also done according to the criteria listed in Table 4.4. Completed questionnaires were marked up by the researcher herself and then the data were entered into the system by the data typists of Statomet at the University of Pretoria. Control lists were checked by the researcher and all anomalies noted and corrected. There were no significant problems regarding missing values.

4.7. Data analysis

Some of the research questions are theoretical assumptions that have been supported in Chapter 3 above, while other research questions are to be supported by empirical evidence. The research questions, assumptions and hypotheses are discussed individually in the next chapter. The SAS statistical package was used for data analysis.

4.8. Limitations of the methodology

The length of questionnaires are seen as the most problematic area in this study. To overcome this potential problem, a number of "check questions" were built into the questionnaire to establish whether the respondents are consistent in their answers.

Another limitation is that the sample was drawn from one discipline, that of information technology. It is feasible that information behaviour or users are not the same in all scientific disciplines and that relevance judgements may be made in other ways in sciences viewed as "harder" or "softer" than information technology. However, since the aim of this study is not to ascribe relevance judgements to users and seekers of information, but merely to establish the

validity of a model to study relevance types, this is not seen as a serious problem.

4.9. Summary

In Chapter 3 a model was defined which describes relevance in terms of relations between the stages of the information seeking and retrieval process on the one hand and the information objects on the other. In Chapter 4 the research methodology used to test various aspects of the model empirically has been described. In this chapter, the questionnaire construction, the rationale behind each question used in the questionnaire and the coding systems used for data analysis have been explained. The sample design and data collection methods have been described and the possible limitations of the methodology have been indicated. In Chapter 5, the results of the empirical study are presented and discussed.