

How Qualitative Data Analysis Software may Support the Qualitative Analysis Process

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Abstract. The last decades have shown large progress in the elaboration of procedures for qualitative data analysis and in the development of computer programs to support this kind of analysis. We believe, however, that the link between methodology and computer software tools is too loose, especially for a novice qualitative researcher. It is very unclear to select the proper functions and tools as a support in a specific phase of analysis. In texts, you will find a description of the steps of qualitative analysis, and in separate texts computer tools are presented, but what function or tool to use in what phase of analysis is hardly discussed. In this article, we will elaborate the phases of the grounded theory approach and indicate which of the tools of the computer program Kwalitan is to be used in each of the steps and procedures. We will also show how the functions of the computer program may be used when doing a qualitative analysis according to three other approaches, namely summarizing analysis, ethnographic analysis and narrative analysis.

Key words: computer programs, ethnographic analysis, grounded theory, Kwalitan, narrative analysis, qualitative analysis, qda, summarizing analysis.

1. Introduction

In the past few decades we have seen many developments in the field of qualitative analysis. An important one is the elaboration of step-by-step procedures (e.g., Spradley, 1980; Hycner, 1985; Maso, 1987; Wester, 1984) that give structure to the process of analysis of distinct research strategies. Another important development has been the publication of many textbooks and articles devoted to principles, procedures and steps of varying approaches of qualitative research and qualitative analysis, making

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qualitative methods available for a large audience of researchers (see, e.g., Strauss and Corbin, 1990; Miles and Huberman, 1994; Denzin and Lincoln, 1994; Wester, 1995; Mason, 1996; Silverman, 2001; Wester and Peters, 2004).

A third and most important development, especially in the past 10–15 years, has been the development of computer programs to support the researcher in carrying out the analysis process (like *The Ethnograph*, *Nudist*, *NVivo*, *Atlas/ti*, *MAXqda* and *Kwalitan*). All these programs have more or less the same qualities; they partly overlap, and partly have their own special features (see Tesch, 1990; Fielding and Lee, 1991; Weizman and Miles, 1994).

Nowadays, even in general methodological textbooks we may find chapters on qualitative methods and sections on computer-assisted qualitative data analysis (see, e.g., the book “*Business research methods*” by Bryman and Bell (2003)).

But in spite of the growing attention for qualitative analysis, it is our experience and conviction, that there is a problematic link between procedures of qualitative analysis and software programs that may support this analysis. The available computer programs can be seen as a collection of tools, but the functions and features of these programs are so divergent, that it is hardly possible for a novice qualitative researcher to select the proper qualitative procedures, let alone to pick the most efficient functions of the computer programs to support such a procedure. This is not a new problem. Many researchers look back with a feeling of nostalgia to the first manuals for SPSS in the early eighties (the ones with the red cover), where the statistical techniques were discussed extensively before it was explained how the specific procedure of SPSS should be used to perform this analysis. We believe there is need for similar publications in which the procedures and steps of the qualitative analysis process are directly related to the functions and tools of computer programs.

In this article, we will elaborate how the various phases of a qualitative research process may be supported by specific tools from computer software. We will start with a short description of the characteristic features of qualitative analysis. In the next section, we will have a closer look at the different levels of data that are used in a qualitative analysis and the type of functions and tools researchers may want to use to support analysis at each of these levels.

In Section 4, we will describe in detail what steps have to be taken in each phase of qualitative analysis, and which computer functions and tools may support these steps. Of course it is not possible in the context of this article to do this for all sorts of approaches of qualitative analysis, nor is it possible to pay attention to all possibilities of all current computer programs. Therefore we will restrict ourselves in two ways:

- we will portray the procedures and steps of qualitative analysis in terms of the grounded theory approach as elaborated by Wester (1984, 1995);
- we will only look at the support the program Kwalitan (Peters, 2005) can offer.

In the fifth section, we will shortly show that these analysis steps and computer tools are also relevant for other approaches like summarizing analysis, ethnographic analysis or narrative analysis. We will close with the conclusion that how useful and indispensable these tools may be, training researchers to carry out a qualitative analysis is more than teaching them to use a computer program.

2. An Overview of the Characteristics of Qualitative Analysis

Whether a qualitative analysis concerns the derivation of perspectives from an interview, a narrative analysis of a television play or an ethnographic analysis of observation material, in all these situations similar characteristics and procedures can be found relating to the open character of qualitative research, undoubtedly the most distinctive feature of qualitative research. The researcher starts with a partly open conceptual frame that has to be elaborated during the research project. In this respect research is a learning process in which the researcher has to tune in his¹ preliminary ideas to the field of research. He has to try out observation procedures and refine research questions, all with the purpose of getting more insight in the field of study and expanding the conceptual frame. Phases of observation and analysis alternate, they are guided by a constant reflection on the results in relation to the research questions (e.g., Wester and Peters, 2004: 41).

The word 'analysis' has several distinct meanings. The first meaning refers to the act of 'unfolding': the researcher tries to unfold the material in terms of some analytical frame. In qualitative analysis the analytical frame used in this activity is generally constructed during the research project itself. However, unfolding by itself is not enough: analysis also means searching for patterns in the material. Searching for patterns implies that the researcher has to make comparisons between separate segments, either within a single unit of text or across various units. These patterns are used to formulate answers to the research questions.

Another very important characteristic of qualitative analysis is the complex process in which successively a number of steps have to be executed, before the final analysis can be made to answer the research questions. These steps build on each other. So we have to deal with a **phased procedure**, containing partial analyses to achieve intermediate objectives. Most procedures for qualitative analysis define a phase of getting

acquainted with the field of research, next to distinct phases in which specific products are worked out, and a concluding phase in which the final analysis of all the data according to the elaborated framework takes place.

A third characteristic of qualitative analysis is that the analysis is based on, mostly sizeable, text-like material. Whether this material consists of (media) documents, observation material or interviews, the researcher usually does not have a readymade analytical frame in which he can arrange the material directly. This implies that in most procedures the observations are recorded through some kind of **transcription** to make analysis easier. These written versions of observations, interviews or (media) documents play a central part in the analysis process. Due to the open character of qualitative research it is necessary that we can handle the transcripts with flexibility. It is the uncertain character of the observation in the initial phase of a qualitative research project that will cause the researcher to use checking procedures (such as replication, triangulation), making the material even more sizeable. Additions may always prove necessary.

The core process of qualitative analysis is the reading of transcripts. This reading is to be done in at least three different ways, referring to different meanings the verb “to read” has (Wester and Peters, 2004: 86):

- Observation perceive the textual material;
- Interpretation understand the text in terms of an analytic perspective;
- Selection make a distinction between what is important in relation to the research questions and what is not.

While reading the text the researcher makes connections between the actual material and the (provisional) conceptual frame. He usually does so by assigning codes to (parts of) texts. Initially this process of **coding** is tentative, it will only become definite after research questions and conceptual frame have been worked out. Therefore, the researcher will need tools that support him to easily link codes to parts of the material, to generate an overview of codes or to compare segments with the same code or similar codes.

Since the researcher starts with a provisional conceptual frame, reading and coding the research material is a creative process that is guided by constant reflecting on research questions, observation material and conceptual frame. During this process all kinds of ideas, perceptions and decisions will come up in the mind of the researcher. Unless they are captured in **memos**, most of these ideas get lost. Writing memos, however, is not merely a support to the memory of the researcher. It is important because it forces the researcher to reflect, to make explicit all the ideas, perceptions and decisions that have arisen during observation and analysis. Writing down and

recording these mental leaps in memos is an important tool for making analysis cumulative.

Once analysis has revealed important categories to classify the material (the analytical frame), the researcher will need overviews of how these categories appear in the material or how they are represented in specific units (like situations, documents, respondents). And next, the researcher wants to create overviews in which each unit of analysis has been arranged according to the most important points of attention (themes), in order to generate descriptive **profiles** in terms of central concepts. These overviews form the basic material for the concluding analysis to answer research questions.

Finally, the researcher will report on the analysis using quotations from the data to illustrate how concepts fit the research material and displaying overviews and matrices to answer research questions.

Before we elaborate the different phases of qualitative analysis, we will discuss this process from a more analytic methodological perspective that gives us a view on the diverse data levels that are relevant.

3. Levels of Data in the Analysis Process

In Figure 1, we take a closer look at the tools and functions that may be applied in qualitative analysis.

The top of this scheme represents a very broad outline of the analysis process: starting from some theoretical notions the researcher formulates

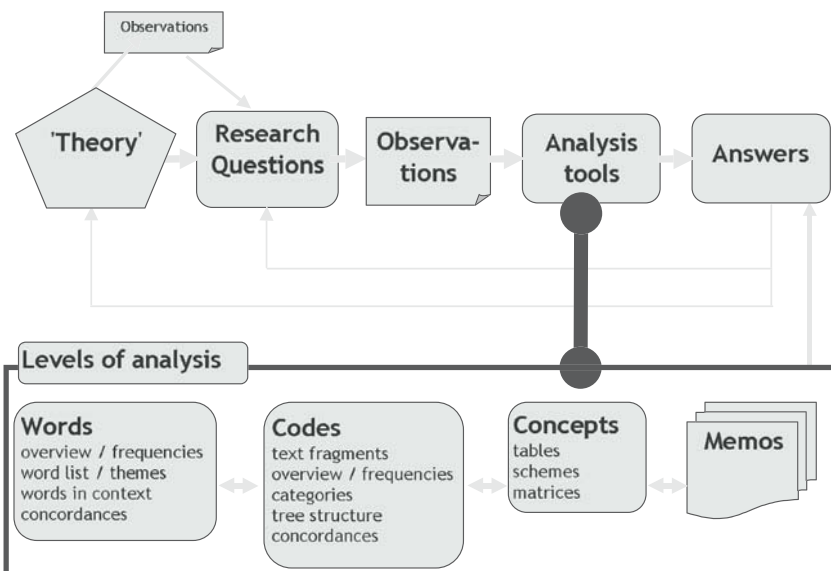


Figure 1. Tools for the process of qualitative analysis.

research questions. The word ‘theory’ is placed between quotes to indicate that in qualitative research the researcher usually does not have a well-defined theory at the start of the research; it is just the objective of the research process to formulate such a theory. In practice, this ‘theory’ will consist of sensitizing concepts that form the start of a conceptual model. Sometimes these preliminary theoretical notions are too vague to formulate any research questions, so explorative observations are used to define a first focus. As the foundation for the research questions is rather weak, these provisionally formulated questions have to be elaborated during analysis. On the basis of sensitizing concepts and preliminary questions, data will be collected and analyzed, according to the characteristics of the phased approach that was described in the previous section. During this analysis process the researcher applies specific tools that will help to document reflection processes, find answers to research questions, reformulate research questions, elaborate the analytic framework or produce overviews of data. In the end, these analysis efforts will help to elaborate the initial theoretical notions into a new or improved theory, or at a less ambitious level, into a well-defined frame to describe the objects of study systematically.

The tools we may use to support qualitative analysis as distinguished in Figure 1, refer to different levels of analysis, that we will clarify next.

Although the analysis of qualitative material is not restricted to the analysis of interviews (as pointed out previously), for the sake of readability we will assume for the rest of this article a context of a research project consisting of interviews.

3.1. ANALYSIS AT THE LEVEL OF WORDS

The first level to be distinguished is analysis on the level of words. At this level the researcher focuses on the words as they appear in the transcript, that is, words as they were spoken (in an interview) or written (e.g., in a document). This is the most concrete level of analysis, since one uses the exact text of the transcript, without any categorization by the researcher. At this level one tries, for instance, to find out which different terms are used to refer to a specific object (so-called field-related terms), and whether some words co-occur often with other words, or to find relevant segments on the basis of the use of a specific word. It is also possible to search for differences between separate documents (e.g., interviews) in the way specific topics are addressed. Tools the researcher may want to use at this level are for example,

- Word lists, containing words that are considered relevant in relation to the research questions;

- Overviews of words used in the documents, that is, all words or just the words from the word lists, indicating the frequency of occurrence of the words;
- Keyword-in-context, which is a list of all occurrences of a specific word in its immediate context that enables the researcher to look for different meanings or connotations of the word;
- Selection of segments containing one or more specific words;
- Matrices and tables indicating the concordance of words.

3.2. ANALYSIS AT THE LEVEL OF CODES

The second level we distinguish is the level of codes. A code represents an interpretation of the researcher of the exact text in the document. By using codes, the researcher tries to make a link between parts of the text, the conceptual frame and research questions. Therefore, codes are on a more abstract or conceptual level than the words that appear in the document text.

In the course of the analysis the function of codes changes. Depending on the phase of the analysis process, we may distinguish (at least) three different types of codes:

- Descriptive codes these are used to describe what the researcher finds in the material, they merely indicate which elements in the texts are relevant in relation to research questions and conceptual model; these codes are especially useful in the exploration phase² as they indicate topics and specifications;
- Analytic codes these codes refer to underlying concepts; they help the researcher to identify dimensions and variables that underlie the separate descriptive codes; this type of code is especially important during the specification phase;
- Pattern codes this type of code is used to refer to patterns that may be present in the material; these patterns may, for example, concern the co-occurrence of dimensions and/or variables; pattern codes are indispensable during the reduction and the integration phase.

Most literature on qualitative analysis focuses on working with codes. Computer tools that are suitable on this level of analysis are:

- Lists of codes used in analysis, together with their frequencies; these lists may help the researcher to get an overview of the analytical frame

(i.e., the set of codes), as it is used to describe the material and to check this frame for errors, the use of synonyms, redundancies or gaps;

- Overviews of the exact locations of the codes in the coded material used to see how codes appear across different documents;
- An overview of the (parts of the) texts assigned to a specific code, enabling the researcher to get insight in what that specific code refers to, and to see whether it is possible or necessary to further unfold that code into subcodes;
- A categorization of codes; a category refers to an underlying aspect/concept; codes that contribute to that underlying aspect or concept are brought together in a category;
- Hierarchical tree structures; this is a tool that helps the researcher to arrange the separate codes into a hierarchical system of codes and subcodes; seen from the root of the tree, one can find how an abstract concept is subdivided into aspects that in turn are subdivided, and so on. Seen from the separate branches of the tree, one can see how the separate codes 'melt together' into more general and abstract themes and concepts;
- Matrices and tables indicating the concordance of codes.

Some of the tools mentioned here are used to keep track of the (descriptive) codes used, other tools are especially useful if the researcher wants to shift to a more conceptual level of analysis.

3.3. ANALYSIS AT THE LEVEL OF CONCEPTS

At the third level, the analyst works at an even more abstract level. After relevant concepts have been identified based on the reading of the data material, the researcher may want to search for patterns and relationships between the concepts. For this purpose the analyst may use the following tools:

- Tables, in which, for example, is described how in separate documents is referred to specific themes or concepts; in a typical matrix, the columns represent the documents, while the rows represent some of the core concepts that are relevant; in the cells the researcher may summarize what the respondent has said in relation to the concept;
- Schemes that are graphical representations of the way separate concepts are related to each other;
- Matrices, indicating, for example, which codes occur in each of the segments or documents; although it will be very hard to discover patterns from this type of matrices at a glance, these matrices may be exported to other programs that have tools for identifying patterns in a matrix (like homogeneity analysis).

3.4. ANALYSIS AT THE LEVEL OF MEMOS

The fourth level, at last, concerns the memos the researcher has written. Memos are written to record the results of reflection processes during analysis. In this respect the memo files represent the most abstract level of analysis. During analysis the analyst may use different types of memos, such as:

- Concept memos containing a definition or description of codes, concepts and relevant terms used;
- Profile memos containing descriptions of the units in the analysis (respondents, documents) in terms of dimensions, variables or concepts that are developed during the analysis;
- Method memos containing research notes in relation to the process of the analysis, for example, arguments for theoretical sampling, decisions and their justification in relation to analysis procedures, research questions to be answered in successive phases;
- Theory memos containing descriptions of the development of the conceptual frame, from the sensitizing concepts via the provisional conceptual frames to the definite conceptual frame used to answer research questions.

Researchers may wish to use other types of memos, focusing on specific elements of the analysis process.

Regular and thorough inspection of the memos (e.g., by recapitalizing your own memos regularly and writing these recapitulations down in new memos) is indispensable for the steering of the analysis process. In fact, profound inspection of your own memos can be seen as a form of qualitative analysis on which all of these apply!

The discussion of the four levels on which analysis may be conducted and the separate tools that are mentioned is not exhaustive. It is typical for qualitative analysis that researchers develop their own tools along the path of analysis, depending on the questions or problems they are confronted with. The distinction between the four levels does neither imply that a researcher has to work on all four levels in order to do a proper analysis. Whether analysis on one of the levels is necessary depends on the research questions to be answered. Although looking at the words that occur in the data material may not be considered by all researchers as a good method to answer the research questions, it may help however to formulate new and more specific research questions, for example, when the comparison between separate documents reveals interesting differences in the terms and expressions that are used.

After the description of computer tools that may be used in a qualitative analysis, we will elaborate in the next section how these separate tools may be used in the various phases of a qualitative analysis according to the grounded theory approach.

4. The Phases of Grounded Theory and the Support by Kwalitan

One of the most mentioned approaches in qualitative analysis is the Grounded Theory Approach, initially developed by Glaser and Straus (1967), and later further elaborated by Strauss (1987) and Strauss and Corbin (1990). The phased mode of operation that is characteristic for qualitative analysis is modeled by Wester (1984) into the following four phases:

- Exploration discovering concepts;
- Specification working out concepts;
- Reduction determining the core concept and the underlying relations;
- Integration answering specific research questions by way of the elaborated theory.

The Grounded Theory Approach mainly concentrates on comparative analysis, at first by comparing segments of text, later by comparing units (respondents) in which all the aforementioned tools and procedures play a part.

Before we enter upon the supporting possibilities of Kwalitan in various phases of a qualitative analysis according to the grounded theory approach, we will start with a brief description of the data structure in Kwalitan (see Figure 2).

The first element is the document. The data of one single observation unit, for instance an interview are stored in a document. Each document is divided into segments. Codes are assigned to the text of a segment. Optionally the researcher may add an annotation to a segment with additional information about the segment or, if necessary, a summary of the text of the segment. A number of documents together make a work file. A number of work files together form a project. The reason for working with separate work files may be the different nature of the data (e.g., one work file with field notes and one work file with interview transcripts), or specific characteristics of the sources (e.g., one work file for data from men and a separate one for women).

In addition to data (documents), six other elements are included in a project: memos, categories, tree structures, word lists, tables and schemes. These elements are created the course of the analysis process and contain the results of the analysis and reflections.

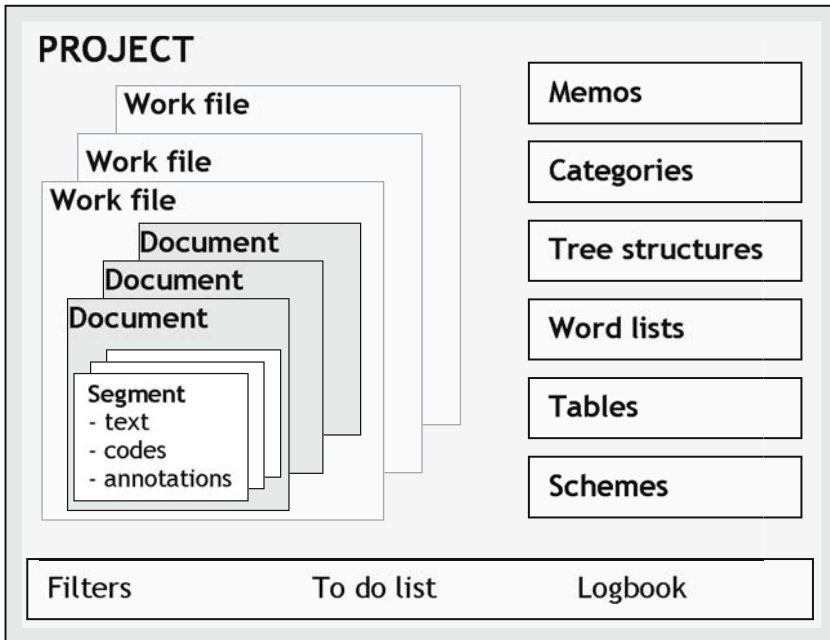


Figure 2. The data structure of Kwalitan.

In the bottom of Figure 2 three elements are mentioned that are useful for the management of the research project, namely filters (enabling the researcher to make selections from the data material), a task list and a logbook; the last two elements are especially useful when more than one researcher is involved in the project.

As mentioned earlier, Kwalitan requires a data structure in which the text is divided into segments: parts of text that belong together either logically or contextually. For example, we can think of an interview question and the answer the respondent has given. Although some researchers feel limited by the fact that the material has to be divided into segments, and although most other programs do not require a segment structure, we think there are some important reasons for pre-structuring the material into segments (see Wester and Peters, 2004: 148):

- They help the researcher to focus on parts of the text that logically belong together;
- They function as a context unit for interpreting the text during the coding process;
- They function as a unit of analysis, for example, when looking for co-occurrences of codes or words.

The segment structure will only be used in the first phases of analysis; from the reduction phase on, the researcher looks at the entire document instead of segments.

Now that we have explained the structure and terms Kwalitan uses, it is time to present a closer look into the phases of the grounded theory approach and the way Kwalitan may support analysis in each of these phases.

4.1. PREPARATION

Before any analysis of qualitative materials may start, the researcher has to make some preparations. These are summarized in Figure 3. In the left-hand column, we describe these preparatory activities; in the right-hand column, the Kwalitan tools to be applied are mentioned.

When using Kwalitan, transcription can either be made with a word processing program (at a later stage to be imported into a Kwalitan project), or the text can be directly entered into Kwalitan. After the material has been transcribed and stored in the file structure we can start to do explorations on the data material. For instance, when looking for ‘field-related concepts’ it is possible to page through one or more interviews, but a more structural way is to ask for overviews of words and search these lists for specific words.

To be well prepared for analysis it is important to write theory memos in which a temporary conceptual frame is explicated, ‘sensitizing concepts’ are worked out and questions for steering analysis during the exploratory phase are explicated.

After we have gone through all these preparatory steps, the time has come for the first ‘real’ analysis: applying open coding in the exploration phase.

| Activity | In Kwalitan |
|---|--|
| <ul style="list-style-type: none"> • Make a transcript • Create a project • Import documents into the Kwalitan project | <p>-</p> <p>CREATE A NEW Project</p> <ul style="list-style-type: none"> • using the function IMPORT A DOCUMENT, in case the material is prepared outside Kwalitan (as a pre-structured ‘raw document file’, or as plain text in text-format or in rtf-format) • or directly in the function DISPLAY SEGMENTS, by typing in the text, or by copying and pasting it from another application |
| <ul style="list-style-type: none"> • Get acquainted with the material | <ul style="list-style-type: none"> • DISPLAY SEGMENTS to browse through the texts • OVERVIEW OF WORDS to get a list of words in the text • WORDS IN CONTEXT to explore the meaning of specific words |
| <ul style="list-style-type: none"> • Formulate sensitizing concepts • Write memos on relevant concepts and the research questions | <p>THEORY MEMOS</p> <p>CONCEPT MEMOS</p> <p>METHOD MEMOS</p> |

Figure 3. Steps and tools in the preparation phase.

4.2. THE EXPLORATION PHASE

The objective of the exploration phase is the distillation of as many relevant codes and concepts from the data material as possible. The important word here is ‘relevant’: the point is to identify parts of texts that are relevant in the light of the questions formulated and record them by assigning one or more codes to these segments. We distinguish the following steps in the exploration phase (see Figure 4).

We will briefly discuss these steps now.

For the record we like to indicate that it is not necessary or wise to carry out the exploration phase with all the data material, as a limited number of carefully chosen interviews will give us enough insight in the variations in the interview materials regarding the research questions. That is why the first step here deals with the selection of ‘rich and informative’ documents.

The computer support in this first phase is mainly based on managing codes assigned to the data materials. Kwalitan has several possibilities.

The form of coding applied in this exploration phase is referred to as *open coding*, since this process aims at finding as many relevant aspects that may help to elaborate the provisional analytical model.

While reading the text, the researcher may use several strategies:

- Focused reading with the research questions in mind, the researcher reads the text of a segment to find expressions that may (help to) answer the research questions;
- Summarizing the researcher globally reads the texts of a segment and tries to summarize in terms of the respondent; the elements of this summary are recorded as codes;

| Activity | In Kwalitan |
|--|---|
| <ul style="list-style-type: none"> • Select material for the exploration phase; in this phase it should be rich and informative material • Read the text | Account for this choice in METHOD MEMOS From paper or directly in Kwalitan using the function DISPLAY SEGMENTS |
| <ul style="list-style-type: none"> • Think up codes and assign them to the segments | DISPLAY SEGMENTS OF AUTOMATIC CODING |
| <ul style="list-style-type: none"> • Clarify, define and/or delineate the (most relevant) codes | CONCEPT MEMOS |
| <ul style="list-style-type: none"> • Check the codes for typing error and synonyms | OVERVIEW OF CODES |
| <ul style="list-style-type: none"> • Link the codes to the research questions, and look for redundancies and gaps | OVERVIEW OF CODES THEORY MEMOS |
| <ul style="list-style-type: none"> • Reformulate the research questions and/or formulate new research questions | METHOD MEMOS |

Figure 4. Steps and tools in the exploration phase.

- Scanning the computer automatically allots codes to the texts, searching for specific words that are considered important (see next).

The first and second strategies are mostly used alternatively. In addition, segments are often reread several times, especially new codes in later read segments may be relevant for segments read at an earlier stage.

Codes can be assigned to a segment in two ways: they can relate to the whole segment or to a specific fragment within the segment. In the first case, the code indicates that a certain theme is mentioned in the segment. In the second case, a specific part of the text is selected and the assigned code is linked to this specific part of the text. The latter procedure is more elaborate and it is not relevant to link all codes to the text in this way. For example, a code indicating that a specific theme is mentioned in a segment can be assigned globally, while a specific interpretation of such a theme better is indicated by a code directly linked to the specific piece of text.

As said, using a computer offers another way of assigning codes, namely assigning codes automatically. In this case Kwalitan is instructed to search for a specific word (the search key) and each time the word is found, it will assign a specific code to these segments. This way of assigning codes may be fast, but is also quite susceptible to mistakes: a respondent may discuss a certain theme without using the search key, or the search key is used with different meanings in the text. In both cases closer inspection of the text will be necessary.

In the exploration phase the researcher will aim at disclosing as many relevant concepts as possible, so that the analyst can decide what is important for the research question and what is not. This objective could easily lead to an increasing multitude of codes in which at a given moment a structure is hard to find. To prevent this, the researcher will aim at keeping the analysis manageable by alternatively assigning codes and reflecting on his coding. To support this kind of reflection, Kwalitan offers tools such as concept memos for describing the codes used or for recording the differences or similarities between codes. Additionally, theory memos form an important tool for the researcher to stay on course, so that the analyst gets an overview and does not get lost in all used separate codes.

After the analyst has assigned codes to a number of documents in this way, and the feeling has grown that coding new material will not generate new insights in addition to the codes already used (i.e., the principle of saturation), the exploration phase can be finished. Now, the step to the specification phase can be made.

4.3. THE SPECIFICATION PHASE

Whereas in the exploration phase the focus was on devising and assigning as many relevant codes as possible, in the specification phase the objective is to find an underlying structure in the wide variety of codes used. The motto for this phase is ‘converge’. The steps taken in this phase are shown in Figure 5.

Just as was the case in the exploration phase, in the specification phase the researcher only needs a limited number of documents assumed that these new interviews are selected deliberately on analytical grounds (i.e., theoretical sampling).

In this phase the greatest danger lies in the fact that while looking for the underlying structure, the analyst will only explore and focus on codes and disregard the texts to which these codes are linked, or in other words, that the researcher forgets to check whether new ideas are actually grounded in the data material. Therefore, it is necessary that all the items devised to structure the codes are checked over and over again in the documents used in this phase of the analysis process. Kwalitan is set up in such a way that the text is available at the click of a mouse, which makes it easy to return to the text for examination.

| Activity | In Kwalitan |
|--|---|
| <ul style="list-style-type: none"> Select material for the specification phase; make transcripts of this material | Based upon METHOD MEMOS FILTER |
| <ul style="list-style-type: none"> Code the new material with the codes that were generated in the exploration phase; if necessary add new codes Identify central codes | DISPLAY SEGMENTS OVERVIEW OF CODES CONCORDANCE OF CODES CONCEPT MEMOS |
| <ul style="list-style-type: none"> Constant comparison of segments: read the texts that belong to a central concept and think up codes that emerge from this comparison | use FILTERS to select appropriate segments either PRINT SEGMENTS and read from paper or use the function DISPLAY SEGMENTS |
| <ul style="list-style-type: none"> Formulate new codes that coordinate other codes (and refer to central concepts underlying dimensions) and check whether these new codes are really founded in the material | CONCEPT MEMOS OVERVIEW OF CODES in combination with FILTERS CONCORDANCE OF CODES CATEGORIES and/or TREE STRUCTURE to elaborate the underlying structure in the codes use FILTERS to select appropriate segments |
| <ul style="list-style-type: none"> Describe these codes and concepts | CONCEPT MEMOS THEORY MEMOS |
| <ul style="list-style-type: none"> Assign the new (analytical) codes to the segments | DISPLAY SEGMENTS |
| <ul style="list-style-type: none"> Create per unit an overview: what is said in each document about the central concepts | PROFILE MEMOS TABLES |
| <ul style="list-style-type: none"> Elaborate the conceptual frame on the basis of these results and reflections | Theory memos |
| <ul style="list-style-type: none"> Reformulate the research questions and/or formulate new research questions | Method memos |

Figure 5. Steps and tools in the specification phase.

The aim of the analysis process is to yield a growing detailed insight in what the material tells us about certain themes. The form of analysis applied in the specification phase is called the method of *constant comparison* or *axial coding* (Strauss and Corbin, 1990). To do so, it is necessary that the analyst can repeatedly select specific segments that may reveal something about the theme that has to be worked out. By means of a filter, Kwalitan can make a very accurate selection of the material. Through a filter segments can be selected on the basis of assigned codes, words in the text, of (background) information about the document at hand (respondent).

When looking for the structure underlying the codes, a number of tools can be used. Here, we mention four of them:

- To get a first impression of codes and their relationships, an overview of codes can be consulted. Such an overview may refer to the material as a whole, or to a part of it. Thus, we can ask for codes that are assigned to segments dealing with a certain (thematic) code. The overviews generated in this way indicate which codes appear together with the code under investigation in the same segment. Now an initial structuring can be applied to the codes.
- We can distinguish groups of codes that point to a common aspect. In Kwalitan these groups are called categories. Categories are defined in such a way that a code can only be put in one of the distinguished categories; in other words, the categories are exclusive. Working with categories is comparable to a method of sorting separate codes in stacks of similar codes.
- Another tool is the construction of a hierarchical tree structure showing the hierarchical relationships between the codes. A certain concept is divided into a number of dimensions that, in turn, are divided into sub-dimensions. The codes are now linked to the proper (sub-)dimension. A tree structure can be built top-down (seen from a certain theoretical concept) as well as bottom-up (the structure is generated starting from the loose codes). Within Kwalitan the tree structure is defined in such a way a code can be placed in various places in the tree structure, that is, the branches are not exclusive.
- A fourth possibility for finding an underlying structure is to have Kwalitan look for co-occurrences of codes. These concordances of codes may reveal which codes take a central position and with which other codes these codes co-occur frequently. Kwalitan can create a matrix in which the co-occurrences of codes are shown.

We refer to the codes that indicate these underlying structures as analytical codes (e.g., dimensions or variables).

When the structure based on the codes has been sufficiently developed, the time has come to change the focus of analysis. Until now,

the researcher has mainly worked with segments from a document. The moment will come when it is necessary to summarize the material in a document from the respondent's point of view. This is an intricate step for the researcher. Kwalitan has two tools to help him. In the first place there are profile memos, in which the point of view of the respondent is described in terms of central concepts, categories or the tree structure devised earlier. Additionally, in Kwalitan the researcher can summarize what the respondent has said about different themes by using (qualitative) tables. On the basis of these kinds of tables the researcher will be able to make a systematic comparison of respondents, which, in turn, can be of help for working out and specifying central concepts.

It will now be evident that theory memos and method memos are indispensable for describing and recording the steps taken during this phase as well as their results.

4.4. THE REDUCTION PHASE

In the reduction phase the researcher's main task is to find out how the analytical codes developed in the previous phases, can be related to each other. One important strategy is to look for patterns of codes assigned to the texts. These patterns will, in turn, give the initial impetus to formulate a theory about the research subject. Such a theory defines what the core concept in the study is and how the core is related to the other elaborated concepts.

In Figure 6 you will find an overview of the steps the analyst may follow in this phase.

The first step in this phase, as in the previous phases, is the use of new material (either from a pool of interviews or newly gathered data) to support the analysis. If there are no documents available, new material has to be collected. Next, these interview data have to be coded, but now using the well-developed codes elaborated before. This way of coding is referred to as *selective coding*. Since the codes we use in this stage are more conceptual and more abstract than the codes in previous stages and since they refer to the respondent (document level), complete transcription of the material is not necessary. The transcript to be coded may consist of (rather detailed) summaries of the interview, instead of verbatim representations.

Although the way of assigning codes in the selective coding process essentially differs from the open coding in the exploration phase and the comparative coding in the specification phase, the same tools from Kwalitan can be used to support selective coding.

The main task for the researcher is looking for patterns of codes in order to find the concepts that may take a central position in the conceptual model. Glaser (1978) and Strauss and Corbin (1990), and also Wester and Peters (2004), discuss several strategies to accomplish this task. As it

| Activity | In Kwalitan |
|--|---|
| • Collect or select material for the reduction phase. Make transcripts of this material | Using THEORY MEMOS and METHOD MEMOS |
| • Apply selective coding | From paper or using the function DISPLAY SEGMENTS |
| • Apply one or several strategies in order to identify patterns and the core concepts for the theory | |
| - survey your theoretical memos | THEORY MEMOS |
| - conduct literature study | Write THEORY MEMOS |
| - survey your profile memos | PROFILE MEMOS |
| - survey code overviews and matrices | OVERVIEW OF CODES MATRIX OF CODES BY SEGMENTS |
| - select and study segments revealing relations between concepts | FILTERS DISPLAY SEGMENTS |
| - build matrices and export them to other programs for additional analyses | MATRIX OF CODES BY SEGMENTS MATRIX OF CODES BY CODES |
| • Formulate the core variable and describe the relation with other concepts | CONCEPT MEMOS THEORY MEMOS CONCEPTUAL SCHEMES |
| • Describe respondents in terms of the core variable and the related concepts | PROFILE MEMOS TABLES |
| • Elaborate the conceptual frame | CONCEPTUAL SCHEMES THEORY MEMOS |
| • Elaborate the formulation of the research questions | METHOD MEMOS |

Figure 6. Steps and tools in the reduction phase.

is not possible to describe these strategies extensively in the limitations of this article, you find an overview in Figure 6 and we further refer you to the literature mentioned here.

We explicitly point at the possibility of creating matrices in Kwalitan. These matrices may be exported to other programs, like spreadsheets or SPSS. Advanced procedures may be applied to search for patterns in the codes, like homogeneity analysis (e.g., see Verloo, 1992).

In the reduction phase, analysis focuses on the more abstract level of relationships between concepts and hence the role of theory memos becomes more important. Having elaborated the core concept and its relationships with other concepts, the researcher is able to formulate the research questions to be answered more precisely.

4.5. THE INTEGRATION PHASE

In the integration phase the seal has to be set on your work: the conceptual frame developed from the start of the analysis on, is now completed and applied to answer the now definitive research questions.

Also in this phase of the research, the analytical frame should constantly be linked to (perhaps new) interview material. As a consequence, the results of the previous phase (codes indicating specific patterns) will have to be assigned to all the interview data (often new interview data).

| Activity | In Kwalitan |
|--|---|
| <ul style="list-style-type: none"> • Collect or select material to be analyzed in this phase; make transcripts | Based upon THEORY MEMOS and METHOD MEMOS |
| <ul style="list-style-type: none"> • Apply selective coding to this material | From paper or using the function DISPLAY SEGMENTS |
| <ul style="list-style-type: none"> • Write per respondent profile memos and summarize them optionally in tables | PROFILE MEMOS TABLES |
| <ul style="list-style-type: none"> • Prepare if necessary additional analyses and conduct them | MATRIX CODE BY SEGMENT MATRIX CODE BY CODE Export these matrices to e.g. SPSS |
| <ul style="list-style-type: none"> • Elaborate the final conceptual frame | THEORY MEMOS |
| <ul style="list-style-type: none"> • Select relevant segments / quotations to be used in the research report | CONCEPT MEMOS PROFILE MEMOS FILTER |

Figure 7. Steps and tools in the integration phase.

An important point of attention during analysis is the relationship between the central concepts of the theory: for this purpose overviews of codes per document and profile memos of respondents are made and analyzed.

For the main part, the analysis now will be at a conceptual level (interpretations). That is why in this phase the different types of memos are the most important tools to be used.

The final step of analysis is during the writing of the research report. In most cases the researcher will want to include summaries or quotations referring to the interviews. They can be retrieved and selected from the data material with the help of codes, concept memos or profile memos.

Figure 7 summarizes these steps.

With the overview of steps and tools in the integration phase, we conclude our description of the way Kwalitan may support qualitative analysis according to the grounded theory approach. In the next section, we will briefly pay attention to three other approaches for qualitative analyses, in order to illustrate that the tools mentioned can also be applied in other analysis strategies.

5. Other Strategies of Analysis and Computer Support

Next to the grounded theory approach there are other approaches for qualitative analysis in which a phased method is used with similar steps and procedures. We will briefly describe three examples: summarizing analysis, ethnographic analysis and narrative analysis.

We will not elaborate extensively which functions and tools of computer programs like Kwalitan can be deployed in the distinct phases of these analysis procedures, as the functions and tools that were used in the grounded theory approach can be used in a similar way in each of these three approaches.

5.1. THE SUMMARIZING ANALYSIS

Summarizing analysis (see, e.g., Miles and Huberman, 1994; Yin, 2003) is a rather well-structured form of qualitative analysis. The researcher starts with a well-defined research question of a descriptive nature, and the analytical frame has already well-elaborated elements. By using these elements the researcher can summarize the material of the interviews and make overviews in order to answer the specific research questions.

In this approach roughly the following phases can be distinguished:

- *Preparation* Study relevant literature, formulate a conceptual frame and define research questions and topic codes. Tools to be used: create a project, collect data and make transcripts with segments and topic codes.
- *Exploration* Read the text: check whether topic codes cover the material sufficiently, think up and assign additional codes and link all codes to research questions.
- *Variable construction* Constant comparison of segments for each topic, formulate and describe analytical codes, summarize each research unit, formulate variables, link findings and conceptual frame to the research questions.
- *Integration* Analyze the material at the level of units in terms of variables, work out profile memos, create matrices and tables of respondents and variables, determine possible relations/formulate typology, select relevant segments for the research report.

This procedure may be considered as a shorter version of the procedures in the grounded theory approach. This is because the researcher has a well-defined conceptual frame beforehand and does not have to develop it from 'scratch'.

Computer programs are used as a tool for making transcripts, recording the procedure by way of memo files, coding the material, describing the coding procedure, making overviews of codes, selecting relevant parts from the material, making summaries, matrices or tables and selecting text segments as illustrations for the report.

5.2. ETHNOGRAPHIC ANALYSIS

According to Spradley (1979, 1980) an ethnographic analysis is a stepwise procedure to derive those (cultural) themes from ethnographic material that may be characteristic for the community, institution or group under investigation. The data to be analyzed consist of observation reports and interview transcripts. Field-related terms, that is, language use and meanings applied by group members, play an important role in ethnographic anal-

ysis. The core activities focus on selecting field-related terms for a domain analysis and working out taxonomies in order to recognize cultural themes.

The ethnographic analysis consists of the following phases:

- *Preparation* Create a work file to enter and store the material, enter transcripts of observations, interviews or documents, distinguish segments and assign topic codes make an index for topic codes and make a list of important indigeneous words.
- *Field exploration* Identify relevant observation situations and get insight in distinctive groups of field-related terms; assign codes to segments, explain and correct codes, assign codes from word list to segments, define domains and link domain codes to segments, link codes to research questions, formulate (adapted) research questions.
- *Domain analysis* Produce a systematic inventory of the terms and relations within a specific domain; enter descriptive observations, select relevant segments, apply constant comparison of segments of a domain, make a word list for each domain, create a domain analysis memo, arrange the codes and words per domain.
- *Taxonomic analysis* Elaborate all relations between the terms in a specific domain; select a domain, select (or execute) specific observations and interviews, select relevant segments, create taxonomy memos, do additional observations, formulate analytical categories, link analytical codes to segments, write theory memos.
- *Componential analysis* Aims at discovering the meaning of cultural elements (terms, practices and habits, objects); execute specific observations and interviews, write memos on the componential analysis, make an inventory of contrast dimensions, select relevant segments, execute additional observations, apply a componential analysis on a complete overview, compare relevant attributes, write memos.
- *Thematic analysis* Thematic analysis goes beyond the domains, it aims at discovering trends throughout all domains: select material from different domains, reflect on possible cultural themes, compare domains for contrast dimensions, search for organizing domains and make an overview of the cultural scene.

In ethnographic analysis the contribution of the computer starts with the transcript, maybe with a template entry for fixed characteristics, such as date, place, etc. In addition, the computer will support the process by way of memo files, describing the coding procedure (coded files), making an overview of codes and selecting the relevant parts from the material. The next step will be the creation of separate files for different kinds of data. The researcher will want to index these data; therefore, a flexible overview of codes must be possible. Terms from the data files are to be entered into overview memos to be used in domain analysis, taxonomies and componential analysis. In

memos the researcher will reflect on general themes. As the researcher will want to select illustrations for the final report, domains, taxonomies and themes should be linked to segments in the material.

5.3. NARRATIVE ANALYSIS

In applying a narrative analysis on media materials, the researcher tries to reconstruct the elements that compose the stories in these documents. Narrative analysis is not a specific analysis procedure, as there are different research traditions with more or less elaborated methods (Hijmans, 1996). We will limit ourselves here to the narrative analysis of stories from film and television drama (Wester and Verbrugge, 2000). Step-by-step, the researcher tries to reconstruct the relationships between story elements to discover the (hidden) messages that are conveyed.

This method has the following phases:

- *Transcript* Create a project, make a template for the transcript, make a temporary transcript of the film in terms of scenes, characters, acts and spoken text.
- *Reconstruction* Formulate a story line with leading characters, use overview memos to describe story lines and characters, supplement the transcript with descriptions of context and conduct in terms of the developing story, create a template for profile memos for leading characters, formulate objectives, values and success rate of leading characters.
- *Inventory* Make profile memos for each leading character, create an overview of all explicitly mentioned standards and values, classify story lines according to everyday life domains and themes, using a list of values and a list of domains as a source for inspiration.
- *Manifest story analysis* Select all segments of a story line; describe each story line in narrative cycles of problems, choices and decisions; determine leading characters; correct descriptions of story lines, objectives/motives; create an overview of values; formulate the general moral message of each story line.
- *Integration* Make an inventory of contrasts in the narrative cycles and put them in an overview; classify standards and values into more abstract categories; compare these categories with the contrasts; formulate lessons of life of each story line; formulate binary contrasts of each story line, look for coherence between story lines; compare contrasts between different story lines.

For a narrative analysis we again start with a transcript, preferably with a template. This will provide a description of consecutive scenes of which the context description may have to be adapted several times. We will need an overview diagram of story lines and leading characters. For each leading

character a profile memo is made describing characteristics and objectives. Standards and values that appear in the text are to be included in an overview and have to be classified (it should be possible to enter a list of values and to adapt it again and again as a source of inspiration). The story lines must be typified according to life domains and corresponding themes (here too, a domain list as a source of inspiration). With the help of lists of contrasts binary opposites or conflicting values can be located.

6. Conclusion

The use of supportive computer programs during qualitative analysis seems undisputed nowadays. Many authors have indicated the necessity of this kind of support. Just as it is unthinkable to conduct multivariate quantitative analyses (like factor analysis or regression analysis) without the support of a computer, it should be unthinkable that a researcher performs an intensive interpretive analysis that meets the standards for scientific work, without the support of an adequate computer program. There are many computer programs available, running on various computer platforms that all have their own requirements, specialties and strong or weak points. But, as it is often not clear how the tools and functions the computer program offers may support analysis procedures, computer use in qualitative research is not generally accepted.

In this article we have tried to illustrate in detail how the tools that the computer programs offer may be used to support the various steps in qualitative analysis. Although we have mainly limited ourselves to the way Kwalitan works, it is fair to say that other programs offer similar support, each in its own way.

It is our experience that many researchers who start using a computer program to support qualitative analysis, feel overwhelmed by the huge possibilities the program offers. Using these possibilities requires some skills in dealing with the program as such, besides the competencies in performing a qualitative analysis. And instead of bothering with questions like "What is a good code?," "What information should be put in memos?," or "What is an adequate analytic code for this phenomenon?," these beginning analysts become preoccupied with new technical questions like "How do I assign a code to a segment?," "How do I open a memo?" or "How can I create a tree structure?."

This observation induces us to formulate three recommendations for methodologists, computer programmers and authors of text books on qualitative analysis.

First, the focus in text books and instructional courses should always be on the methodological steps and procedures for executing a qualitative analysis (i.e., the left-hand columns in Figures 3–7). A manual or half-day

instruction in handling the program is helpful for, but not equivalent to a methodological instruction in the design, steps and grounds of analytic procedures.

Second, authors and methodologists should put more effort in illustrating how computer programs may support the methodological quality of procedures used in various approaches of qualitative analysis. It seems that just pointing at the existence of computer programs or stressing the necessity to use them is not sufficient for (novice) researchers to apply these programs adequately. Therefore, there is a need for detailed instructions simultaneously focusing on the 'why' and 'how' questions. For this, extensive reports of concrete projects in which computer support was used (the so-called reconstructed logic) may help other researchers to better understand of what the benefits may be of using this kind of support in their qualitative research efforts.

Notes

1. We are aware of the fact that there are remarkably many female researchers under the qualitative researchers, but in spite of this we will refer to the researcher by the male form; so if we talk about 'he' and 'him' we invite you to read this as 'she' and 'her', too. Using the plural form does not justify the individual character of the efforts of the researcher.
2. The phases we refer to here stem from the grounded theory approach. They will be explained and elaborated in Section 4.

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