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Exploration of Coding in Qualitative Data Analysis: Grounded Theory Perspective

Devajit Mohajan[1] & Haradhan Kumar Mohajan[2]

[1] Department of Civil Engineering, Chittagong University of Engineering & Technology, Chittagong, Bangladesh

[2] Department of Mathematics, Premier University, Chittagong, Bangladesh

Correspondence: Haradhan Kumar Mohajan, Department of Mathematics, Premier University, Chittagong, Bangladesh.

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Abstract

This study tries to identify, define, and analyze the coding techniques that the grounded theory researchers follow when they develop the qualitative research. Grounded theory is a qualitative research analysis that systematically collects and analyzes data to develop a new theory on human behavior in social welfare perceptions. It also tries to discuss coding method, coding cycle, theoretical sensitivity, theoretical sampling, theoretical saturation, etc. Usually, a code is a word or short phrases that symbolically allocate a summative, salient, and essence capturing for a portion of visual data. In qualitative grounded theory research coding plays an important role that enables the researchers to identify, organize, and build new theory that is grounded in data. The purpose of this study is to provide an overview of codes, coding, and coding methods that form a qualitative grounded theory.

Keywords: Grounded theory, qualitative research, data analysis, coding procedures

1. Introduction

Two American sociologists and professors Barney Galland Glaser (1930-2022) and Anselm Leonard Strauss (1916-1996) have published their seminal book *The Discovery of Grounded Theory: Strategies for Qualitative Research* in 1967, which is considered as a groundbreaking work in medical sociology. These two famous sociologists are considered as the founder of grounded theory (GT) methodology in the social sciences (Glaser & Strauss, 1967). Actually, the book has encouraged the young researchers to develop themselves as a distinguished scholar for serving the society. Both authors Glaser and Strauss have stressed on the production of new theory from the collected data and have advised the GT researchers not to apply the existing theory to develop a fruitful research. GT also enables the researchers to understand mysteries and moments of human life (Charmaz, 2006; Morse et al., 2009).

Soon after the born of GT in 1967, popularity of this field is increasing smoothly. At present range of GT research area has expanded worldwide. GT is a popular research hub in many valuable applied fields, such as in nursing, sociology, healthcare, education, etc. (Mey & Mruck 2011; Mohajan & Mohajan, 2022b). The main target of GT is to develop theory, which makes success by applying coding process efficiently (Vollstedt & Rezat, 2019). A “code” in qualitative research is “a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data” (Saldaña, 2016). In GT research, different parts of the data are marked with appropriate “codes” for identifying the further analysis. Later, the collected data are evaluated by applying different ways of coding as the core process (Spradley, 2016).

Coding arises from the interaction of researcher with the data. It is not preconceived and applied to the data to

develop theory. Coding tries to apply shorthand label to a piece of data that takes this datum apart and defines what it means (Charmaz, 2011). It is an analytical process and is used to identify concepts, similarities and conceptual reoccurrences in the data. It is the principal link between collecting data, and then developing a theory, which explains the data (Tie et al., 2019). Coding is an important tool that transforms raw qualitative data into a reliable theory. It reduces large amounts of empirical materials into a word, a paragraph, or a page, and makes data readily accessible for analysis (Linneberg & Korsgaard, 2019).

2. Literature Review

Julie Bytheway shows that GT is a suitable research methodology for work-integrated learning. It does not test hypotheses nor merely describe phenomenon; but also explores participants' perspectives and actions through an inductive approach to generate theory that is grounded in the complexities of the real world (Bytheway, 2018; Urquhart, 2013). Wayne A. Babchuk has investigated the GT within the qualitative research followed by an overview of its history and development, as well as a consideration of more contemporary theoretically repositioned approaches (Babchuk, 2011). Margaret M. Cullen and Niamh M. Brennan have described GT methodology, its purpose and application in social science researches. They have also examined the core tenets of GT, revealing how to collect and analyze data applying its fundamental tenets (Cullen & Brennan, 2021).

Maike Vollstedt and Sebastian Rezat have provided an overview of the main techniques and procedures of GT, such as the coding procedures, theoretical sensitivity, theoretical sampling, and theoretical saturation (Vollstedt & Rezat, 2019). Barney G. Glaser and Judith Holton have identified that in GT the research is simultaneously collecting, coding, analyzing and categorizing data at the three levels of constant comparisons: i) codes are compared with codes, ii) codes are compared with emerging categories, and iii) categories are compared with one another (Glaser & Holton, 2007). Johnny Saldaña has provide the basics of coding, the purpose of analytic memos, twenty-five different types of first cycle coding, and six types of second cycle coding. He has also discussed the background knowledge of coding and details many different types of coding (Saldaña, 2016).

Henna A. Qureshi and Zuleyha Unlu observe that analytic tool for GT comprises of four steps as code, concept, category, and theme. Each step helps to understand, interpret, and organize the data in a way that leads toward theory emerging from the data (Qureshi & Unlu, 2020). Maike Vollstedt and Sebastian Rezat have provided the coding procedures, theoretical sensitivity, theoretical sampling, and theoretical saturation of GT in social sciences (Vollstedt & Rezat, 2019). Michael Williams and Tami Moser have focused to identify and describe the coding techniques available to the researchers. They have stressed on the function of each stage in the coding method, the iterative review process associated within the coding cycle, and the transition from codes to themes toward constructing meaning from the data (Williams & Moser, 2019).

K. Andrew R Richards and Michael A. Hemphill seek to capitalize on the benefits of coordinating qualitative data analysis in groups of six phases: i) preliminary organization and planning, ii) open and axial coding, iii) development of a preliminary codebook, iv) pilot testing the codebook, v) the final coding process, and vi) reviewing the codebook and finalizing themes (Richards & Hemphill, 2018). Cliff Scott and Melissa Medaugh have discussed the aspects of axial coding in some details (Scott & Medaugh, 2017). Haradhan Kumar Mohajan has highlighted on the GT research analysis (Mohajan, 2018). In two papers he has also worked on feminism and feminist GT (Mohajan, 2022a, b).

Devajit Mohajan and Haradhan Kumar Mohajan have developed memo writing techniques within the framework of GT methodology of qualitative research in social sciences. They have realized that memoing is a tool that can be used for conducting qualitative research; where memos permit the exploration of the paths of various qualitative researches (Mohajan & Mohajan, 2022e). They have also discussed the constructivist grounded theory of American sociologist Kathy Charmaz (Mohajan & Mohajan, 2022c). They have realized that feminism and feminist research can change global gender inequalities, remove women's subordination, and end the social inequality in all forms (Mohajan & Mohajan, 2022d).

3. Methodology of the Study

Grounded theory (GT) is a systematic and flexible constant comparative approach for theory constructing inquiry. Data collection and analysis with coding are essential in GT (Glaser & Strauss 1967; Charmaz, 2006). At the starting we have tried to discuss on the grounded theory methodology (Mohajan, 2018). Then we have highlight on data collection strategy in grounded theory. Later, we have tried to discuss types of coding in some details. At last we have to show the usefulness and disadvantages of coding system (Mohajan, 2020). Ethical approval is essential to uphold the possible benefits, and minimize harm to participants, science, and society (NASW, 2021). We have tried to maintain the reliability and validity throughout in our study. Consequently, we have tried our best to properly cite the references both in the text and the reference list (Mohajan, 2017).

In this study we have stressed on the secondary data sources. The valuable information of our research is collected from the published and unpublished data sources (Mohajan & Mohajan, 2022c, d, e). We have used

various research resources, such as journal articles, books written by famous authors, internet, websites, etc. to furnish our research fruitfully (Mohajan & Mohajan, 2022a, b).

4. Objective of the Study

The topmost objective of this article is to discuss the various sides of coding procedures in grounded theory. Some other trivial objectives are;

- to provide basic ideas of grounded theory,
- to highlight on the data collection policy, and
- to show the benefits and disadvantages of coding.

5. Grounded Theory Approach

Grounded theory (GT) is a scientific research methodology, which is characterized by the data collection, data analysis, and theory development through a set of systematic methods (Vollstedt & Rezat, 2019). It is an inductive enquiry that explains social processes in complex real-world contexts (Bytheway, 2018). It is a distinct history that has resulted in numerous approaches, which has its roots in both positivism and pragmatism. It develops theories about social processes that are grounded in real-life experiences (Rieger, 2019; Bogdan & Biklen, 2007). It is considered as a way to reveal how people manage the problematic situations in their lives. It is one of the most popular research designs at the present world (Dey, 1990; Birks & Mills, 2015).

Grounded theory is a package of research methods that includes recent data collection, analysis, categorizing, theoretical sampling, coding, constant comparison, comparing, memoing, saturation, and promotes quality standards (Elliott & Lazenbatt, 2005; Díaz et al., 2021). It explores the social processes that are present within human interactions. The constant comparative method enables the generation of theory through systematic and explicit coding and analytic procedures (Holton, 2008). It integrates research processes, such as collection of data, defining subsequent samples, coding data, analyzing data, writing memos and diagrams, generating theory, and reviewing literature, etc. (Glaser & Strauss, 1967; Urquhart, 2013). Its theoretical base is resulted from pragmatism, symbolic interactionism and social constructivism (Denzin & Lincoln, 1994).

After the development of GT, the students of Glaser and Strauss, namely Juliet Corbin, Adele E. Clarke, and Kathy Charmaz have developed second and third generation of GT (Vollstedt & Rezat, 2019). Grounded theory is an evolving method, which has many variants (Mohajan & Mohajan, 2022b), such as i) classic Glaserian grounded theory (CGGT) (Glaser & Strauss, 1967; Glaser, 2005), ii) Straussian grounded theory (SGT) (Strauss & Corbin, 1998), iii) constructivist grounded theory (CGT) (Charmaz, 2006), and iv) feminist grounded theory (FGT) (Wuest, 1997). Each variant has a common core, such as coding, theoretical sampling, and constant comparative methods (Mills et al., 2006). Glaser believes that good grounded theory should satisfy six key criteria: fit, work, relevance, modifiability, parsimony, and scope of explanatory power (Glaser, 1992).

6. Data Collection in GT

Professors Barney Glaser and Anselm Strauss in their GT have created a comprehensive idea of the epistemological research process in the social sciences (Glaser & Strauss, 1967). In GT, data collection, coding, and analysis run concurrently from the beginning of the research. The data can consist of interview transcripts, participant observation field notes, elicited texts, journals, documents, memos, photographs, drawings, questionnaires, open-ended survey responses, perspectives and timeframes, scholarly literature, artifacts, photographs, video, websites, Internet sites, e-mail correspondence, and so on. Then the researchers analyze these using specific procedures to develop theory (Charmaz, 2006; Saldaña, 2016).

In GT, data collection is not an isolated event, but continues throughout the research process; therefore, subsequent phases of data collection must be planned (Urquhart, 2013; Birks & Mills, 2015). Data collection and analysis occur simultaneously; which differences GT with other qualitative research methodologies where analysis starts after all the data are collected (Thomson et al., 2014). In qualitative research data collection involves participant observations, interviews, diaries or other transcribed accounts (Backman & Kyngäs, 1999). But in any GT research, data collection, analysis and formulation of theory are closely interrelated (Glaser & Strauss, 1967). In GT, data are considered as objective and discovered that become a true representation of realities of the participants. The contexts of the data are not considered unless emerge as a code (Glaser & Strauss, 1967; Walker & Myrick, 2006; Glaser & Holton, 2007). Data collection is not an isolated event; and it is a continuous process throughout the research (Birks & Mills, 2015).

Charmaz states “systematic analytical procedures are part of a cyclical process where participant selection, data collection, data analysis, and theory development are interdependent, iterative and often overlapping” (Charmaz, 2010). The three factors are needed for the integration of a GT as: i) an identified core category, ii) theoretical saturation of major categories, i.e., there is no need for further collection of data, and iii) an accumulated bank of analytical memos (Birks & Mills, 2015).

7. Meaning of Coding

A "code" in qualitative research is a word that symbolically provides a summative, salient, essence capturing, and evocative attribute for a portion of language based data. It enables researchers to identify, organize, and build theory (Saldaña, 2016). Charmaz defines coding as the "critical link" between data collection and their explanation of meaning. i.e., coding is the process of what the data are about. Data analysis begins through the coding of data (Charmaz, 2000; 2014). Therefore, a coding is defined by technique leading to micro analysis of word-by-word data (Bryman, 2012). It is a pattern of the divisions of data with symbols, descriptive words, or category names. In GT, coding is inductive, comparative, interactive, and iterative, and later deductive (Charmaz, 2009). It is a key structural operation in GT research that enables data analysis and successive steps to serve the purpose of the research procedures (Williams & Moser, 2019).

Coding is a mechanism that allows a research to get from raw data to a well-developed theory (Holton, 2010). Glaser believes that coding is done line-by-line (Glaser, 1978). Coding is the process of naming or labeling the data, categories, and properties (Saldaña, 2016). Gordon-Finlayson stresses that "coding is simply a structure on which reflection (via memo-writing) happens" (Gordon-Finlayson, 2010). It is an exploratory problem-solving technique without specific formulas to follow (Saldaña, 2016). It refers to the process of "breaking down, examining, comparing, conceptualizing and categorizing data" (Strauss & Corbin, 1990). The aim of coding is to break down and understand the text and develop categories (Flick, 2018). Coding is not a one-time, linear event. It is primarily an interpretive, heuristic, and exploratory process that requires a problem-solving process and a synthesis of the data. By the use of coding, researchers identify their biases, subjectivities, and predispositions within the research process (Rogers, 2018).

Codes could be based on an interview guide and are developed before the start of coding process based on theory or existing literature (Linneberg & Korsgaard, 2019). These can be linked to a line, a sentence, a paragraph (Flick, 2018). Code occurs throughout the initial analysis of emerging data. It is tied to the premise of allowing all data to be included in the coding process of categories (Sebastian, 2019). Based on the nature of the collected data; summarize them with a short name, such as process code, attribute code, and descriptive code, etc. and similar codes are put together under a provisional category. After verification and refinement of data through a continuous back and forth movement theory is generated eventually (Holton, 2010; Khanal, 2018).

Coding in GT is comprised of the procedures that enable collected data to be assembled, categorized, and thematically sorted, which provides an organized platform for the construction of meaning (Williams & Moser, 2019). The coding of qualitative data and decisions concerning related to the GT research design in the analytical process are important for researchers (Linneberg & Korsgaard, 2019). Johnny Saldaña has observed "as you code and recode, expect…your codes and categories to become more refined and, depending on your methodological approach, more conceptual and abstract" (Saldãna, 2016).

8. Types of Coding

Glaser and Strauss originally indicate two levels of coding in their published book in 1967; first into as many categories as possible, and then integration of categories (Glaser & Strauss, 1967). On the other hand, Strauss and Corbin first describe two levels of coding and later make them three. According to them, the two types of coding are: i) substantive coding, and ii) theoretical coding (Glaser, 1978; Strauss & Corbin, 1990).

Substantive Coding: According to Glaser, in GT methodology, "*substantive codes conceptualize the empirical substance of the area of research*" (Glaser, 1978). Substantive coding is the process of conceptualizing the empirical substance of the area under study. It produces categories, presents properties, and identifies as a core category. Without substantive codes, theoretical codes are meaningless (*Hernandez, 2009*). Substantive code occurs throughout the initial analysis of emerging data and allows that all data to be included in the coding process of categories (Sebastian, 2019). In substantive coding, a researcher can work with the data directly, fracturing or analyzing (Saldaña, 2016). Initially it works through *open coding* for the emergence of a *core category* and related concepts. Then it works through *theoretical sampling* and *selective coding* to theoretically saturate the core category and related categories (Glaser, 1998; Glaser & Holton, 2007).

Theoretical Coding: To develop GT, the emerging relationships between the elaborated concepts need to be integrated into an overarching framework with one core category, which is theoretical coding (Glaser, 1978). Theoretical coding is a process of data collection for generating theory whereby the researcher simultaneously generates, codes, analyzes, and synthesizes data and decides what data to collect next and where to find them (Tossy, 2015). Theories are usually characterized as: grand theories, middle-range theories, and minor theories (Creswell, 2014). A theoretical coding occurs at the conceptual level. It tries to find the theoretical code that will integrate the emerging substantive theory. It is the relational model through which all substantive codes are related to the core category (Evans, 2013; Hernandez, 2009). For novice researchers, it feels one of the most problematic areas. It emerges through the data analysis process, rather than being overlaid on the data through

the use of conjecture codes. It is described by Glaser and is not a part of Strauss' approach to GT data analysis (Glaser, 1978; Strauss & Corbin, 1998).

According to Glaser, in GT methodology it is realized that "theoretical codes conceptualize how the substantive codes may relate to each other as hypotheses to be integrated into the theory" (Glaser, 1978). Theoretical codes are either implicit or explicit, and flexible but, their purpose is to integrate the substantive theory. A major characteristic of the theoretical code is that it must be developed through the data, not pre-considered by the researcher (Saldaña, 2016). Without theoretical codes, the substantive codes become mere themes to describe rather than explaining a substantive area. Theoretical codes help to develop an integrated theory by weaving fractured concepts into hypotheses that work together (Glaser, 2005; Hernandez, 2009).

Again, substantive coding itself consists of two sub-phases: open coding and selective coding (Strauss & Corbin, 1990). On the other hand, according to Charmaz, GT involves three main phases of coding: initial coding, focused coding, and theoretical coding. Numerous scholars agree on three phases of coding approach as: initial or open coding, focused or axial coding, and selective or theoretical coding (Strauss & Corbin, 1998; Charmaz, 2006, 2014; Saldaña, 2016). Therefore, there are three types of coding stages in GT: i) open coding, ii) axial coding, and iii) selective coding (Bryman, 2012).

During the qualitative data analysis, open coding is necessary at the initial stage. Later, axial coding and selective coding are used. At the final stage of the research, theory for example, grounded theory can be built (Strauss & Corbin, 1990). Now we briefly overview on three types of coding of GT: open coding, axial coding, and selective coding.

Open Coding: Open coding or initial coding is the first level of coding. It is "the analytic process through which concepts are identified and their properties and dimensions are discovered in data" (Strauss & Corbin, 1998). It is an analytic method by which concepts to the observed data and phenomenon are attached during qualitative data analysis, and the researcher tries on distinct concepts and themes for categorization (Flick, 2018). Core elements of open coding are to introduce sensitizing questions and constantly comparing data and codes (Vollstedt & Rezat, 2019). When researchers continue GT research, open coding plays a major contribution on data processing (Glaser, 2016). Famous authors Glaser, Strauss, Corbin, etc. have started their valuable research works through the open coding (Glaser & Strauss, 1967; Strauss & Corbin, 1990).

Open coding includes labeling concepts, defining and developing categories based on their properties and dimensions (Bulmer, 1969). It makes initial connections with categories (Creswell, 2007). It is usually the first approach to the data and is organized by creating initial broad thematic domains for data assemblage (Williams & Moser, 2019). It is achieved by segmenting data into meaningful terms and describing them in single word to short system of words (Flick, 2018). It is the part of data analysis that focuses on the conceptualization and categorization of phenomena through an intensive analysis of the data. In open coding, the data are broken up into smaller parts that are deeply analyzed (Vollstedt & Rezat, 2019). As the data are fractured it can be quite time consuming (Glaser & Strauss, 1967).

It can take several forms, such as analyzing transcriptions or field notes, line-by-line coding, analyzing every sentence and word by word, or using short segments of data, etc. to identify substantive codes emergent within the data (Birks & Mills, 2015). Sometimes, researchers look into a bit broader scale and code against a sentence, paragraph, chapter, etc., and need to define concepts for an entire document (Holton, 2008; Charmaz, 2006).

In open coding, the concepts emerge from the raw data and later grouped into conceptual categories (Miles & Huberman, 1994). Open coding aims to develop substantial codes for describing, naming and classifying the phenomenon under consideration (Strauss & Corbin, 1990). It allows the researcher the full range of theoretical sensitivity by encouraging the generation of codes that fit and work. It minimizes omission of an important category and ensures the grounding of categories in the data (Holton, 2008).

Open coding is a large source of descriptions that must be managed and controlled when doing GT research. For completing a GT approach successfully, the researcher begins his/her research with open coding (Glaser, 2016). In open coding, the analyst aims to "generate an emergent set of categories and their properties which fit, work and are relevant for integrating into a theory" (Glaser, 1978). Open coding is the moment when data are opened, through the process of fragmenting the text and naming categories (Strauss & Corbin, 1990). The goal of open coding is to build a descriptive, multi-dimensional preliminary framework for later analysis (Sarker et al., 2000). For the success, it tries to develop substantial codes for describing, naming or classifying the phenomenon under consideration of qualitative research. To reach this goal, sensitizing questions are posed related to the data when these are being analyzed (Flick, 2018; Vollstedt & Rezat, 2019).

Open coding initiates with line-by-line coding where concepts and key phrases are identified, highlighted, and moved into subcategories, then categories. Units of meaning are examined and coded against as many categories as they may fit. New categories emerge, and new units of meaning are fitted with the existing categories. In open

coding, researchers analyze the data in all possible directions (Holton, 2008; Jones & Alony, 2011). It may be applied in varying degrees of detail and the codes can be linked to a line, a sentence, a paragraph or wholesome text. It allows the researcher to see the direction in which to take her/his research so s/he can become selective and can focus conceptually on a particular social problem (Flick, 2018). During open coding, researchers require to interrogate and firmly stick to the data, reading line-by-line to select, define, and label data into shorthand codes (Creswell, 2007).

Axial Coding: Anselm Strauss and Juliet Corbin have introduced axial coding as the second phase of the constant comparative method to analyze qualitative data (Corbin & Strauss, 2008; Scott & Medaugh, 2017). In GT, it is considered as a central part of research and is used to identify whether a GT can be developed or not (Scott & Medaugh, 2017). Axial coding is needed to investigate the relationships between concepts and categories that have been developed in the open coding process (Strauss & Corbin, 1990). It builds dimension from categories and properties of categories. It provides a process of constructing data relationships between and within categories (Creswell, 2007).

Axial coding is one way to construct linkages between data in a qualitative research. It is the second level of coding, which is along the axis of a category and does not immediately visible in the tag list (Corbin & Strauss, 2015; Bryman, 2012). It provides a coding framework to synthesize and organize data into more coherent, hierarchically structured categories and subcategories (Noble & Mitchell, 2016). In axial coding, the researchers contextually, consequentially, interactionally, and causally analyze the relations within the data (Jones & Alony, 2011). Axial coding first attempts to consider and then tries to develop relationships between working categories and subcategories (Noble & Mitchell, 2016).

Axial coding reassembles data that have been divided into separate codes by open coding. It aims to add depth and structure to existing categories (Charmaz, 2006). It investigates conditions of situations described in the interview by "relating categories to subcategories along the lines of their properties and dimensions" (Strauss & Corbin, 1998). It further can be sifted, refined, aligned, and categorized that enable and advance effective content categorization to create distinct thematic categories in preparation for selective coding (Williams & Moser, 2019). Axial coding is the "Six C's Model" depending on key perspectives for further organizing and categorizing data through ''causes, contexts, contingencies, consequences, covariance, and conditions'' (LaRossa, 2005).

Selective Coding: Selective coding is the process of choosing the core category and relates it with the other categories from axial coding (Linneberg & Korsgaard, 2019). Selective code enriches core variable and its properties. It is the third level of coding. Its goal is to integrate the various categories that have been developed, elaborated, and mutually related during axial coding into one cohesive theory (Vollstedt & Rezat, 2019). For example, a researcher no longer codes everything in the data; better s/he codes selectively for the core variable in order to enrich the core variable and its properties (Chametzky, 2016). It facilitates theoretical formation (Creswell, 2007). Its procedure is similar to axial coding but more abstracted, and the results from axial coding are further elaborated, integrated, and validated (Vollstedt & Rezat, 2019).

According to Strauss and Corbin selective coding is "*the process of integrating and refining categories*" (Strauss & Corbin, 1998). Glaser states that "to selectively code means to delimit coding to only those variables that relate to the core variable, in sufficiently significant ways to be used in a parsimonious theory" (Glaser, 1992). A selective coding occurs when the analyst identifies core categories and limits coding to "those variables that relate to the core variable in sufficiently significant ways to be used in a parsimonious theory" (Glaser, 1978). Uwe Flick has realized that "selective coding continues the axial coding at a higher level of abstraction through actions that lead to an elaboration or formulation of the story of the case" (Flick, 2009). For choosing the core category relations need to be validated and some categories might need to be refined and further elaborated (Vollstedt, 2015).

Selective coding enables the researcher to select and incorporate the organized data from axial coding in cohesive and meaningful presentations. After the refinement of the data of axial coding, selects the main thematic category, and then in a systematic manner aligns the main theme to other categories that have been selectively coded (Williams & Moser, 2019). It allows the researchers to craft case stories that accurately and powerfully present the amount of the progressive coding process. After completing of selective coding, a researcher can move to develop theory and ultimately constructs meaning (Williams & Moser, 2019).

The procedure of selective coding is similar to axial coding but more abstracted (Vollstedt & Rezat, 2019). The goal of selective coding is to integrate the different categories that have been developed, expanded, and mutually related during the axial coding into one cohesive theory. To reach this goal, the results from axial coding are further elaborated, integrated, and validated (Linneberg & Korsgaard, 2019).

During the formation of open coding a text of many pages are formed. From this text, some pages are reduced by

summarizing and a text of many segments is formed. For example, from this reduced text, about 40-50 codes are formed and consider it as axial coding. Then axial coding needs to be reduced to about 20 codes, and finally it is reduced to nearly 6-7 codes (Williams & Moser, 2019). This final code packet is considered as selective coding. Linear flowchart of qualitative GT research is given in Figure 1.

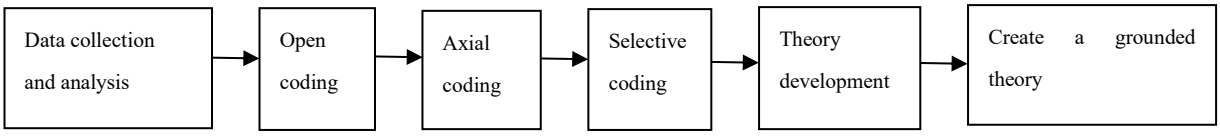

Figure 1. Linear flowchart of qualitative GT research. Source: Williams & Moser (2019)

9. Benefits/Usefulness of Coding

The process of coding is a vital relation between collecting data and the development of a theory (Charmaz, 2006; 2014). Coding represents the gritty craftsmanship that enables artful and creative interpretation and analysis of the data. The coding process creates an inventory of the data that enables a researcher to do the text steps of research efficiently (Miles et al., 2019). Coding is an important procedure to transfer from the raw data to the findings. It is a way to ensure that the questions asked are the questions that have been answered (Holton, 2010; Charmaz, 2014). It plays a pivotal role in facilitating the researcher's ability to advance effectively the research process (Douglas, 2003). It helps to acquire deep, comprehensive and thorough insights into the data; makes the data easily accessible and retrievable; helps in sorting and structuring the data; and ensures transparency and validity of the data (Saldaña, 2016; Linneberg & Korsgaard, 2019). Theory generation is done after the continuous process of open coding, axial coding, and theoretical coding of the data. Using coding the researchers can form a well-developed theory from raw data in GT research (Khanal, 2018). Therefore, raw data are transformed into conceptual categories through the coding processes (Charmaz, 2006).

The roles of open, axial, and selective coding are essential to achieve the research goals in qualitative research. Coding provides thematic integration and organizational strength. It enables the researchers to be reflective and reflexive in joining the data in pioneer ways and to employ the outcomes from the coding process to perform the research (Williams & Moser, 2019).

Code is used to summarize, synthesize, and sort the collected data for GT research. A researcher also uses codes as conceptual tools to: i) fragment the data and thus take them apart, ii) define processes in the data, and iii) make comparisons between data (Charmaz, 2017).

Qualitative GT researchers believe that coding is the best way to analyze the data. The coding process creates an inventory of data, which enables the researchers to acquire deep and comprehensive insights into the data (Miles et al., 2019). It connects the qualitative data collection phase with the data analysis phase of a study (Saldãna, 2016). It helps a researcher to judge data whether these are relevant or not for his/her research. It increases the reliability and validity of the data (Linneberg & Korsgaard, 2019).

10. Disadvantages of Coding

In GT researcher, coding plays enormous benefits, but it has some limitations. During the grounded theory study a researcher have to deal with huge amounts of data. As a result, a researcher faces difficulties due to overlapping of hundreds of initial codes. Sometimes coding may be biased by personal preconceptions (Bytheway, 2018). Coding is a very time consuming and tedious work. Sometimes line-by-line coding feels very difficult and consequently the researchers decide to stop the coding. For experience researchers, coding is not very difficult in GT; but it feels difficult when the researchers do not constantly compare codes, incidents, categories, and properties efficiently (Chametzky, 2016). Moreover, researchers need to use a variety of data collection methods within a GT study to ensure that triangulation is achieved.

11. Conclusions and Recommendations

Grounded theory is an inductive research methodology, and avoids preconceived ideas and follows paths of enquiry as these are revealed. Coding in grounded theory enables researchers to identify, organize, and finally to build theory. Grounded theory provides opportunities to the researchers for exploring their skills in real-world problems and also for emerging ideas, explanations, and theories. We have observed that during grounded theory research, coding has both advantages and disadvantages; but advantages are massive than disadvantages. We have also observed that research on grounded theory is complicated for novice researchers. Therefore, novice researchers should proceed in their research with perseverance. As a result, they will find interest in ongoing research in grounded theory.

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