Can we counter AI with a manual method for qualitative data analysis, or are we too dependent on CAQDAS?

Dr. Carin Strydom, North-West University Business School, North-West University, Potchefstroom, South Africa, Orcid: 0009-0006-1325-3877

Prof Stephan Van Der Merwe, North-West University Business School, North-West University, Potchefstroom, South Africa, Orcid: 0000-0002-5144-0861

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Abstract

As **background** in the study "Developing a framework for SMME survival based on events during COVID -19 in the Western Cape of South Africa", the researcher did not want to take the risk of making use of Artificial Intelligence and CAQDAS programs to analyse the complex data encompassing economic, financial, emotional and mental factors, all due to the economic lockdowns of COVID -19. This article aims to provide a scientific method of manual qualitative data analysis that was followed to analyse this wide variety of data. The **motivation** for developing this manual method was due to the emotional upheaval experienced during difficult economic periods of lockdown by the participants.

The **research methodology** followed was a study conducted via 16 face-to-face semi-structured interviews with the successful SMME owners secured via snowball sampling. The **study's main findings** indicated that a framework could be developed based on the manual data analysis process by applying scientific methods and using a Thematic Analysis Process and a wall-coding concept. The **contribution** of this research is that it was proven that CAQDAS programs or AI-generated software are not the only solution when a researcher has to analyse qualitative data.

1. Introduction

1.1. Background

The proposal to investigate the application of a manual method for data analysis in a qualitative study versus using Computer Assisted Qualitative Data Analysis Software (CAQDAS) or Artificial Intelligence (AI) originated in a study on SMME survival during the recent COVID-19 pandemic (Strydom, 2024:170). AI has been gaining momentum and became popular over recent years in the field of research (Van Heerden, 2024, Garcia-Horta & Guerra-Ramos, 2009:151) to assist scholars

with analysing data, via means of leading CAQDAS programs and in the workplace with human beings being replaced by intelligent machines (De Cremer & Kasparov, 2021:1). This scholar is not concerned by the increased use of AI software to assist researchers, but rather with the potential decrease in human brain capacity as a result of allowing AI to constantly think for us (Kavathatzopoulos, 2024:19). Before the existence of software programs, researchers relied on pen and paper to analyse data, these days research students constantly regularly rely on artificial intelligence or computers with CAQDAS programs to do all of the thinking (Carcary, 2011:10), which leads to the question - do they not risk losing their cognitive abilities when AI replace our thinking (Kavathatzopoulos, 2024:19), since it becomes easier to just capture the data and let a computer program handle the complex tasks? Should we not use our God-given cognitive abilities and do the thinking and interpreting sections ourselves rather than outsource our intelligence to technology (De Cremer & Kasparov, 2021:2)? This researcher asks the question; can a researcher still legally claim in all honesty that it is his or her own work, if the majority of the work was done via a computer program? What are the ethical considerations about this aspect of plagiarism, or ownership of research done, as the common sources of AI include and use publicly available published data, databases, websites, and structured knowledge bases (Agrawal, Gans & Goldfarb, 2017; Majer, 2024).

1.2. Problem Statement

"Can a manual qualitative data analysis method provide the same in-depth analysis of a complex set of data that a Computer Assisted Qualitative Data Analysis Software program (CAQDAS) can deliver?"

It was deemed best to address this problem statement by actually attempting to perform a manual method of data analysis in a comprehensive qualitative study. In order to explore what the surviving SMMEs did to survive COVID-19 the study "Developing a framework for SMME survival based on events during COVID -19 in the Western Cape of South Africa" (from now on referred to as "the COVID -19 study") was conducted whist the pandemic was occurring as it was the opportune timing for such research (Doern, 2020:1). In addition, the entrepreneurial climate in the Western Cape contributed with their interventions were investigated to ascertain if these assisted the SMMEs to survive the diverse effects of the pandemic and the challenging economic lockdowns (Western Cape Government, 2021:1). This study delivered a complex data set in endeavouring to understand "what" the participants did and "how" the participants survived the pandemic - these were the important questions asked to fill the knowledge gap, as emphasised by Osterwalder in his research (Osterwalder, 2004:42). A comprehensive literature study was conducted, as little knowledge of lockdowns impacting SMMEs were available at the time (Fubah & Moos, 2022:1). A two-pronged approached was followed to fill this gap in knowledge. Firstly, a literature study attempted to understand the global situation as well as the South African economic situation during the pandemic. Secondly, the empirical study went to the source for real-time answers. This COVID-19 study can help us gain an

understanding of the lockdowns, restrictions, and regulations and their socio-economic impact (Odeku, 2021:1).

Since the pandemic created emotional upheaval (Markowitz, 2022:10) and difficult economic circumstances simultaneously (Sakhbieva *et al*., 2021:6054), a simple computer program focused on understanding cold, hard economic facts (Garcia-Horta & Guerra-Ramos, 2009:160) was not sufficient to analyse the data. In addition, emotional factors and frustrations were added to the data and code (Strydom, 2024:213) and had to be interpreted with the correct level of sympathy, entrepreneurial understanding and empathy to make sense of what exactly the successful entrepreneurs did, to survive. These skills or abilities of humans being intuitive, emotional and culturally sensitive are what make us unique and bring more effective abilities to the analysis process (De Cremer & Kasparov, 2021:2). The purpose of this article is thus not to promote any specific method, rather to investigate if it was indeed still possible in a world where everyone turns to AI, to just be able to use a manual method of data analysis in a qualitative research study, by referring to the actual COVID -19 study that was conducted from mid-2020 to 2024 (Strydom, 2024:1-649).

1.3. Research objectives

The research questions must be addressed in the research design of a study. The research design refers to the plan detailing how the study will be conducted and which methods will be followed (Babbie & Mouton, 2001:74). Different types of data analysis methods are available for analysing qualitative data (Friese, 2012:10; Marshall & Rossman, 2016:392).

The primary research objective of this study is to ascertain if CAQDAS programmes will be adequate to analyse a complex set of data across different study fields and whether it can be done manually. The secondary research objectives include the following:

- Ascertain which manual methods of analysing qualitative data are available.
- Determine whether it is possible to design a specific manual method for qualitative research by expanding on existing methods that can easily be applied by managers in reality.
- Is there a risk that AI has negative consequences when used - can it present moral issues when used or can AI cause unemployment when human brain function is replaced with AI?

1.4 The layout of the paper

In this paper, the researcher will provide a literature review on the most used manual methods and some most used CAQDAS programmes. The research methodology utilised in the original study, "Developing a framework for SMME survival based on events during COVID-19 in the Western Cape of South Africa", will be discussed to provide an overview of how and why this specific comprehensive manual method was developed and the results the study yielded.

2. Literature Review

The reason why the researcher chose the topic of how COVID impacted SMMEs was that research on small businesses' survival in response to an ongoing pandemic was scant (Katare, Marshall, & Valdivia, 2021:2213), and there is a lack of sufficient empirical business studies amongst SMMEs on the African continent (Mkhonza & Sifolo, 2022:483). The COVID-19 study followed a bilateral approach by performing a literature review followed by an empirical study. The manual method followed by leading scholars was also studied via a literature review before applying this method when analysing the data. The literature review was necessary to determine whether this process was viable. The thought process of why it was used, by whom it was previously applied and how it was expanded in the COVID-19 study will be explained below. A literature review must aim to provide a clear and balanced picture of current events and the main concepts and theories related to the study (Bloomberg & Volpe, 2016:105).

2.1. Explaining the process from raw data to code

Normally, once the data have been collected, it needs to be organised first and can then be analysed. The reason for the analysis is that it aids the researcher in understanding the research patterns and investigations (Cozby, 2009:224). The analysis of the data can be done via manual intervention and procedure or with the use of computer software, as there are two camps of researchers: those who feel software can be used with ease and will yield the best results (Friese, 2012:3) and those who feel using CAQDAS is peripheral and using it can distance a researcher from the data (Welsh, 2002:5). Some researchers prefer to use software tools to obtain the data, with a variety of tools available, such as SurveyMonkey or Qualtrics. When these were used for data collection, the data analysis part of the research naturally flows from the data collected into the analysis process (Marshall & Rossman, 2016:342). Analysing text data and other multimedia forms can present the qualitative researcher with a perplexing trial, as the process has many steps and stages (Creswell & Poth, 2016:320).

The problem is that data collection, analysis, and eventual report writing are not separate steps of the entire research study. Instead, these stages are interrelated and occur concurrently in a research study (Creswell & Poth, 2016:327). The first stage of fieldwork or data collection needs to be the pre-arranging of the data collected, with provision made for the possibility that later stages of data collection can be added (Ritchie & Lewis, 2003:56). The data can be easily analysed if the identifying of themes was done upfront on the data (Ritchie & Lewis, 2003:56). In the original study where the manual method was applied, the researcher realised that theming the data (Saldana, 2016:200) or thematic analysis is an important step that had to be incorporated upfront. This realisation came after completing the pilot phase (Strydom, 2024:164).

The pilot testing phase allowed for some form of evaluation of the validity and reliability of the data (Saunders *et al*., 2019:812), therefore enabling the researcher to organise and standardise the

questionnaire to effect thematic analysis. This meant themes could be identified in line with the questions per the semi-structured interview questionnaire used for all 16 participants. The pilot phase of a study helps the researcher to be prepared for the challenges that can occur in a substantive qualitative study (Malmqvist *et al.,* 2019:1). In the comprehensive COVID-19 study with 2631 code words, the pilot study indicated that more questions were needed to obtain more quality-rich data once the themes started to appear (Strydom, 2024:164).

2.2 Manual method advocates

Some well-known experts in the field of manual methods of data analysis on qualitative studies have been reviewed to gain a thorough understanding of how such a manual method should be conducted.

The experts in the field of manual analysis that were reviewed included Kent Lofgren (Department of Education, Sweden and Umea University), Prof Johnny Saldana (Arizona State University, USA), Prof Svend Brinkmann (Aalborg University, Denmark) and Dr Daniel Turner (Quirkos – Youtube).

Kent Lofgren (Lofgren, 2013) developed several YouTube tutorial videos that have been frequently visited by numerous students in the 11 years he had his YouTube channel. In his tutorial titled "Qualitative analysis of interview data: A step-by-step guide for coding/indexing", he suggested a researcher should first read the transcripts, then read it a second time whilst starting with the labelling or marking of relevant words, either actions or concepts, thus "coding" the data – whatever you as researcher think is relevant in this interview or transcript. He said this is key. Your opinion matters. If compared to the research onion of Saunders *et al.* (2019), the researcher will, at this stage, be following the outer layer of the research onion and highlighting the code via either a mindset of critical realism or interpretivism.

Lofgren suggested in his videos a researcher can code on a piece of the typed transcript (Lofgren, 2013), and that the researcher can decide why that particular piece of code is relevant. He stated it remains up to the researcher to decide which phrases or words can be coded, as the researcher will be interpreting the study and should inform the reader of the rationale why this specific code was chosen (Lofgren, 2013).

This process of manually sorting and analysing the data has been referred to as a "tabletop category", which involves the literal arrangement of cut-out data chunks in a tabletop format (Saldana, 2016:231). Saldana stated that coding is not the only way of analysing data; it is just one of the possible ways to analyse it (Saldana, 2016:3). He said his students remarked "touching the data" after pieces were cut out and physically moving them around into multiple arrangements to find the ultimate fit, helped them to discover patterns and understand the data better, especially under different organisational concepts such as hierarchy, process, interrelationship, theming, and structure (Saldana, 2016:231).

He also mentioned the irony that one can manipulate the data quicker with two hands than a computer with CAQDAS software can (Saldana, 2016:231). He advised moving the data around as much as one needs to get to a structure that "feels right" and then adapting it into an operational model diagram for the study. This researcher followed a similar approach by writing the code onto colour-coded paper, sorting it on a tabletop format and then pasting it onto a wall for a visual overview, referred to as wall-coding.

Brinkmann has always been an advocate for using your brain. In his recent book "Think! In Defence of a Thoughtful Life" (Brinkman, 2023), he takes the rationale for his thoughts back to Socrates, who was known for his long spells of contemplation, which he referred to as listening to his inner voice. Brinkmann also said we as a biological species are called "homo sapiens", which is the Latin term for "wise man" or then loosely translated to "thinking human", indicating we as humans should use our brains. He also quotes Kant's slogan of "sadare aude!", which means to have the courage to use your reason (Brinkmann, 2023:6). In using and applying the manual method of qualitative data analysis, this researcher has used her courage to attempt to analyse the 2631 code words extracted from the data in her COVID -19 study by utilising her cognitive abilities for the analysis process, not the abilities of a computer software program.

Turner did various YouTube videos, educating many students in various data analysis methods over the years. In a recent publication, he stated that content analysis of data in a qualitative study is a blanket term to determine what the content is about and from there on, the researcher can apply any of many approaches (and it can be deductive or inductive) to analysis data as there is not a specific correct or wrong method (Turner, 2021) to analyse code.

2.3 Review of coding data

When coding, one has to stay close to the data, although coding is not an exact science, it is merely an interpretive act and can summarise or condense data (Saldana, 2016:5). Code-condensing is always an option at a later stage (Bryman *et al.*, 2014:192-194). For an opinion to stand out, it has to be mentioned several times in a transcript or by several participants, so one should try to code as far and as wide as possible. Lofgren said in his YouTube tutorials (Lofgren, 2013) that for a first step, try to obtain critical mass in terms of coding. Not all codes have to be used, as minor codes can be dropped, but a researcher should keep those regarded as important to a study. The codes then have to be categorised. Coding and categorisation of data may result in data sacrifices; however, this is required for efficient analysis (Cooper & Schindler, 2008:405).

It is best to apply the thematic analysis of Cresswell at this stage of the process. In the mentioned COVID-19 study, the different questions, as listed in the semi-structured interview questionnaire, were identifying themes, as the different questions referred to different aspects of the study, e.g. challenges, motivational factors, the role of mentors, success factors, entrepreneurial ecosystems,

which actions were performed and recommendations and advice given. This means the data are analysed via the different themes in a process called thematic analysis.

Thematic analysis is the process referred to using data reduction and an analysis strategy by which qualitative data are organised via segmentation, categorisation, summarisation, and then reconstructed in a manner that concentrates on the important concepts from the data obtained from all the participants (Given, 2008:867)

Coding the data enables the development of themes, and the development of themes helps with the coding of the data, it is an interlinked process. In the coding process, certain portions of data are separated from their original context as a preliminary form of data analysis (Marshall & Rossman, 2016:398) when provided by the participants and then labelled in a way so that all data with the same idea or "theme" can be retrieved and inspected together, to obtain a summarised view from all the participants (Given, 2008:867). This is how the concept of coding is executed: collect all pieces of data under the same code or central idea, then categorise it under different separate headings that make sense, and organise the data in a way acceptable to the researcher.

In the mentioned COVID-19 study it was categorised in network organograms, tables and mind-maps to make visual sense to the researcher to support a hypothesis or reach a conclusion. According to The SAGE Encyclopaedia, qualitative researchers appear to be inductively driven: They commence with the data, then analyse it, and then develop hypotheses (Given, 2008:869) or conclusions. This is where the 5th layer of the research onion is applied.

Creswell and Creswell defined coding as the process of organising the data by bracketing specific chunks of text or image segments by using a word or phrase to represent this category in the margin. Coding involves taking the text data or pictures gathered during the data collection process and then labelling those categories with a term, often using the actual language of the interviewed participant (they specifically called it an in vivo term) to encapsulate the whole idea of the participant in one summarised word or short phrase (Creswell & Creswell, 2018:269). They have also recommended that data analysis plans be presented as a series of steps so that a reader can easily follow how one step leads to another (Creswell & Creswell, 2018:218).

Furthermore, they also stated that in qualitative research, the idea is to concentrate the data into a small number of themes. They suggested approximately five to seven themes (Creswell & Creswell, 2018:268). In the mentioned COVID-19 study, the researcher used 12 themes to explain the comprehensive amount of code (2631 code words to be exact) to conclude.

The five steps which Creswell and Creswell suggested researchers can follow included:

Step 1. Organise and prepare the data for analysis.

Step 2. Read or look at all the data.

Step 3. Start coding all of the data.

Step 4. Generate a description and themes.

Step 5. Representing the description and themes.

Source: Creswell & Creswell (2018:268)

As a researcher, one must be open-minded when conceptualising a large amount of qualitative data codewords. Once it is ordered into themes, the themes can be further organised into different categories or even sub-categories. An internet search or textbooks can be done to further break down a theme. For example, the theme "motivational aspects of starting an SMME" can be researched on the Internet and standard reasons such as "push and pull factors" or then sub-categories emerge to clarify the topic further.

Lofgren (2013) labelled his main distinctions as categories, whereas Creswell referred to them as themes. Lofgren also had a connection between his categories that represented the core of his whole study. He then concluded if there was a hierarchy between the categories, he could draw figures, write up his results and describe the categories and results neutrally. He interpreted the results in line with previous study results, or line with theories or in line with other opinions. This researcher prefers to follow the Creswell approach by referring to it as themes and dividing the coded data into themes at the start of the analysis process, instead of categories, as mentioned by Lofgren (2013).

Once the themes were identified, coding the data under these themes became necessary. The researcher must decide which words or phrases to include as code or not, as it depends on the values, beliefs, and attitudes of the respective researchers about qualitative inquiry (Saldana, 2016:2). It is at this stage where the researcher will be at the second layer of the Saunders *et al.* (2019) research onion approach – applying an inductive or deductive approach. Thematic analysis can be performed via an inductive approach, a deductive approach, or combining both approaches. The deductive analysis occurs when the researcher uses a theoretical framework derived from predetermined general theories to identify numerous codes within the text, which can then be grouped into several specific themes (Du Plooy-Cilliers *et al.,* 2014; Fereday & Muir-Cochrane, 2006:80).

The codes obtained from the deductive analysis can also be called prior codes and are developed from the existing theory and literature study before the examination or analysis of the data obtained (Saunders *et al.,* 2016:582). An inductive approach to qualitative analysis will involve developing research-specific concepts from which a theoretical framework can be developed (Saunders *et al.,* 2019:639). Deductive theory embodies the clearest view of the nature of the relationship between theory and research. In contrast, inductive reasoning refers to the research outcome, especially in this study where interpretivism is applied (Bryman *et al.,* 2014:9-11).

It is also important to note that coding is not the only way to analyse data; it is just one of the possible ways to analyse it (Saldana, 2016:3). Data coding is necessary to clarify the information the data contains to the researcher. This phase of forming and positioning codes into categories or themes forms the heart or core of qualitative data analysis (Creswell & Poth, 2016:333). The coding process is fundamental to qualitative research as it involves making sense of the collected data secured from the interviews. In the mentioned COVID-19 study, in vivo coding was applied, mostly using the participants' exact words, with some forms of interpretivism where needed. Different colours were assigned to the code words and the specific themes to facilitate the identification of the codes and themes. This resulted in effortlessly applying the manual method and seeing clearly where the code should fit under which theme. The colouring of codes has also been advised in the past, as it makes it easier to see which code word belongs to which label or theme (Friese, 2012:75).

In a similar approach, Marshall and Rossman (2011:209) stated that seven steps could be followed to analyse the data, and according to them, these steps included:

- Step 1: Organise the data.
- Step 2: Immersion into data.
- Step 3: Generate categories and themes.
- Step 4: Code the data.
- Step 5: Interpret the data.
- Step 6: Search for alternative understandings.
- Step 7: Write the report.

Source: Marshall and Rossman (2011:209)

By taking all the advice from these established scholars into account, the researcher then had to determine whether a manual process or making use of AI or CAQDAS programs would be the ideal solution to analyse the data in the COVID-19 study. To reach a well-thought-through conclusion, both sides of the coin had to be reviewed – going old-school manual versus using tools.

2.4 To be or not to be – to use computer software or not

If a researcher wishes to make use of CAQDAS, then some of the most frequently used computer programs utilised for data analysis to consider are Nvivo, MAXQDA, Quirkos, Transana, QDA Miner, Dedoose, RQDA, AQUAD, Taguette, HyperResearch, SuperHyperQual and ATLASti (Friese, 2012:10, Given 2008:407, 845). Available transcription software that can be used to transcribe the collected voice recordings into Word documents includes Express Scribe, Olympus Digital Wave Player, Microsoft OneNote, a Live Scribe smartpen, Dragon NaturallySpeaking, e-Speaking, and

many more (Marshall & Rossman, 2016:392). To review all these here will be time-consuming, thus only one popular CAQDAS program will be reviewed.

A popular program such as ATLASti is compatible with most textual, graphical, and doc and docx files, whilst multimedia formats can be converted to rich text. Most computers with a Windows operating system will have the converters installed, or it can be done by installing an Office package. PDF files are also supported (Friese, 2012:23). It does not matter if the research was conducted as action research, observations, via interviews, focus groups, or biographical research; this software tool can assist with analysing data for all of the above methods by analysing it systematically in a computer-assisted manner (Friese, 2012:3).

A decision can only be made whether to follow a process of CAQDAS analysis or a manual process of analysing the qualitative data once a thorough understanding has been reached of both methods. ATLASti was reviewed for potential usage because it was the preferred software program at the academic institution where this researcher conducted her COVID-19 research.

All that is important in the end, when deciding which method to use, is to remember that individual researchers must realise that they do have a freedom of choice, as so eloquently described by Cresswell and Poth when they stated that "…they are free to choose the methods, techniques and procedure of research…" when performing research to obtain the best results for their specific study (Creswell & Poth, 2018:82). A researcher must choose whether it follows the group who sees it as a brilliant aid and analysing tool that adds rigour to data analysis process of qualitative research (Neergaard & Ulhoi, 2007: 346) or select the opposing group who feels CAQDAS can create a distance between the researcher and the data (Welsh, 2002: 5). An informed decision can only be made by understanding what a CAQDAS program can deliver or after obtaining some guidance of what it entails (Friese, 2012:6).

2.5 What is ATLASti used for?

ATLASti is part of the field of CAQDAS programs (Friese, 2012:10). CAQDAS is the abbreviated name for computer-aided qualitative data analysis software widely used for data analysis in qualitative studies. Computer software programs can identify strings or patterns amongst large quantities of data and with large combinations of data. First, however, the researcher has to pinpoint parameters for the software to function optimally, to instruct the computer software program by coding exactly which data segment is important and then what kind of significance that particular piece of data has.

ATLASti can be used for qualitative and quantitative research. ATLAS.ti will not alter original material; therefore, original document files are safe (Friese, 2012:10). The question remains about the uncertainty of a computer program understanding the subtle nuances of emotional upheaval combined with financial impact and economic concepts on a micro and macro level, as computer programs are not intuitive (De Cremer & Kasparov, 2021:2) and can only map work tasks that it has been explicitly

created for (Tolan *et al*., 2021:191). The reason why the researcher decided not to make use of computer-aided qualitative data analysis software is that for this specific study, the qualitative data is of such a nature that it requires an interactive and iterative process, demanding thoughtful, reflective, and reflexive analysis rather than a mechanical process (Saunders *et al*., 2019:638), therefore using CAQDAS will not be the ideal solution.

3. Research Methodology

In the original COVID-19 study, the research methodology was based on a qualitative research design, as qualitative methods allow a researcher to understand all processes and procedures involved in a crisis (Crotty, 1998). For this paper, the research onion process of Saunders *et al*. was followed to ensure the research objectives were met (Saunders *et al.,* 2019:174). The research methodology approach was followed by making use of interpretivism in a deductive mono-qualitative method based on using semi-structured interviews and the questionnaire guide as an instrument.

The research was conducted via semi-structured interviews to help gain an in-depth understanding of the specific know-how and skills these small business entrepreneurs were willing to share. When the questionnaire was developed for the semi-structured interviews, clear and concise questions were used to obtain answers that would help to understand the social problem being investigated (Easterby-Smith *et al*., 2015:140). Once the coded data was extracted from the transcriptions of these interviews, the Thematic Analysis Process (Creswell & Poth, 2018:333) was applied via the "describing and classifying codes into themes"-method to enhance the understanding of the code. Saldana referred to this process as "theming" (Saldana, 2016:200).

This process meant the data gathered during the sixteen interviews had to be sorted or organised into different themes or ideas for the Thematic Analysis (Alhojailan, 2012). Thematic analysis has been widely used in qualitative studies (Bryman & Bell, 2014:350) as a flexible data analysis method to enhance insight. The coded data was then analysed via a manual method to be fully explained in this article, each step to be explained fitting into the layers of the research onion (Saunders *et al.,* 2019:174).

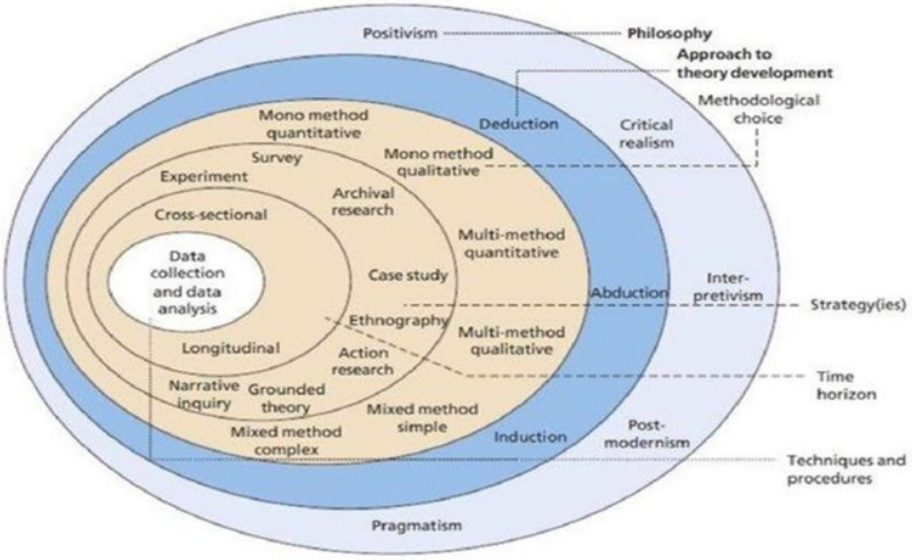

Figure 1: The research onion

Source: Saunders et al. (2019:174)

4. Results and Findings

Developing matrixes and interpretations when performing manual qualitative data analysis is difficult, especially with a large data set. The coding "bible", as per the Excel spreadsheet, is quite a large document, with a total of 555 line items for all 16 participants in the mentioned COVID-19 study. Describing the entire process: The data has been accumulated via interviews, transcribed, and themes assigned via thematic analysis. Subsequently, coding was applied, and all the colour-coded codewords (each theme receiving its unique colour) were converted into a comprehensive coding bible. Ultimately, this research then reached the stage where the data was finally ready for analysis, where matrixes and patterns could be identified to answer the research questions.

The code words were written on coloured paper the same as per the chosen or allocated colour in the Coding Bible. The colour-coded sticky notes were then manually sorted under the different categories and sub-categories onto a large white wall to give the researcher a visual image of the representation of all the code words or phrases.

Unfortunately, due to spatial constraints, the individual network diagrams of each theme could not be displayed on the wall for all the code words simultaneously, but it was possible to display the code words per theme, as organised and categorised into sub-categories underneath each theme onto a white wall. When analysing raw code, this researcher found it helpful to identify repetition links and patterns when viewing the data all combined on a flat surface, in this instance, a wall – and preferred to refer to this form of manual analysis as wall-coding.

A visual example of thematic analysis and code sorted in the different colours of the different themes, as well as per category and sub-category, is provided below in Figure 2 as an example of what can be done with wall coding. Make use of a large open wall to put sticky notes in the different themes and organised in different categories and sub-categories in the format of a network diagram on a wall and this will provide an overview of data analysed in terms of wall coding.

Figure 2: Thematic analysis via the manual method using colour-coded code

The manual process for this study worked well as several similar code words emerged under different themes. Patterns already emerged as the data was coded and placed onto the wall in the wall-coding process. In producing this highly contextualised data set developed from the 2631 code words, it became apparent that the data collected was characterised by fullness and richness, providing an opportunity for in-depth analysis (Saunders *et al.,* 2019:639).

Sorting the codes into the themes as per Creswell's thematic analysis, (Cresswell & Cresswell, 2018:270) as it emerged from the analysis, was hassle-free due to the same semi-structured interview format followed by all 16 participants. The actual process thus developed to follow a manual method for qualitative research when there is a rich data set of information available in transcribed interviews covering several study fields over multiple areas of interest, is listed below:

Steps developed by Strydom in the 2024 COVID-19 study are:

Step 1 – Read through the transcriptions carefully (Saldana, 2016:69) and apply thematic analysis (Cresswell & Cresswell, 2018:270) to decide on the different themes that emerge from the transcriptions. If a semi-structured interview process was followed, the different questions asked to the participants could aid the researcher in this step of identifying specific themes and alternatively apply thematic analysis.

In addition, this step entails the grouping of different ideas together under different headings, e.g. When did it happen, where did it happen, what happened, how did they experience it, who did what, the impact of what happened on the participant and more. The data collection forms the inner core of

the research onion and was already adhered to with the interview process on a cross-sectional basis (second layer) via narrative enquiry in the third layer.

Step 2 – Assign a different colour to each theme. In the COVID-19 study, the colour pink was assigned to the first theme, namely "Challenges pre- COVID" and yellow to the theme "Challenges during COVID" and so forth, up to 12 themes in total. Highlight the code on your electronic document into different colours per different themes – sometimes you, as the researcher, will have to apply interpretivism as per the last layer of the research onion (Saunders *et al.,* 2019:174) to the words and actions of the participants as their data will be in a raw and mostly non-academic format.

In vivo code is still acceptable, as long as the researcher can utilise the exact words of the participants as code, there is no need for interpretivism, but sometimes a researcher can summarise the participants' words into more usable code (e.g. in the COVID -19 study the researcher used the term "pivoting" instead of "and then when I could not go to London, I decided to do an online exhibition"). The condensing of sentences into one-word codes is already one form of code-condensing.

Step 3 – The highlighted code on the different MS Word or any other type of electronic documents of all the different participants now have to be summarised in one document, called a coding bible file – this is where all the code words and phrases are incorporated into one spreadsheet. This researcher used Excel, with columns for each theme and line items for the participants, with the colours all next to each other. This will provide a total of line items and also provide the researcher with the added benefit of counting code and responses easily in Excel when compiling the matrixes to see how many participants had the same type of response. The copy and paste function on any computer can easily be utilised to transfer the code from the original transcript into the coding bible spreadsheet. In this instance, Excel was used. Some writers call it a codebook and provide the categories it usually contains, whether it is a paper-based codebook or a spreadsheet version (Cooper & Schindler, 2008:405).

Step 4 entails how the highlighted code in the electronic coding bible spreadsheet must transform living in the electronic realm into the physical world. Here are different options available, a researcher can either print it out and cut out chunks of code or write the shortened code on colour-coded pieces of paper by hand. Transform all the preferably condensed code (via applying the 5th layer to use either the deductive or inductive approach) onto pieces of paper onto a flat surface where it is visually available for analysis. For a video of the process, the YouTube video of the researcher can be visited at https://youtu.be/1yYIAvtQhRs (Strydom, 2024).

A good option is a whiteboard, a tabletop or even a large open wall as per photo examples by a researcher who used Vivo Codes (Saldana, 2016:79) using some form of reusable white sticky adhesive such as Prestik. Sort the themes per colour where it is visually visible. Theming is important as it allows one to draw out the codes' essence (Saldana, 2016:231). Once all the code is on a wall, it

can then be organised. Suppose a variety of participants mentioned the same concept under a theme. In that case, the researcher does not have to make a colour-coded label each time a participant said "save" rather use one label with a code under one category and add dots on the piece of paper of how many participants agreed, e.g. six dots indicate that six participants agreed, this is another form of code-condensing.

Step 5 – Take each theme down separately for the organisational structuring per theme. This step is best performed on a flat surface to manually analyse and categorise the code. Saldana advised it is best to sort the data by hand by physically moving the pieces of data around and to "feel" the code (Saldana, 2016:231). The process of manually sorting and analysing the data has been referred to as a "tabletop category", which involves the literal arrangement of cut-out data chunks in a tabletop format (Saldana, 2016:231). Saldana stated that his students remarked that "touching the data" after pieces were cut out and moving them around into multiple arrangements to find the ultimate fit helped them discover patterns and understand the data better. In this step, each theme must be organised and categorised. Here, layers 4 and 5 of the research onion can be functional.

Standard categorisation can be applied, as done with internet or textbook searches. For example, motivation factors include pull factors and push factors, and if there is still a large amount of code left to organise, it can even be divided into sub-categories, for pull factors. In the mentioned COVID-19 study, the pull factors were sub-categorised into industry knowledge reasons, identified a gap, wanted a lifestyle change, personal reasons, and philanthropic reasons. The sub-categories can be added onto small pieces of paper to organise the code into a more usable format.

The secret is to move the bits of code around until it makes sense and to group the different bits of code that explain or comment on the same idea until you get the perfect fit. The researcher's understanding of the data and applying the researcher's cognitive ability here is an immensely satisfying exercise as the physical patterns appear under your fingertips and in front of your eyes. No computer program organising the data for you can provide this level of satisfaction. This way one understands where the data comes from, and every participant's contribution starts falling into place to start creating the bigger picture. This is a very important step where the researcher becomes the data analyser and creates the operational network diagram per theme with the heading in the centre and different categories, sub-categories, and main code around it. Take a photo of the operational network diagram – this is part of the deductive layer to create the tables and figures.

Step 6 – Repeat this process for each theme to create an operational network diagram (Strydom, 2024:224) and then put them back onto the wall or surface used, but this time in an organised format, with the different categories and sub-categories displayed for visual effect. Remember to photograph each operational network diagram per theme on the flat surface before putting it back onto the wall.

To indicate which categories and codes belong together, a researcher can use pieces of string or paper to indicate the flow of information.

Below is a photographic image depicted in Figure 3 of the theme: Motivational factors to start an SMME. This indicates the usage of sticky notes or coloured paper, with pieces of string or wool to indicate which sub-category falls under what particular section.

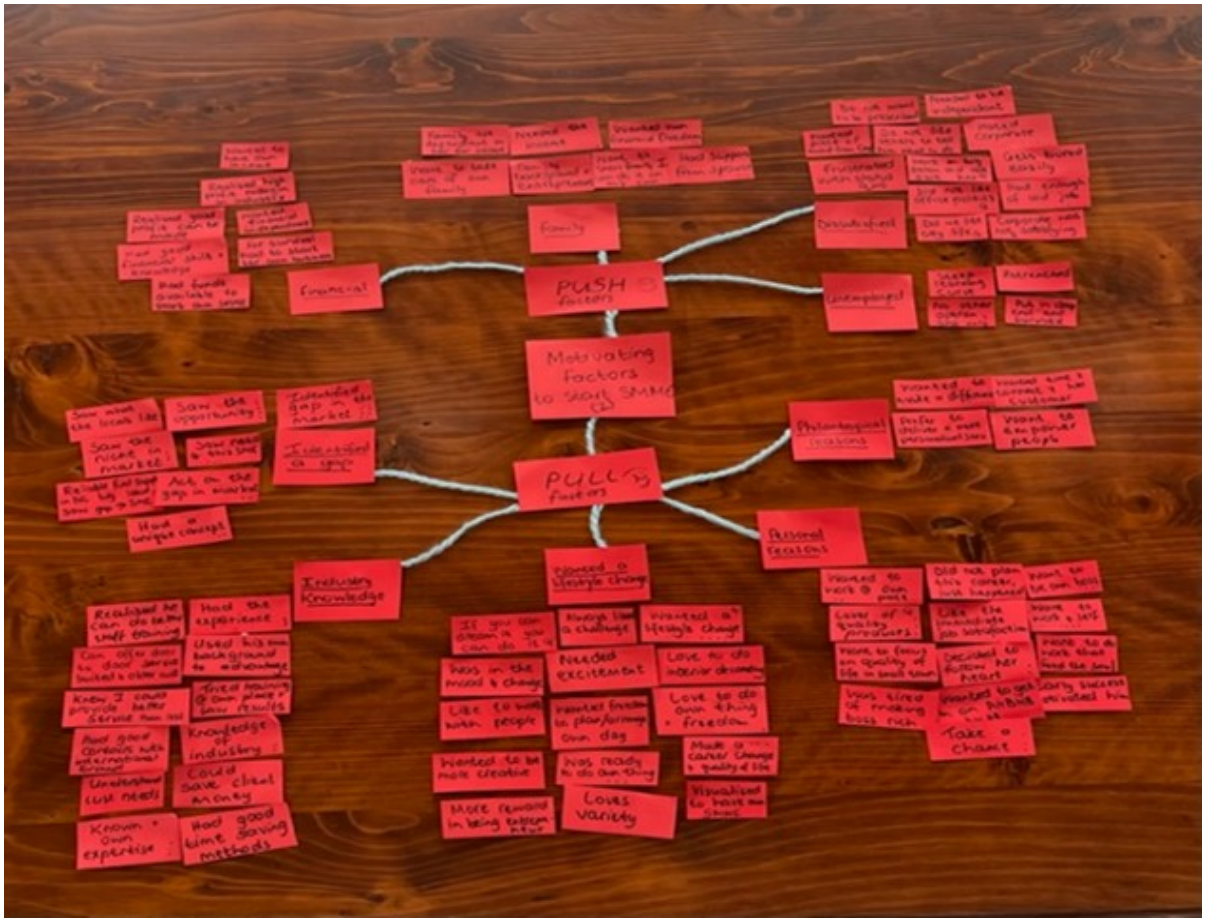

Figure 3: The code organised into categories and sub-categories

Source: Strydom, 2024:207

Step 7 – Once all the themes have been organised into operational network diagrams, the raw code can be converted into mind maps. This step can be done manually by creating a mind map in MS PowerPoint or Paint. Alternatively, the researcher used a simple organising tool where the program draws the exact network organogram that you, as the researcher, devised in a program called Simple Minds. This is specifically not a use of AI; this is to be able to properly read the code in the network diagram as the handwritten version is quite strenuous on the eyes (Strydom, 2024:224).

Below in Figure 4 is the computerised version of the network diagram. Do note that no "thinking by a computer" went into this visual display. It is merely a visual representation of the thought patterns of the researcher, where the researcher did all the work, it was only digitalised by Simpleminds.

Figure 4: Mind map of the Theme of Motivational Factors (Strydom, 2024:273)

Step 8 – This step entails the creation of the matrix and occurs in Excel where the coding bible already exists. From there on, it is relatively easy to sort and organise the data, using the categories and sub-categories of the operational network diagram (which will not feature in the coding bible, as that is only the raw code from the transcripts). This step entails creating a new spreadsheet per theme, called a matrix to organise the data (Saldana, 2016:262). In the first column, provide the categories under that theme, in the second column, provide the sub-categories under that theme, and so forth if needed, and then provide a column for the main code words. A column for each participant should follow this, labelling it P1 for the first participant, P2 for the second participant and so forth till all the participants receive their column. The main code words per sub-category are then typed into the column called "Main codes".

Now it is a simple matter of scrolling through the Coding Bible or Codebook, as Creswell and Poth refer to it (Creswell & Poth, 2018:335) in Excel and seeing which participants used the same kind of code words per categories or who agreed on certain aspects, then simply mark that participant with an x in the matrix, to indicate the level of consensus amongst participants, as shown in figure 5 below.

			Participants																
Category	**Sub-category**	**Main Codes**	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P 10**	**P 11**	**P 12**	**P 13**	**P 14**	**P 15**	**P 16**
Push	**Financial**	Had to start my own SMME to survive					x		x		x			x	x			
		Wanted financial independence	x	x	x						x	x	x	x	x	x		x
		Had financial expertise	x	x		x		x		x					x	x	x	x
		High profits lured	x	x	x		x	x			x	x	x				x	x
	Family	Wanted to take care of their own family	x	x		x	x	x				x	x		x			x
		Family background of entrepreneurs	x		x		x		x			x	x	x	x	x	x	
		Had support from the spouse	x		x	x		x		x		x			x	x		
	Dissatisfied	Frustrated with the status quo	x	x		x	x	x	x			x		x		x		
		Hated corporate		x			x	x				x		x		x	x	x

Figure 5: Matrix extract of the theme Motivational factors (not the whole matrix)

Source: Strydom 2024:269

Step 9 – The creation of a table with the most used codes per category and theme is important to indicate some quotations from the participants, as accompanying tables is a method applied in the past to indicate which code was used or which categories were constructed (Saldana, 2016:264). Such a table can prove the validity of the study as exact quotes can be traced back to the original transcribed interviews and to the recordings. This path of relevance indicates that no biased opinions from the

researcher occurred, as the exact information from the participants ended in the scientific study that led to the findings and conclusions.

This step by creating a table with direct in vivo code or quotations from the participants' exact words, creates a digital audit trail that can serve as evidence of where the code originated from, which participant said exactly what and it has the added benefit that it can be easily retrieved from the transcribed interview and be examined (Silver & Lewins, 2014) as shown in Figure 6 below.

Theme	Category	Sub-category	Codes and quotations from participants
Motivating factors to start own SMME	**Push**	**Financial**	**For survival, had to start own SMME** – "Realised I have to really focus on creating my own constant income stream for survival and not only do favours for friends," Participant GB001 and "I was retrenched in 2008…so in the recession, so he took my tree, and uprooted me, and he put it down here, goof. I knew nothing. I was so out of my depth. No other option but to survive" Participant STR001.
			Wanted financial independence – "My aunt had her own business, and I liked the money she made. I wanted to have her same lifestyle and financial freedom." Participant NUM001.
			Had financial expertise – "I started my own company as I had the knowledge and the expertise, and I knew I could provide better service" Participant SW004.
			High profits lured – "Working at this big chain of hair salons, I realised the high-profit margin to be made" Participant MC001.
		Family	**Wanted to take care of own family** – "The biggest reason for me to start my own business was that I wanted to take care of my own family. I do not want to take a slice of bread from your table. I can survive on my own." Participant HB002.
			Family background is entrepreneurs- "We have been involved as a family in the fuel sector for years." Participant BVL001.
			Had support from spouse – "And my late husband was a big support, he motivated me, he encouraged me, and he believed in me, and he said I could do it, so I did, Participant SW004.
		Dissatisfied	**Frustrated with status quo** – "And I was frustrated at that stage that our income was decided upon political factors and not dependent on the entrepreneurial skills of the businessman." Participant BVL001.
			Hated corporate – "I was working before that in the corporate environment for quite a while, but it was not very satisfactory for me " Participant STB001.
			Needed to be independent – "I saw how the banks dealt with foreigners. I realised there and then that people who do not generally speak English or Afrikaans will always struggle

Figure 6: Table of themes with quotations from participants

Source: Strydom, 2024:264

Step 10 – The next step is to explain and elaborate on each visual aid: the matrix, the table, and the mind map of the network organogram, all should now be discussed to indicate which pieces of code were extremely relevant. The researcher can also indicate how many participants agreed or disagreed on certain aspects and the emotional impact or reasons behind their answers, this is an important human aspect a computer program can never replicate. Discussing each figure in detail helped the researcher understand where the code originated from and how it fits into the bigger picture, which were important codes and delivered findings. Notes in the margin of the original transcripts assisted in this discussion of the results chapter to provide added insight into where the code originated from. For documents or manuscripts with length restrictions, Saldana advises keeping the write-up brief, to about two full paragraphs per theme at most (Saldana, 2016:284).

Step 11 - This step entailed the identification of interrelated links or relationships between keys and constituted the key findings. These code words or terminology appeared under several themes and deserved further attention to see what were the focus areas that enabled the participants to survive the COVID-19 pandemic as a business. In the COVID-19 study, the key findings identified were financial

matters, networking, communication, focus, resilience, technology and self-constructed support. Identifying links acknowledges intricate interrelationships, in both qualitative and quantitative research (Vogt *et al.,* 2014:200). By following all the manual steps and identifying these key findings, the researcher scientifically proved that it is possible to develop a framework for survival based on the actual participants' actions and deeds they affected to survive the pandemic. The discussion of these findings and the results of the study thus led to the development of the framework.

The interrelated links and the code words that were repeated the most were indicative of the synergies between participants under various themes. In the COVID-19 study, seven concepts emerged from the manual data analysis process that appeared to be the reasons why some participants with SMME managed to survive the pandemic, as they placed their focus on:

- Financial matters
- Networking
- Communication
- Focus
- Resilience
- Technology
- Self-constructed support

A full description of these seven findings is not required for this article, and yes, most likely, the same conclusion will have been reached when a CAQDAS software program has been used, but the researcher found it tremendously satisfactory to have applied her cognitive abilities to reach this conclusion herself. The seven concepts formed the basis for the development of the framework for survival in the original COVID-19 study. Several theories also emerged and were reviewed in the study, with resilience theory being the most applicable to describe why the participants managed to survive the pandemic and the managerial implications that emerged from this study.

5. Managerial Implications

The managerial and practical implications of this study provide answers to the secondary research objectives, as it indicates it is possible for any researcher or SMME owner to easily follow a manual approach to analyse problems. Demanding and complicated computer programs are not needed to analyse a research problem. Any researcher or SMME owner can now perform an analysis of their specific research problem, such as performance issues during a difficult economic situation. Whereas most researchers would have previously applied a CAQDAS program to analyse data, scholars,

researchers, and even SMME owners can simply apply this 11-step manual method to analyse the code or data (extracted from their staff or organisation) about the research problem they are facing.

6. Conclusions, Limitations and Future Research

Suppose a researcher follows the layers of the research onion and incorporates it in each next logical step in the 11-Step Manual Method. In that case, a researcher will realise a qualitative manual method approach is best for this study. The entire study can indeed be done using only human cognitive abilities from the design of the study to the eventual creation of the questionnaire for the semi-structured interviews up the analysis process when creating the tables and figures from the data collected.

The limitations of the original COVID-19 study were not relevant to this paper. Suffice it to say the POPI act caused some limitations as to how a sample of participants could be selected as the study had to be done via snowball sampling. The POPI act thus, in the opinion of the researcher, limited the scope and outcome of the study.

Ethical Dilemma

In his thesis "Christian Ethical Guidelines to Artificial Intelligence and Technological Singularity", Van Heerden suggested that there is an ethical dilemma in using artificial superintelligence. He called for a future where faith and technology can collaboratively rather enhance ethical standards and human values, as without the human aspect of values and standards, there is a risk that societal morals will not be upheld (Van Heerden, 2024). In a Harvard Business Review, De Cremer and Kasparov advocated that AI should augment human intelligence, not replace it, as when computers are introduced as the new super employee, it may leave humans feeling they serve an inferior role to the machine (De Cremer & Kasparov, 2021:5). This means that no job is safe and we as humans are ultimately creating unemployment when using AI as they will replace us and undermine our existence (Kavathatzopoulos, 2024:19). It appears there will be an implication of ethical issues on society if AI is further advanced (Gogineni, 2022:1).

Conclusion

By following a scientific process of the research onion from start to end, the organisation and analysis of the data to code to organised visual aids, it is possible to follow a manual method process and be able to state unequivocally that the research was 100% the work and effort of the researcher with the ability to reach a conclusion and develop a framework for survival (Strydom, 2024:526).

In creating the 11-step manual method, various existing manual methods of well-known scholars were reviewed and incorporated. Special mention is needed of the various instruments incorporated to create the comprehensive 11-step method: the research onion of Saunders *et al.* (2019:174), the

thematic analysis process and the code book example of Cresswell & Poth (2018:338), the advice of Saldana of "feeling the data" and moving it around until it "reaches a perfect fit" (Saldana, 2016:231) – all these contributed to the final process. This manual method is not promoted as being "better" than CAQDAS programs. It is rather presented as an alternative to existing software programs in the instance of research where AI or CAQDAS cannot cope with a wide variety of aspects, specifically for emotional, culturally sensitive or intuitive aspects. Whether this 11-step manual method is useful or not, only future research and usage of this manual method in study fields other than Economic Management Sciences will be able to indicate.

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