The Use of Computer Applications in Qualitative Research: A Review

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Abstract – *This paper presents a review of twelve (12) foreign research articles from peer-reviewed journals spanning the years from 2002 to 2016. It is noteworthy that no local article was incorporated in this review due to its unavailability in the online search portal. These researches featured computer assisted qualitative data analysis software (CAQDAS). The paper includes a brief historical background on CAQDAS. Some of the early computer programs in qualitative research such as Ethnograph, MAXQDA, NVivo, ATLAS.ti and NUD.IST as well as their latest versions were discussed. The development of the functions and features of majority of CAQDAS programs and how they change the way researchers deal with qualitative data were also presented. Common features of these software packages are centered on the coding as the most fundamental key strategy in qualitative research. In a CAQDAS program, code hierarchies, annotations, writing memos and data exploration can now be done electronically in easy, fast-paced and accurate manner. Despite of a number of advantages in using the software packages, the research article enumerated some vital concerns and criticism about CAQDAS. This part is more focused in this review with conceptual discussions on issues that include (1) diversity of CAQDAS software programs, (2) misconceptions that the software alone can do the analysis, (3) the ownership of the data or its proximity to the researcher, (4) over reliance on the software, (5) the way researchers present their study using CAQDAS, (6) methodological bias leaning on grounded theory, (7) lack of recognition from experts and practitioners, (8) familiarity and technical readiness in using a software of this kind, and (9) the cost and commercialization of CAQDAS programs. In the discussion, precautionary reminders in using the technology was included. In conclusion, manual coding is still irreplaceable while technology such as CAQDAS is considered an add-on to aid and help in the burdensome work of a qualitative researcher.*

Keywords – *CAQDAS, computer applications, computer assisted qualitative data analysis, qualitative research*

INTRODUCTION

Necessity is indeed the mother of all inventions. All technology that surround human life came out because of the huge need that demands for it. The same is true in the use of modern technology in doing qualitative researches; most especially in the field of social sciences. Qualitative research collects and examines text, interviews, comments, and other types of 'unstructured data' which must be interpreted for meanings [1]. According to Schönfelder [2], qualitative research is a heterogeneous field comprised of different and sometimes competing analytic strategies. Doing qualitative research is really burdensome for most researchers. This reason gave rise to the extensive use of technology in doing such job. In fact, Gibbs, Friese and Mangabeira [3] reported that the earliest use of technology in qualitative researches is in the form of tape recorders in doing field interview sessions. It was followed by the widespread of closed circuit television or CCTV which is now used for safety and security measures. In quantitative researches, the statistical package for social sciences (SPSS) become well known which come in updated versions every after a certain period of time. Similar quantitative software packages also came out in the market like Statistica and Stata. Most researchers of today are taking advantage of the convenience and accuracy that these statistical packages offer.

Today, even qualitative researches are utilizing computer software programs. In fact, a growing number of qualitative researchers are now relying on the use of computer assisted qualitative data analysis software (CAQDAS). Welsh [4] defines CAQDAS as an aid to the researcher in the search for an accurate and

transparent picture of the data while also providing an audit of the data analysis process as a whole. Researchers, in reviewing related studies may read from research journals or participants of conferences may hear research presentations reporting results of qualitative researches generated through CAQDAS. The extensive use of this technology in qualitative data analysis has been reported in many research articles (e.g., [5, 6]). CAQDAS programs have developed tremendously in the past decade and many features have emerged in these programs [7]. It is not only text or transcripts that can be analyzed through the help of computer application software, even videos, audios, photos and other sources of data can now be easily analyzed. Various qualitative methodologies such as discourse analysis, grounded theory and thematic analysis can be performed using the same type of technology.

With the strong appeal of the CAQDAS packages among qualitative researchers, graduate students and other professionals, it is interesting to delve into the rich review of literature and results of studies on the use of computer applications in qualitative researches. This article aims to shed light on the use of computer applications in qualitative researches since more and more disciplines are currently adapting the qualitative approach in conducting research. More so, there are misconceptions, criticisms, and limitations as well as latest developments, trends and innovations about CAQDAS that are needing attention to promote a clear understanding of the optimal use and to orient novice researchers and those who might be interested in using the technology. For instance, with the continuous advancement of this modern technology, there has been a connotation that CAQDAS alone can do the coding process of the qualitative data, similar with what statistical software can do with numerical data. Another interesting question about CAQDAS is when it is most appropriate to use. There are some small-scale researches that can be dealt using manual coding, however, researchers become more fascinated with the use of the software instead of becoming well-oriented of their data.

In addition, as Humble [7] points it, only little empirical research has actually been carried out on this topic. She further argued that researchers need information in order to critically and carefully use such programs and their various features. With its increasing utility, a thorough discussions on the use of CAQDAS and an avenue for progress to be made are imperative. Hence, this research article is foreseen to be of great value for researchers especially those who are venturing in qualitative approaches to have a complete understanding about the use of CAQDAS in their research endeavors and the important features of this technology that can aid their journey in analyzing qualitative data.

METHODS

This paper presents a review of twelve (12) foreign research articles from peer-reviewed journals spanning the years from 2002 to 2016. The years covered the early development up to the time of extensive use of CAQDAS. The articles were retrieved from ProQuest LLC, a global information-content and technology company that features academic papers, journals, reviewed theses and dissertations from various institutions across the globe. The journal articles that were selected are those that presented the historical development of the said technology and those that evaluated and reviewed specific CAQDAS software. Search keywords used include “CAQDAS”, “computer applications in qualitative research”, “software”, and “qualitative analysis”. They were retrieved from October to December 2017. It is noteworthy that no local article from the Philippines was incorporated in this review due to its unavailability in the said online search portal.

The said articles were analyzed thematically based on the key information and critical issues presented. The gathered data circles around common themes that include history of CAQDAS; different computer applications; functions and features of the computer applications as compared to manual coding, and criticisms, limitations and disadvantages of using CAQDAS. Critical discussions about this themes were presented in this article.

OBJECTIVES OF THE STUDY

This article presents a critical review of the use of CAQDAS. Specifically, it delved on (1) the history of CAQDAS; (2) the CAQDAS packages; (3) functions and features of the computer packages as compared to manual coding; (4) and criticisms, limitations, and disadvantages of using CAQDAS.

HISTORY OF CAQDAS

Society transforms and is transformed by new technology [3]. In this sense, there are new ways in which qualitative researches collect and analyze data and new forms of data to collect. The manner qualitative researches were done has come a long way and developed drastically through time. One of the early starters was the Italian theologist Roberto Busa,

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who became famous as "pioneer of digital humanities" for his project "Index Thomasticus," an IBM sponsored project that digitized and indexed the complete work of St. Tomas Aquinas in 1949 [8]. In addition, according to Carvajal [9], the first wave of CAQDAS programs were created in the 60's (although Humble [7] argues that it is in the 80's) but the advantages of the software programs in qualitative analysis were elusive during that time. It was adapted only by some disciplines seeking to document ethnographies of culture in education such as the work of Wolcott, and Geertz, followed by Lincoln and Guba, Miles and Huberman, and Cobin and Strauss [5]. It was only in the 80's and early 90's (Rademaker, Grace, & Curda [5] said it is in the late 1990's) when they began to be widely recognized in the field of qualitative analysis in some areas of United States, United Kingdom and Australia. Another milestone was the software "The General Inquirer," developed in the 1960's by a communication scientist for the purpose of computer-assisted content analysis of newspapers [8].

Some these software packages in the 1980's are Ethnograph, MAXQDA, NVivo and ATLAS.ti. There is a rough estimate of 15 different CAQDAS programs by 1993 [7]. At that time, the best source of information on CAQDAS is a website called the CAQDAS Networking Project which existed in 1994. Interestingly, although NUD.IST was born in 1981, version 2 in 1987 was still only available on mainframes, and not commercially, whereas ATLAS.ti released its first commercial version in 1993 and the first English version of the MAXQDA appeared in 1995 [5].

As of the moment, there is a wide array of available software packages with distinctive features that suit the different qualitative methodological approaches. The term CAQDAS was introduced by Field and Lee [3] as a name of their networking project. This acronym refers to a wide range of software packages that are now readily available in supporting a variety of analytic styles in qualitative work. According to Kelle [7], early programs focused on code and retrieve functions. These programs debunked that manual way of organizing data like cutting with scissors and pasting using glue. The traditional way of coding in paper-and-pencil is now declining. With the use of CAQDAS, researchers are spared of using index cards and cabinets to organize their data. However, some researchers (e.g., [3]) still advocate the use of the traditional and manual way of dealing with qualitative data.

The early set of CAQDAS programs provide functions for data or document management, development of code hierarchies, annotation of text segments with codes, writing memos, exploring data and text retrieval as well as visual representations of data annotations [3, 7, 8,]. All advanced functions of most CAQDAS programs today progressed from their humble beginnings from their predecessors.

CAQDAS PACKAGES

There are diverse type of CAQDAS packages available to address the different needs for qualitative researches. Schönfelder [2] said that software vendors try to accommodate an increasing demand for common and specific analytic needs and include an ever growing number of features in their products. One of the earliest packages which will now be categorized under CAQDAS is Ethnograph which was popularized sometime in 1980's. Many authors of qualitative analysis textbooks featured some of the well-known and well-established computer packages. For instance, the work of Humble [7], stated that ATLAS.ti, HyperRESEARCH, MAXQDA, NVivo, QDA Miner and Transa were featured in the step-by-step guidebook in using software in qualitative research of Silver and Lewins in 2014; in the third edition of book of Corbin and Strauss in 2008, MAXQDA software was used in their examples; while Bazeley in 2007 published a book focusing on data analysis carried out with NVivo. Meanwhile, Carvajal [9] reported that the demand for workshops in learning the operations of computer software packages are focused on ATLAS.ti and NUD.IST. The work of Scales [1] featured how the Library Instruction Team of Washington State University used the software ATLAS.ti in assessing and improving student learning and how HyperRESEARCH was used to code and analyze blog postings to study the development of students' higher-order-thinking skills.

The use of some computer software programs allows "mixed" methods in data analysis or the convergence of both quantitative and qualitative methodologies. With some indexing and coding functions, some scholars claim the possibility to quantify qualitative data, although some repute this kind of treatment to qualitative data [2]. For instance, NVivo, ATLAS.ti and MAXQDA allow analysts to code and analyze passages of narrative from in-depth interviews, focus groups and the like as well as to combine such data with quantitative results from surveys, or to convert qualitative coding and matrices into format that allow statistical analysis [1]. Also, tools for creating charts or cross tabulations allow for a similar presentation of qualitative data similar to that

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used in quantitative research [2]. Now, the pressing issue here is the loss of depth and flexibility that occurs when qualitative data are quantified [10].

Moreover, varied methodologies are integrated in CAQDAS programs. NVivo, for instance, claimed to be a tool for discourse analysis, ethnography, phenomenology, grounded theory, mixed methods and more; while MAXQDA is described as "methodologically multi-faceted" and designed for "hermeneutic text studies," grounded theory and various mixed methods [2]. Aside from that, Dedoose is also made available for mixed method researches. It is a cloud-based mixed methods data analysis which strongly supports real-time online collaboration for data analysis [6].

Furthermore, CAQDAS developers continuously adapt to the ever changing field of social science research. That is why, newer versions of computer software are coming out, one after another. For example, the study of Schönfelder [2] discussed the similarities and differences of NVivo 8 and MAXQDA 10. Meanwhile, more than a decade ago, Gibbs, Wilma, and Mangabeira [3] were discussing its predecessors - EZ-Text, winMAX 99, NUD.IST 4 and ATLA.ti 4.2. In addition, qualitative research methodologies also permit analysis of other materials beyond text and transcriptions. The article of Hatani [11], reported some CAQDAS-based video analysis using Transa, a software especially designed for qualitative analysis of digital video and audio data. Also, other software packages feature literature review in online databases, concept map tools, bibliographic software programs such as Endnote [6]. As a matter of fact, some researchers recommend the use of such software like NVivo in doing literature review. With the ever changing functions of the CAQDAS programs, most of them provide valuable guidance for potential first time users in their discussion of their basic features [2]. There are step-by-step discussions of how various functions are supported in each program.

Other than the previously mentioned software programs, there are other available CAQDAS including HyperQual2, AQUAD, CoAn, Code-A-Text, Diction, DIMAP, KEDS, TEXTPACK, TexSmart, and Best among others [3, 9].

FUNCTIONS AND FEATURES OF CAQDAS VS. MANUAL CODING

Technology is one of the driving force in the advancement of researches in both quantitative and qualitative nature. With CAQDAS, analyzing audio, video and photographic data are now getting considerable attention from qualitative researchers. Most of the qualitative data analysis software are excellent in doing indexing, the systematic way to classify data documents to summarize its content and to increase its detectability which can be burdensome if done manually using system cards, catalog data and research notes [6]. Clearly, carrying out such a search electronically will yield more reliable results than doing it manually simply because human error is ruled out [4]. Also in textual analysis, computer software packages are used. They take advantage of the semi-automatic tool, which combine the automatic retrieval of key words within the text corpus, with a supervised, data driven dictionary learning algorithm [8]. In addition to replacing note cards and sorting approach, CAQDAS programs are more readily facilitating multiple coders and inter-rater reliability evaluations along with expediting the analysis [5, 10]. Thus, it helped in working in the multiple perspectives and all discrepancies between coders will be properly addressed.

As a newer version of a software comes out, the features and functions of the program expand to simplify voluminous manual work. However, the choice of using computer applications still depends on the capacity of the researchers who are supposed to undertake the analysis and most especially, as Salmona and Kaczynski [6] put it, "manual data management and analysis may be the best choice for some studies." For some, the combination of both computer-based and manual analysis is the best one to practice [4]. On the other hand, other experts are saying that the consideration to whether do it manually or electronically should depend on the scale of the data. If the data set is relatively small, it is better to do it manually. However, if one is doing a nationwide study dealing with thousands of individual data, the use of CAQDAS is the most ideal.

With a number of software available, a researcher must carefully select which program best suits his or her needs and capacity. For instance, Welsh [4] chose NVivo over NUD.IST since it is new at that time. It was selected because of its simplistic style and it addressed the problems with other programs. Interestingly, other software like MAXQDA features a function called MAXDictio which can be used in empirical textual data analysis [8]. Also, it is possible to import documents directly from a word processing package and code the documents easily on screen. Coding stripes can be made visible in the margins of documents so that the researcher can see at a glance which codes have been used. In addition, it is possible to write memos about

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particular aspects of documents, hence, linking these to relevant pieces of text in different documents electronically which can be used when building up themes across the data [4]. Likewise, MAXQDA has an excellent "memo manager" for memoing functionality [11]. Similarly, CAQDAS also feature intersection searches and cross-indexing of group of terms, including matrix and matrices, "Boolean" (intersecting search within the researcher's text data), text analysis and mixed methods [10].

Aside from coding text and transcripts, another innovative feature of most advanced CAQDAS packages today is qualitative analysis of videos. In the study of Hatani [11], the main feature of MAQDA version 10 was exemplified. This function is called "timestamp," a tool in transcribing video data. It was used in analyzing dialogues made by different speakers in a video of panel discussions which do not only focus on the speakers' narratives. It can also be used in analyzing videos uploaded online like in YouTube. In the same way, ATLAS.ti and NVivo functions to keep up with the rapid growth of multimedia which are great sources of qualitative data. A volume of information in the form non-verbal languages such as gestures, postures and directions of gaze can now be analyzed.

The core function of CAQDAS, which is the heart of all qualitative methods, is to do the coding. Newer versions of some CAQDAS like the MAXQDA allow importing of PDF file documents, image files and other types of data for coding [11]. It has the ability to provide codeline, code relations, code-subcode-segment model, and code model theory. Humble [7] also enumerated advanced functions such as code-and-retrieve programs, code-based theory-building programs, text retriever, and conceptual network builders. However, Rademaker, Grace, and Curda [5] stressed that these software packages are largely dependent upon the work of the researcher in entering and coding the data. This is where one important misconception about CAQDAS should be clarified. These computer applications are intended only as organizing tool for data management that will save researchers for volumes of papers for the data analysis. This what Gibbs, Wilma and Mangabeira [3] pointed out. They argued that for some, they see CAQDAS as something that will do the analysis for them. Meanwhile, on the suggestion of combining manual and electronic coding, Rademaker, Grace, & Curda [5] cited a study concluding that the software used did not increase rigor in the research work, nor change the analysis, but it did allow the researchers to improve their organizational skills and felt a high level of trustworthiness on the data due to the linking capabilities of the software in connecting various sources of data to interpretations and themes. In addition to coding, data representations and analysis functions in some CAQDAS like ATLAS.ti replicates the concept of grounded theory [8]. This is the reason why a wide review of literature argues that CAQDAS functions support only the grounded theory which Rademaker and her colleagues [5] labelled as a "possibility of bias in the analytic process." Conversely, the advanced functions of CAQDAS cannot be discounted. For example, MAXQDA codeline browser can operated after careful coding in order to obtain a comprehensive view of the codes assigned to the transcription which visualizes the structure of a document and overlaps of codes in different paragraphs [11]. The code-and-retrieve element function allows the user to break up data into segments which can be categorized, organized in various ways and retrieve the detailed review and in-depth analysis [2]. Furthermore, the code-subcode-segment model of MAXQDA, a free-mapping tools which is called MAXMaps investigates instances of sub-codes within a main code. Similarly, ATLAS.ti has the so called Coding Analysis Toolkit, a web add-on that helps team coders compare and standardize their codes [1].

Another key issue in coding is language. Although this has been addressed already by some software developers. For instance, MAXQDA features transcribing functions for different languages. A researcher can transcribe and code in the original language, and translate only the results of the analysis into the final language; or transcribe in the original language, and then provide a translation, for example in English after transcribing; or translate foreign languages into English at first hand while transcribing the original language in a memo [11]. As of the moment, no information was provided if there are translations available in Filipino or Tagalog or any local dialect.

CAQDAS programs provide more advanced functions for data and document management, development of code hierarchies, annotations of text segments with codes, writing memos, exploring data and text retrieval as well as visual representations of data annotations [8]. Overwhelmingly, there is a huge number of tactics, strategies and techniques offered in most CAQDAS. These are specifically enumerated in the work of Evers [12] to showcase the possible strategic combinations of these tactics, strategies and techniques. She further mentioned some important

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consideration in using and selecting computer software. Some important concerns are about accessibility and familiarity to the software to be used. Equally important is compatibility of the software to the computer processor is another concern. Some CAQDAS programs require an Intel dual core T7300 2 GHz processor with 2 gigabytes RAM running Windows XP professional [2]. One should be careful in selecting the software by looking at the specified processor.

The study of Salmona and Kaczynski [6] enumerated the benefits of using CAQDAS. These are that functions that include: (1) data management tool supporting complex data triangulation; (2) building connections and relationships in the data (3) concurrent analysis of both old and new data; (4) assist the researcher to develop autonomous inductive insights; (5) more efficient to use in the long run, once over the learning hurdle; (6) resolving discrepancies in latter stages of analysis; (7) managing secure backups in multiple locations; and (8) ability to visualize and model data in different ways. In summary, most CAQDAS packages, if not all are user-friendly, provides convenience versus manual coding, increase reliability and trustworthiness in the data. In other words, it addresses the major needs of the analysts.

CRITICISMS, LIMITATIONS AND DISADVANTAGES OF USING CAQDAS

Despite of the wide array of complex and advanced functions of computer software that gave qualitative research a different reputation, a number of research articles (e.g., [3; 10]) evenly discussed both the advantages and limitations of such programs. Since some of the advantageous functions and features of CAQDAS have been discussed already, this section highlights the issues presented in the articles under review.

First, there is a huge volume of choices in what specific CAQDAS program to be used. One may see this as something advantageous on the part of the researchers because there are commercially available packages. But, with so many available programs, a researcher may have trouble in selecting which program to utilize and which analytic approach to choose among the varied functions of a software. In support to this, Gibbs and his colleagues [3] and Carvajal [9] contended that there is a need for standardize guidelines in what program to be used in storing and exchanging qualitative data and analyses.

Then, there are misconceptions about CAQDAS that the software itself can analyze. Researchers stressed that it can work efficiently in systematic data management; it can hold and organize large amount of texts, codes, memos, notes and so on [3]. When researchers do the manual transcriptions, coding and reading the lines one by one, they become overly familiar with their data. Some are actually skeptical about its use in doing the actual analysis of the data; whether they can really help in the interpretation or not [5]. Therefore, CAQDAS can only function on the mechanical aspects of doing qualitative data. The heart of qualitative analysis is the conceptual aspect, which can only be done by human researchers. As defined by Gibbs and colleagues [3], these refer to the reading of the text, interpreting it, creating code schemes, defining codes, and identifying fruitful searches and reports which need a human and cannot be done by any machine. Thus, they argued that CAQDAS can only analyze textual data. Hence, there is only little help from the software when it comes to the interpretation.

Also, the issue of ownership of the data is said to be at stake in using computer software. Gibbs and colleagues [3] said that there is a certain feeling of being distant from the data, hence, researchers using paper-based analysis felt closer to the words of the interviewees and their field notes than if computers were used in the study. Due to the added features in the computer applications, some get overwhelmed with the software and get distracted rather than focusing in the data for in-depth analysis [5]. As programs get more sophisticated, they become less connected to any analytic approach. Alarmingly, Cravajal [9] reported some researchers developed too much reliance of the software which prevented them in learning the fundamental skills in qualitative researches. This may lead to fracturing the data and losing its meaning [10].

In addition, some studies are presenting their research as valid and reliable on the basis of using a CAQDAS program as if using such add to the quality of their work. Wiedemann [8] stressed that there is no or little comprehension is computer software. Again, it is just a tool, a good qualitative analysis still relies on careful analytic human researcher. A close reading is necessary to discover important patterns and significant instances of insight [3]. The complex and advanced features of most CAQDAS do not directly give assurance of a more valid and reliable results. As a matter of fact, Schönfelder [2] refute the capacity of most programs to statistically compute qualitative data because in social constructivist perspective, ideas are presented in textual forms. Also in most cases, when CAQDAS was used, researchers do not report in detail to what extent it was used in their study [7].

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Another one is the accusation that most CAQDAS favor the use of the grounded theory methodology which presents an issue if the researchers are more oriented in using other framework such as narrative and phenomenological approaches [2, 5, 9]. Grounded theory requires finding interesting things in the data; noticing similar things and collecting them together; and finding patterns and relationships in the data [1]. Hence, majority of the CAQDAS functions are intended for pattern analysis based on simple codes that correspond to principles of grounded theory. On the same note, some researchers lament on the idea that the software itself builds the theory [10].

Gibbs and his colleagues [3] observed that CAQDAS lack full recognition from practitioners and authors of guidebooks in qualitative research. At most, there is only one chapter dedicated for computer applications and it was not discussed all throughout the guidebooks.

Likewise, familiarity and the technical capability with the software hinder researchers to use the software. The study of Salmona and Kaczynski [6] revealed that doctorate students were resistant in using the technology despite of the digital trend in the delivery of graduate level education. There are reasons why they choose to do it the traditional way. One of those is the lack of awareness in using the software, hence, the dissertation supervisors did not recommend the use of such. Along with the issue of familiarity, there are more concerns that confront the use of CAQDAS. Using any software requires time for familiarization and to develop the technical know-how. Novice researchers will have difficulty in using the software [5]. However, they are the same people who may easily be tempted to use CAQDAS [2]. The impression that CAQDAS may save time is not actually true. It will require more time to learn the software. Carvajal [9] found that most CAQDAS trainings are limited to one- to two-day workshops that are designed to teach basic skills which are not enough to acquire adequate capacity in using computer applications. More surprisingly, some are using the software without prior training. In line with these, some practitioners suggested to include subjects on CAQDAS in the curriculum among graduated degree courses [6] and to offer well-planned training workshops in teaching and learning the software [9]. On the other hand, some companies offer free webinars and in-person workshops and seminars [1] and online supplemental materials [7].

Another issue is the cost and commercialization. Procuring a licensed software will incur a considerable amount of money. Even in large universities, only few computers were installed with a kind of software. Alongside, with expansive commercialization of the computer software, some developers are already exceeding in conclusions on what can be derived from qualitative analysis. They actually invite potential users to utilize what they offer whether or not they are appropriate [2]. Similarly, software developers release new and updated versions after a short period of time. Because of this rapid pace, after purchasing a software, it will easily get outdated [7].

With all of these, there is still much debate about the degree to which CAQDAS can itself produce qualitative analysis or merely assist with its development by human researchers [3]. Without considering these aforementioned limitations and criticisms on CAQDAS, some of the intended nature and analytic depth of qualitative research may be threaten.

CONCLUSION AND RECOMMENDATION

Technology is the leading key player of majority of society's progress and development. The use of CAQDAS has already penetrated the way researchers deal with qualitative data and through this review, its impact has been revealed. There is a very expansive improvement in the way qualitative research analysis was done; from the traditional paper-and-pencil coding to the capacity of analyzing videos, audio and photographic data. Indeed, CAQDAS has introduced advantageous, easy, practical and efficient manner to deal with qualitative data.

However, the utilization of computer software packages in qualitative researches is still fairly new, so as learning CAQDAS functions and operations. In the Philippines, there were limited number of researchers conducted using CAQDAS, none of which have been reviewed in this paper. Evidently, authors have identified important issues and concerns in using computer software packages. In the desire to make qualitative research a speedy process, researchers must not sacrifice the trustworthiness, validity and reliability of their data. Not all agree to the advantages of CAQDAS, some remains to be ambivalent about the convenience it may bring. Whereas, for experts, CAQDAS is still an extra add on in the rigorous qualitative methodologies existing.

In conclusion, there can be no best CAQDAS for they generally have their downfalls. Some considerations whether to use a computer software or not should be addressed first by a researchers, especially among the novice one. Thus, the volume of

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the data, number of researchers, methodology to be used and familiarity with the technology and availability of the software shall not be taken for granted. Therefore, qualitative researchers should not just use something because it is available. Moreover, manual coding is still irreplaceable while technology will aid and help in the burdensome work of a qualitative researcher. The conceptual aspects of qualitative research remain to be the job to be done by a creative and analytic human researcher.

Through this article, qualitative researchers should take in consideration the critical points that had been examined by this paper in coming up with the decision to use a specific CAQDAS software or not or to use it as an aid to manual coding. Furthermore, software developers may look at the limitations and disadvantages of the use of the computer applications as pointed out in this article for innovating and improving their software applications to come up with a new version which can be more convenient to use but without sacrificing the "quality" of the qualitative data to be generated.

Since this article is only limited to 12 foreign journal articles spanning the years of 2002 to 2016, it is recommended for future researchers to review more journal articles covering a wider time frame and to feature and review more CAQDAS that came out just recently. Also, if deemed possible, it will also be noteworthy to delve on the use of CAQDAS in the Philippines and to include local research article.

REFERENCES

[1] Scales, B. J. (2013). Qualitative analysis of student assignments: A practical look at ATLAS.ti. *Reference Services Review*, *41*(1), 134-147. doi:10.1108/0090732

[2] Schönfelder, W. (2011). CAQDAS and qualitative syllogism logic—NVivo 8 and MAXQDA 10 compared. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, *12*(1).

[3] Gibbs, G. R.; Friese, S., & Mangabeira, W. C. (2002). The use of new technology in qualitative research: Introduction to Issue 3(2) of *FQS*. *Forum Qualitative Sozialforschung/ Forum: Qualitative Social Research*, *3*(2).

[4] Welsh, E. (2002). Dealing with data: Using NVivo in the qualitative data analysis process. *Forum Qualitative Sozialforschung/ Forum: Qualitative Social Research*, *3*(2).

[5] Rademaker, L. L., Grace, E. J., & Curda, S. K. (2012). Using computer-assisted qualitative data analysis sofware (CAQDAS) to re-examine traditionally analysed data: Expanding our understanding of the data and of ourselves as scholars. *The Qualitative Report*, *17*(43), 1-11.

[6] Salmona, M., & Kaczynski, D. (2016). Don't blame the software: Using qualitative data analysis software successfully in doctoral research. *Forum Qualitative Sozialforschung/ Forum: Qualitative Social Research*, *17*(3).

[7] Humble, Á. M. (2015). Review essay: Guidance in the world of computer-assisted qualitative data analysis software (CAQDAS) programs. *Forum Qualitative Sozialforschung/ Forum: Qualitative Social Research*, *16*(2).

[8] Wiedemann, G. (2013). Opening up to big data: Computer-assisted analysis of textual data in social sciences. *Forum Qualitative Sozialforschung/ Forum: Qualitative Social Research*, *14*(2).

[9] Carvajal, D. (2002). The artisan's tools: Critical issues when teaching and learning CAQDAS. *Forum Qualitative Sozialforschung/ Forum: Qualitative Social Research*, *3*(2).

[10] White, M. J., Judd, M. D., & Poliandri, S. (2012). Illumination with a dim bulb? What do social scientists learn by employing qualitative data analysis software in the service of multimethod designs? *Sociological Methodology*, *43*, 43-76. doi: 10.1177/0081175012461233.

[11] Hatani, F. (2015). Analyzing high-profile panel discussion on global health: An exploration with MAXQDA. *Forum Qualitative Sozialforschung /Forum: Qualitative Social Research*, *16*(1).

[12] Evers, J. C. (2016). Elaborating on thick analysis: About thoroughness and creativity in qualitative analysis. *Forum Qualitative Sozialforschung/ Forum: Qualitative Social Research*, *17*(1).

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