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Saturation in qualitative research: Considerations and limitations

Pratap Chandra Mandal
Indian Institute of Management, Shillong, Meghalaya, India

Abstract
Researchers have diverse opinions regarding the measurement of quality in qualitative research. Measurement of quality in qualitative research cannot be done as it is done in quantitative research. Nevertheless, researchers have proposed various frameworks which are available for the measurement of quality in qualitative research. One such important and somewhat neglected argument relates to the application of data saturation for the measurement of quality in qualitative research. While it developed originally from Grounded Theory, the meaning of data saturation has evolved and become transformed. Data saturation is increasingly accepted by researchers as a marker of quality and sample adequacy in qualitative research. In this article, various issues with the acceptance and application of saturation are discussed. Based on the arguments, it is proposed that the concept of saturation as a marker of quality in qualitative research needs to be applied with caution.

Keywords: data saturation, qualitative research, quality, transparency, sample adequacy

1. Introduction
Measurement of quality in qualitative research is a contentious issue. It is an important but difficult task. It is important because otherwise the quality of the research conducted would be questioned. It is difficult because there are no specific and well-defined yardsticks for the measurement of quality in qualitative research (Francis, Johnston, & Robertson, 2010) [6]. It is a contentious issue with diverse opinions. Also, various available frameworks within the evidence base aim at measuring quality of qualitative research. One important and somewhat neglected argument within this domain is the issue of data saturation. Different qualitative perspectives have different indices for quality assurance (Meyrick, 2006) [16]. One such index of quality assurance is saturation. Although the concept of saturation is important, some qualitative approaches do not rely on saturation as a marker for sample size adequacy and consequently, quality (Bowen, 2008) [2]. The concept of data saturation originally evolved with the development of Grounded Theory (Glaser & Strauss, 1967) [8]. The concept was later adopted for other qualitative research methods and termed as data saturation or thematic saturation. In qualitative research adequate sample size cannot be determined the way it is done in quantitative research. In those cases, data saturation is increasingly accepted and expected as a marker for sampling adequacy. Again, the concept of saturation and its plausibility need to be questioned, and its transferability across all qualitative approaches needs to be investigated (Tracy, 2010) [24]. Increasing emphasis is being placed on theoretical, thematic, and data saturation. So, the issue warrants further investigation.

2. Criteria for quality in qualitative research
Researchers have discussed a great deal about whether there should be generic criteria for measuring quality in qualitative research (Tracy, 2010; Caelli, Ray, & Mill, 2003; Mays & Pope, 2000) [24, 3, 15]. It is accepted by the researchers that the criteria for verifying quality in qualitative research is important (Barbour, 2001) [1]. But at the same time, researchers have agreed that there is no singular way to measure quality of qualitative research because the field of qualitative research is diverse and can be applied across different domains (Guba & Lincoln, 2005; Mays & Pope, 2000) [15]. For this reason, it is extremely difficult to develop criteria for measuring quality which might be applicable to all qualitative research approaches. Different qualitative research approaches follow different criteria. A unique criterion for measuring quality would not be able to address the wide range of methodologies adopted in qualitative research. Each type of methodology adopted might have its own quality criteria (Caelli *et al*., 2003) [3]. Researchers have emphasized that there is no unique way to measure the quality of qualitative research. This is because the field of qualitative research is quite diverse (Guba and Lincoln, 2005; Mays and Pope, 2000) [15]. It is argued, therefore, that it is problematic to attempt to develop a unique quality criterion which will be applicable to all qualitative approaches. A single criterion will fail to appreciate the wide range of methodologies that fall under the rubric of qualitative work. So, each approach should be evaluated against quality markers that are congruent with their epistemological origins and are specific to the particular approach under consideration (Caelli *et al*., 2003) [3].
There are areas regarding quality measurement in qualitative research which relate to all qualitative approaches (Tracy, 2010) [24], but those markers are less suitable for a blanket approach. One such aspect related to quality is the aspect of sampling adequacy in qualitative research. The adequate sample size for qualitative research cannot be determined as it is done with the help of statistical tools in quantitative research. In the absence of such markers in qualitative research, the concept of saturation seems to be a gold standard

for sampling adequacy in qualitative research (Guest, Bruce, & Johnson, 2006). But the problem with saturation lies in the fact that saturation has multiple meanings and limited transparency. It has already been mentioned above that saturation can be of various types – theoretical saturation, thematic saturation, and data saturation. Also, it is very difficult to ensure with certainty that saturation has actually been reached for a specific scenario. It depends entirely on the researcher to determine whether saturation has actually been achieved or not and the adequate sample size for reaching saturation. Based on the above arguments, it might be stated that the quality of qualitative research relates to a large extent on sampling adequacy based on saturation which should provide depth and maximum opportunity for transferability of findings (Spencer, Ritchie, & Lewis, 2003).

3. Sampling considerations in qualitative research

One major responsibility among researchers is the determination of the adequate sample size and whether the sample is representative of the population. Proper sampling is considered as one of the important issues for the success of any form of research (Tucket, 2004). In quantitative research, the adequate sample size is determined based on statistical tools. In qualitative research the determination of sample size cannot be done in that manner, because in qualitative research the emphasis is not on counting the number of opinions of people or whether they are representative of the entire population but to explore the range of opinions and the richness of the information gathered (Kuzel, 1992). In qualitative research, the number of participants required depends on the construct considered and the variety and the richness of the information provided by them (Gaskell, 2000). The collection of data through various qualitative research methods like depth interviews and focus groups is stopped once it is felt that no new information is being collected. Also, during the data collection process through depth interviews and focus groups, only those participants are selected who are able to add to the information already gathered from the previous participants. In qualitative studies, researchers try to ensure that all aspects about a specific phenomenon are taken care of. So, those participants are selected for further responses who can add to the known information. Those participants are also selected who can provide new and unexplored perspectives to a specific phenomenon. So, the two key considerations that guide the sampling methods in qualitative research are appropriateness and adequacy (Morse & Field, 1995). The researchers need to be flexible and practical in their approach and an adequate sample would be that which sufficiently answers the research questions and explores the phenomenon under consideration from all perspectives (Marshall, 1996).

From the above discussions it is evident that generalizability is not sought by qualitative researchers because each situation may require a unique approach which may not be extended to other approaches. The focus is also more on sample adequacy rather than merely on appropriate sample size (Bowen, 2008) [2]. Generalizability is linked to external validity of a study which asks the question: To what populations, settings, treatment variables, and measurement variables can the effect be generalized? (Guba and Lincoln, 2005). Sample adequacy refers to the sample size which ensures that all relevant information about a specific phenomenon is gathered (Guba and Lincoln, 2005). It has been argued by researchers that sample adequacy for qualitative research can be tested based on whether saturation has reached or not (Guest *et al*., 2006; Spencer *et al*., 2003). This means that the depth as well as the breadth of information is achieved. So, an in-depth understanding about the concept of saturation is required.

4. Concept of saturation

The concept of saturation evolved with Grounded Theory developed by Glaser and Strauss (1967) [8]. A category in the analysis based on Grounded Theory is considered "saturated" when no new information seems to emerge during coding or analysis of the data collected, that is, no new properties, dimensions, conditions, actions or interactions, or consequences are seen in the data. But it is a matter of degree. Upon closer inspection, however, if one looked long and hard enough, one always would find additional properties or dimensions. There always is the potential for something new to emerge. Saturation is more a matter of reaching a point in the research where collecting additional data seems counterproductive and the "new" information generated does not add much more to the information which has already been gathered (Corbin & Strauss, 1990) [4].

In theory building for qualitative research, the analyst aims for density. Density means that all the salient properties and dimensions of a category have been identified and explored, thereby building in variation, giving a category precision, and increasing the explanatory power of the theory (Bowen, 2008) [2]. Poorly developed categories usually become evident on analysis. This indicates that saturation has not reached and more data about that category need to be collected to fill in the dimensional gaps.

Filling in is done by looking for data that might have been overlooked. Filling in continues in an iterative fashion till the last phase of analysis. Even then, it is almost impossible to ensure that gaps are not there. Gaps will always be there. The problem is deciding when to let go. Not every detail can be well-developed or spelled out. Of course, large gaps should be filled in. A category should be sufficiently developed in terms of properties and dimensions to demonstrate its range of variability (Corbin & Strauss, 1990) [4].

The ultimate concern for determining whether or not to finalize the data-gathering process is theoretical saturation (Glaser & Strauss, 1967) [8]. It denotes that during analysis, no new properties and dimensions emerge from the data, and the analysis has accounted much of the variability. Once the theoretical scheme is outlined, the analyst is ready to refine the theory, trimming off excess and filling in poorly developed categories. Poorly developed categories are saturated through further theoretical sampling.

The process of attaining saturation has its limitations. There always are constraints of time, energy, resources, availability of participants, and other conditions that affect data collection and data analysis. These can impose limits on how much and what types of data are collected and analyzed. However, if the gathering and analysis of data is stopped before reaching theoretical saturation, then the theory might not be fully developed in terms of density and variation (Meyrick, 2006)

[16]. Sometimes, there is no choice and within the limits of various constraints the researcher must settle for a theoretical scheme that is less developed than desired.

5. History of saturation

The concept of saturation emerged with the development of Grounded Theory by Glaser and Strauss (1967) [4]. The saturation considered by them was called theoretical saturation. Other variations of the concept for other qualitative methods include data saturation (Francis, Johnston, & Robertson, 2010; Guest *et al*., 2006) [6], thematic saturation (Guest *et al*., 2006) and in some cases, simply saturation (Starks & Trinidad, 2007). The above terms have distinct meanings and are typically applied to all qualitative methods. Thematic or data saturation means that data need to be collected until nothing new is generated (Green & Thorogood, 2004). It is the point where there are no more emerging patterns in the data (Gaskell, 2000). This concept of saturation is quite different from theoretical saturation which is used in Grounded Theory. Grounded Theory is more concerned with the development of categories. The concept of theoretical saturation as applied in Grounded Theory has already been discussed in details in the previous section.

From the above discussion, it is evident that different meanings have been applied to saturation. But it is generally accepted that the concept of saturation is important and has significant influence over sampling adequacy in qualitative research. Again, it must be recognized that uniform acceptance of using one form of saturation as a quality marker has considerable drawbacks. The issue is discussed in the next section.

6. Quality and Transparency in qualitative research

Spencer *et al*. (2003) recognize that transparency in qualitative research is an important marker of quality. Transparency means that clear indication about each step in the process of data collection and data analysis needs to be mentioned (Meyrick, 2006) [16]. In qualitative research it is the depth of data which matters and not the number of participants. So, the samples should consist of participants who best represent the research topic, from whom the maximum amount of information can be generated, and who provide insights about different perspectives of a specific phenomenon (Morse, Barrett, & Mayan, 2002). One of the objectives of qualitative research is to have generalizability or transferability (Onwuegbuzie, 2003) which means that the research may be extended to other situations and contexts. So, to achieve this, the sample size needs to be large enough to capture a wide range of experiences. But again, the sample size should not also be so large that the data gathered from the participants become repetitive. For this reason, saturation becomes important (Mason, 2010). Although the concept of saturated samples act as an indicator of quality (Guest *et al*., 2006), at the same time transparency also needs to be ensured (Bowen, 2008) [2]. So, the process followed in reaching saturation also becomes important.

There are two areas of importance in relation to the need for guidance about saturation. First, for every research to be effective, it needs to have a proper planning and funding. Also, it has to follow the ethical norms. So, in some cases, research needs to specify the required sample size. The proposed sample size needs to be mentioned in the beginning. But it becomes quite difficult in case of qualitative research to comment on the adequate sample size in the beginning. The adequate sample size becomes evident only when the concept of saturation is applied on the data collection from participants and the analysis of the collected data. So, a priori estimations are inappropriate (Morse, 1995). Second, the expertise of an experienced qualitative researcher is required to realize that saturation has been reached (Bowen, 2008; Guest *et al*., 2006) [2]. Based on the above logic it becomes evident that unlike quantitative research, it is difficult to determine the appropriate sample size. Also, a lot of subjectivity is involved. This is the case because the knowledge, perception, and efficiency of researcher determine the quality of the study conducted. All these aspects are specific to a researcher and may vary from one researcher to another. This brings in subjectivity which makes it tougher to define the quality criteria. Again, there is no clear indicator to specify that saturation has actually reached. However, based on practical considerations, researchers often have to limit their investigations. They may have to stop gathering data from participants and analyzing them when resources become limited. So, quality often becomes driven by time, energy, and money, rather than sample adequacy and consequently, objectivity (Green & Thorogood, 2004).

The practical problems faced by a researcher need to be focused in details. It might be difficult for the researcher to search for participants who might contribute to the existing information. The participants might not be eager to respond to the depth which the researcher desires. The researchers also need to pay attention to both the length of interviews as well as the number of interviews (Onwuegbuzie & Leech, 2005). Length of an interview may have to be extended to reveal all the perspectives of the respondent about a specific phenomenon. On the other hand, if the interviews are too lengthy, then it may cause boredom to the participants. So, a researcher may have to comprise between the two conflicting requirements. Also, within the given time frame, it may sometimes be required to limit the number of interviews. Transparency about these limitations on reaching saturation does not necessarily invalidate the findings. If the researcher feels that saturation is not reached, this might simply mean that the phenomenon has not yet been fully explored. It does not necessarily mean that the findings are invalid (Morse, 1995). So, it is necessary that within the limitations of sampling adequacy, transparency be maintained. The researchers need to clearly indicate whether saturation was reached and how it was reached, how they ensured trustworthiness of the data and any other issues which they might have faced during the data collection and analysis process.

Researchers deploy saturation to ensure that all the different dimensions are taken into consideration. But this becomes difficult to ensure in reality because the number of emergent themes for a specific construct are potentially limitless. It depends to a large extent in the manner in which different perspectives to a specific phenomenon are viewed by the respondents (Green & Thorogood, 2004). More the number of perspectives, more should be the number of respondents to

validate the different perspectives, and consequently, more should be the number of interviews. This in turn makes it difficult to ensure that saturation is reached.

This section highlighted the importance of transparency in the process of conducting qualitative research. The documented research also suggests that achievement of quality is much more in-depth than merely achieving transparency of saturation. Achieving transparency is only one of the aspects which ensure quality of qualitative research. The researchers also need to clearly specify the other indicators of quality and the merits of the overall approach (Caelli *et al*., 2003) [3].

7. Expectations about saturation

Different data collection methods frame the sufficiency of data quantity in different ways and so it becomes questionable that whether saturation can be applied in all cases. Researchers have argued that more data do not necessarily lead to more information. Data collected needs to be pertinent and meaningful to extract useful information (Mason, 2010). It is also unethical to gather data from the participants and not to make use of the collected data. That much data should be collected which ensures that a specific phenomenon has been explored from all the possible perspectives (Francis *et al*., 2010). The aim is not to acquire a fixed number of respondents. Those many respondents should be interviewed based on which the researcher feels that sufficient depth of information is attained and the phenomenon being studied is explored and described properly (Fossey, Harvey, & McDermott, 2002). Also, various approaches frame research questions, sample participants and collect data differently in order to achieve richness and depth of information (Starks & Trinidad, 2007). So, attaining saturation will depend on the approach. Based on the above arguments, it might be emphasized that applying the concept of saturation as a marker of quality cannot be applied universally and rigidly in all cases.

8. Conclusion

It is evident that the concept of saturation is an important marker of quality in the field of qualitative research. Existing theories like Grounded Theory have provided clear indications about what constitutes saturation, and how to use and apply the concept of saturation. Researchers need to appreciate that saturation as a criterion for quality will differ depending on the approach being followed. The qualitative researchers need to follow those instructions and apply the concept of saturation specific to a particular approach and after becoming fully aware of the limitations of saturation as a marker of quality.

9. References

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