Saturation And Run Off: How Many Interviews Are Required In Qualitative Research?

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Abstract

Quantitative methodologists spend a great deal of time increasing the quality of their data collection and analysis approach. However, this is less the case in qualitative research. In fact, while the term 'saturation' is ubiquitous in the qualitative data collection approach, there are very few guidelines to teach the researcher when this 'saturation' occurs. Furthermore, should data collection stop when saturation is reached, presuming the researcher realises that said saturation has been reached? This paper answers three research questions regarding saturation and qualitative research methods.

Keywords: research methods; case studies; qualitative research; interviews; saturation; data run off

In qualitative research, saturation appears to be the criterion by which sample size are determined – when the collection method is collecting no new perspectives and insights. This article explores the notion of data saturation through examining one research project with three homogenous case studies. In Glaser and Strauss' seminal work, cited some 50, 000 times, saturation was defined as when:

> *"no additional data are being found whereby the (researcher) can develop properties of the category. As he (sic) sees similar instances over and over again, the researcher becomes empirically confident that a category is saturated ... when one category is saturated, nothing remains but to go on to new groups for data on other categories, and attempt to saturate these categories also"* (1967:65).

While Glaser and Strauss were referring to a particular type of saturation and 'grounded theory' specifically, the ideas are useful in guiding both inductive and deductive forms of research. While the notion of saturation is problematic for non-probability sampling techniques of interviewing the question of 'how many interviews' is ambiguous and, according to Saunders (2012, p283) "there are no rules". Morse (1995) notes that if saturation is not reached, it does not make the research findings invalid: rather, it simply means that the topic is not fully explored. What remains important is a transparent write up process. Still, it is the experience of researchers that is likely to pre-dispose them to a view that a minimum number of interviews are required regardless of any notion of saturation and that while a precise number is not likely, some numerical guidelines will support the organisational

researcher.   This is particularly important when organisations are being more selective in where resources are placed, making opportunities for research increasingly difficult. Unlike quantitative research where there are extensive debates and research projects designed to determine aspects of statistical analysis and statistical strength, placing quantities around the number of qualitative research methods has not been a strong research focus. While there are some papers starting to point towards what an appropriate sample size is (Morse, 2000; Guest et al, 2006; Kvale and Brinkman, 2004; Creswell, 2007), few of these contributions are focussed in the organisational research sphere.

The data used in this research were collected through interviews with managers and employees at three hotels. The key contribution of this paper is to examine the process of data analysis to provide an understanding of how (depending on interview type) and when (the number of interviews) saturation occurs in qualitative, organisational-based research. Two main areas were under investigation in the primary research project from which these data originated. Firstly, managerial strategies at a time of stress (around the Global Financial Crisis or GFC); and secondly, employment relations matters focussing on employee engagement for mutual gains. This article will intentionally avoid discussion of the research questions and findings of the original workplace-focussed research project as they are presented elsewhere (for example, Townsend 2013; Townsend, Wilkinson and Burgess 2013; Wilkinson, Townsend and Burgess, 2013).

This article answers research questions that have been developed from a review of the limited methodological research around the topic of 'how many' interviews are required in organisational based research projects to reach the point of data saturation. A final research question is answered which considers the benefits of data collection beyond the point of saturation. It is important to state early that this article is not an attempt to 'quantify qualitative' research, indeed Pratt (2008: 858) points out that this approach can create "the worst of all worlds". Rather, this article is designed to continue provide qualitative researchers with some meaningful guidance and to continue the useful scholarly discussions that are increasing the methodological credibility of qualitative research.

The Silence on Saturation

Qualitative research is "great" for understanding "how questions – rather than how many"; and for understanding a phenomena from the perspectives of those being studied (Pratt, 2009). While it is a common research method now, it was only in the 1970s that interviews became commonplace in social sciences and regularly appeared in organisational research (Cassell, 2009). Miles, writing in the 1970s argues that "qualitative data tend to overload the research badly at almost every point: the sheer range of phenomena to be observed, the recorded volume of notes; the time required for write up, coding, and analysis can all be overwhelming" (1979: 590). Times have changed and significant technological developments have occurred since then with digital recorders, ubiquitous desktop and notebook computers, transcription software (for example, Dragon Naturally Speaking), computer aided qualitative data analysis software (CAQDAS, for example, NVivo) all designed to support the qualitative researcher, so it is surprising that we are not further advanced in determining the volumes of data required for increasing validity in qualitative studies. The process of qualitative research through interviewing is challenging enough, not knowing how long to continue the process makes it even more challenging.

Furthermore, if software analysis is being used on *a priori*, theoretically driven codes in a qualitative study, how much credence does the researcher need to place on the notion of coding coverage of *a priori* codes, compared with the notion of data saturation? Hence, a research question have been developed in an attempt to differentiate coding coverage (RQ1) from the key research question on data saturation (the focus of RQ2):

> *RQ1:   How many interviews are required to complete coding coverage within a heterogeneous sample?*

In qualitative research, sample selection has a significant effect on the ultimate quality of the research (Coyne, 1997; Saunders, 2012). Researchers have been criticized for not describing their sampling strategies in sufficient detail, which makes interpretation of findings difficult (Kitson et al. 1982). While qualitative research has been criticised in certain quarters, the value of this research over time

is undeniable (Cassell and Symons, 2007). The purpose of qualitative research in the workplace or organisational realm is to link events and meanings during the construction of a social reality (Van Maanen, 1998: xxi). This is not easy, indeed Gephart (2004:460) describes the process as "extremely challenging". Graves (2002: 169) notes that a "lack of widespread agreement" among interviewees means that it is very difficult to present the "correct" experience. One quote might sum up superbly a researcher's theme, but standing alone it is only an opinion. Buried within a weight of supporting evidence, this quote becomes useable data. Richer data allows for greater insight and more strength in the conclusions drawn (Bachiochi and Weiner, 2004).

Cassell (2009) explains that there are very few articles published on interviews in organisational research. Patton (2002) explains that sample size differs around what the focus of the research is, what will have credibility, and what resources are available. Saunders (2012) explains that the key texts recommend continuing data collection until there is saturation is problematic as it is often necessary to have an idea of the number of participants likely to be involved at the start of the project. Certainly, practitioners allowing access expect to know how much of their organisation's resources are being shifted to the data collection process (McDonald et al, 2009).

Research methods textbooks rarely tell the researcher more than to continue data collection until the point of saturation is reached, Saunders et al, (2012) being an exception. Guest et al (2006: 65) note that while *theoretical saturation* is the most commonly used term in published works, the meaning is "diffuse and vague". O'Reilly and Parker (2012) point out that there is published referenced to different forms of saturation, including data saturation (see Francis et al, 2010); thematic saturation (see Guest et al 2006); and that some work simply refers to 'saturation' (see Starks and Trinidad, 2007). Many, including Guest et al, (2006) refer to a "general notion of saturation" where the researcher will keep interviewing until few new pieces of information or new themes arise. This article will adopt the same approach to the notion of saturation that Guest et al used. These authors go on to demonstrate through a review of papers that very few papers provide the readers with an explicit

explanation as to why the number of interviews were performed – a methodological reporting flaw in much qualitative research.

A key component of sample size is the 'depth' of data rather than the frequencies, so participants should be well placed to represent the research topic (O'Reilly and Parker, 2012). Cresswell (2007) suggests that a heterogeneous population would require between 25 and 30 interviews, and semi-structured/in-depth interviews require a minimum sample size of between 5 and 25 according to (Kuzel, 1992 cited in Saunders, 2012; and Cresswell, 2007). Saunders (2012) makes some attempt to guide the researchers with a tabulation of this research, whilst noting that the research area on quantifying saturation point is thin. The implications for qualitative researchers in the organisational setting are important. Rarely are researchers given unfettered access to organisational resources, particularly the 'human resources'. So from the theoretical standpoint, the depth of data becomes irrelevant if the practical obstacles are too significant to overcome. By strengthening our knowledge around the number of interviews required, we can better establish our research projects at the time of funding applications, project design, and negotiating entry (as McDonald et al, 2009) point out, a critical point of success or failure in data collection.

Based on this review of the scant literature that points a qualitative researcher towards understanding when the point of saturation is 'likely' to be reached, the following research questions have been developed.

RQ3: How many interviews are required to reach saturation within a heterogeneous sample?

In an editorial of the journal *Qualitative Health Research*, Morse (2000) makes the very good point that there are many factors to consider in determining sample size of qualitative research projects, including: the scope of the study; the nature of the topic; the quality of the data; and the study design. Within this list the quality of data deserves further mention. If we were to use the analogy comparing rainfall to the data collected, the heaviness of the rain (quality of the data) determines how long it takes for the ground to become saturated (reaching data saturation). But the rain does not stop

necessarily when the ground is saturated, nor should data collection stop necessarily when the point of saturation is reached. As the rain continues to fall, the 'run off' fills the rivers and streams and contributes to the broader eco-system. Collecting additional data, or 'run off' after the point of saturation improves the point of intersection between the quantity and quality of the data assisting the researcher to provide richer insights in to their topics. However, as the rain continues, run off can become problematic – so too can spending too much time in the field collecting more and more data. Hence, RQ5 provides a new contribution to begin a line of enquiry for future research:

> *RQ5: What are the benefits of performing interviews past the point of saturation and collecting 'run off'?*

Research methods

Sampling and Study Population

Our research was designed to understand how managers and employees worked together for mutual gains in both union and non-union workplaces in Australia. A coincidence of timing meant that data were collected immediately after the worst of the 2008-2009 GFC. Hence, between applying for funding and beginning data collection the researchers had already evolved from one primary research objective to two primary research questions. They were: How do 4 and 5 star hotels deal with employee voice for mutual gains?; and how did managers of 4 and 5 star hotels deal with the GFC (and what impact did this have on employees?)

The sampling strategy revolved around an information-oriented selection to maximise the utility of information collected. The choice of hotels was to have strong comparative power. The data collection sites were similar in size and all high-end luxury hotels. Furthermore, they operated in the same city (hence, the same labour markets), and served the same product market (corporate orientation). Research was completed one case at a time, and all three cases were completed within six months beginning in mid-2010. Each of the hotels had a virtually identical organisational structure consisting of a food and beverage department, front office staff, a housekeeping department, and administrative workers. Based on these factors, our three hotels were very homogeneous and we

expected strong comparative power. With that decision made, the research team did not seek saturation in each case separately.

After access was agreed through the HR manager of each hotel, we requested formal interview time with the general manager; the human resource manager; the department manager of the four departments; and at least four employees from each department. This would provide a heterogeneous sample of 22 interviewees from each hotel. We did not quite reach this goal of scheduled interviews. Two interview schedules were designed, one for managers and one for employees. Some comparative hotel and interview participant information is presented in Table 1.

INSERT TABLE ONE ABOUT HERE

A thorough examination of existing, disciplinary specific research led to the experienced research team to develop a set of codes for data. These theoretically derived codes were from the broad human resources and industrial relations literature around our primary research questions. A codebook was developed with the codes, a brief definition of what the code meant to remind the analyst how it had been used in the past interviews, and an explanation of when the codes might have some overlap, how they should be used. The primary interviewer completed the coding for the first ten interviews adding more codes as matters became apparent. While 18 codes were initially used, after ten interviews 21 codes existed. From here, a research assistant was employed to code the remainder of the data. The research assistant was trained to understand and effectively use the coding system. After the research assistant had completed five interviews, the primary interviewer reviewed the coding. While there was a moderately high level of consistency, the team refined the coding to be more nuanced as the coder demonstrated a tendency to include long coding zones or 'clumping', a problem associated with inexperience. A second review of the research assistant's coding led to a much higher correlation of coding agreement. Furthermore, the research assistant in collaboration with the lead researcher reassessed the coding system and introduced a hierarchical system of coding whereby the broad topics now had more precise sub-themes. As a result of this process, 10 primary codes remained, with some

28 subsidiary coding labels for a complete list of 38 codes. For example, the Node 'employee voice' evolved to have sub-themes including: department meetings; consultation; union; informal voice; and others. In this paper, these 38 codes will be referred to as the 'initial codes'.[1] At this point, all interviews were recoded with the consistent set of initial codes.

Progressively, we realised that some codes did not hold the relevance we initially thought. Hence, the research protocol became more refined for the field interviews and the codes were removed from the analysis of cases 2 and 3, but additionally, cases 2 and 3 had specific matters that warranted additional coding. Hence, case 1 had 38 codes, case 2 had 35 codes, and case 3 had 28 codes. In each case, three codes were solely reserved for employee specific questions.

Analysing and assessing 'the number' of interviews required

RQ1: How many interviews are required to complete coding coverage within a heterogeneous sample?

Analysing the three samples individually, then as one data set provides important insight. Firstly, in case one, complete coverage occurred after eight interviews, that is, the six manager interviews and just two employee interviews. Intuitively, the experienced researcher would realise that two additional interviews, a heterogeneous sample does not make! So looking at how many employee interviews it took to reach coding coverage for both managers and employees, the result was twelve in case one, ten in case two, and twelve in case three. There are explainable reasons for the differences as throughout the first case, the research team engaged in the process of data collection, analysis to find patterns, linking findings to theory, developing more focussed research questions and collecting more data. Additionally, there were case specific codes and case one became an anchor point to which all other cases became comparators. Although the process of collection, analysis, and focussing continued through all cases, we were unable to re-enter the cases after the initial data collection was complete. The third case demonstrated some site-specific differences uncovered in the first interviews

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[1] Some demographic codes have been excluded from this analysis, for example, length of tenure, union membership, age, sex.

which led to a longer time before some of the coding topics were discussed. While each case required ten or more interviews from a heterogeneous sample to cover our coding areas, only a small number of site specific codes were raised in case two and three. If it was only coverage of coding sought with both managerial and employee perspectives, this would have been achieved after twelve interviews – six manager interviews and six employee interviews in case 1 (see table 3). However, continuing to collect data in three cases allows for greater levels of generalisation to theory than had the researchers stopped at one case.

It must be noted here that the coding saturation will not only be influenced by two key elements of research design. Firstly, the 'type' of interview being performed (i.e. formal, structured interviews would likely reaching coding saturation earlier than informal, or semi-structured interviews). Secondly, coding coverage might be entirely driven by the *a priori* codes that are being used. For example, twelve broad codes that match twelve questions on an interview schedule will reach saturation long before the 38 primary codes used in this semi-structured interview process.

INSERT TABLE TWO ABOUT HERE

RQ2: How many interviews are required to reach saturation within a heterogeneous sample? Data saturation, in the sense that no new codes were developed, was not reached in case 1 or case 2 because until the final interview, new codes were being developed. However, in case 3 no new codes were included after interview number five. Cumulatively, data reached saturation point in a heterogeneous sample after 43 interviews in total. However, these figures should be met with some caution and potential explanations presented. As figure one demonstrates, patterns emerged and new areas of investigation continued throughout the process of preliminary analysis. Furthermore, as previously noted, saturation is likely to be reached earlier in structured interviews than in semi-structured interviews such as used in this project.

If it were possible to track only the data pertaining to the initial research questions, the point of saturation would have been reached long before the 43 interviews. Nevertheless, saturation at the

point of 43 interviews is well short of the total number of 55 interviews used in this project. Additionally, eight of the ten final codes included were of limited value and did not contribute to answering any of the project's research questions. If we were to exclude these eight codes due to the diminished level of return, then our data saturation point for a heterogeneous sample is at 33 interviews. Creswell (2007) suggests up to thirty interviews are required and the semi-structured nature of interviews is given as a factor in this project, 33 interviews by an experienced researcher with a heterogeneous group seems consistent. Based on reaching coding coverage of twelve interviews with a heterogeneous sample significant data was collected between here and interview 33 that could be considered run off. Many data collected between number 33 and interview number 43 could be considered superfluous to data saturation, but certainly all interviews between the absolute end of new codes regardless of their eventual use, number 43, and the last interview, number 55 would be considered run off.

> *RQ5: What are the benefits of performing interviews past the point of saturation and collecting 'run off'?*

What has become clear throughout the course of this analysis is that there are different points at which qualitative researchers need to reach in the data collection process. They are firstly, coverage of coding; secondly, data saturation; and a third, the rarely discussed stage of data run-off. Reaching the coverage of data coding is reliant, in part, by the volume of *a priori* codes being used and the type of interview schedule. Data saturation is reached at different points based on whether an homogenous or heterogeneous sample is used; whether an iterative, or convergent form of data collection and analysis occurs as was the case in this project.

While the coverage of coding was reached at twelve interviews, data saturation occurred much later. While 33 interviews met the 'value-added' point of saturation, and 43 interviews demonstrated complete saturation. However, in each of the research publications that stemmed from this data collection process, insights from the final interviews – numbers 43 through to 55 have been used. The insights from the informants were not new, but they did illuminate our research findings in a useful manner. At this point it was no longer important to get new codes, but important to get new quotes.

Qualitative research survives on the richness of the data collected, and sometimes it is in the researcher's best interest to complete *just a few more* interviews even after the point of data saturation to capture the 'run off'. When qualitative researchers are searching for data to either progress theory development or that has clear implications for practitioners then additional interviews may just provide the quotable gems that illuminate their cases. Townsend and Burgess (2009) refer to the 'serendipity' of research opportunities – that being in the field often leads to unexpected opportunities, these opportunities certainly increase with time in the field. There can be a direct relationship between time spent in the field, the rapport developed with interviewees, and the quantity and quality of data collected. But no research is perfect and resources dictate that data collection treads the fine line between validity and pragmatism.

Discussion

Research methods in any of the social sciences are far from exact and full of compromises and pragmatism. This paper has analysed three sets of organisational based research data and demonstrated that, while using an experienced interviewer, coverage of theoretically derived *a priori* codes can occur quite quickly. Data saturation will take longer to be reached and this is more so the case when informal interviews are performed. However, while offering some guidelines to researchers, caution is suggested from using these figures as more than a heuristic device to be tested elsewhere. The data that are collected after the point of saturation can still be very useful to the qualitative researcher. This run-off data can still provide the rich quotes sought by the interviewer to elucidate the matter at hand – the run-off can lead to greater levels of researcher awareness of the issues under investigation. If we were to compare this to quantitative studies, there are clear guidelines about the number of responses required to achieve statistical significance in survey analysis. Consideration of research costs and benefits will occur, but should only occur after the point that saturation has been reached and run-off is occurring. Computer based software is allowing qualitative researchers to increasing the credibility, transferability, dependability and confirmability of their analysis. However, qualitative researchers must demonstrate this rigour through describing how they perform their research in more detail in publications. It would be worthy of future research to

understand the content of qualitative methods write-ups as well as testing for saturation and benefits of run-off to enhance the success of qualitative research projects and influence. We must be careful as qualitative researchers that we continue to capitalise on our strengths – the richness of our data. While this paper has quantified data collection through an semi-structured interview guide for organisation-based, qualitative researchers these numbers must be considered guidelines, not rules.

Conclusion

In summary, coding coverage of *a priori* codes is important; reaching a point of data saturation is important; however, completing enough interviews for adequate levels of run-off allows the qualitative researcher to select the quotes that best illuminate the matter under observation. This paper has suggested that researchers must recognise three key points in the data collection process in qualitative, interview-based research. When *a priori* codes are being used then coding coverage is an important first step and will occur at different stages depending on the number of codes, the type of interview and the skills of the interviewer. In this project, coverage was met by 12 interviews.

The next critical point in data collection is saturation. Data saturation was reached at 33 interviews, consistent with views presented in previous research. This paper has made a valuable contribution in the understanding of 'run off' for the qualitative researcher. Qualitative research survives and thrives on the volume of quality data. It is in the best interests of the researchers to go past the point of saturation because some of the data run off that occurs from this point can be valuable in illuminating the topic under consideration and analysis.

Acknowledgements

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Table 1: Organisation and Interview Descriptive Information.

	Case 1	Case 2	Case 3
Size	275 Rooms	300 Rooms	200 Rooms
Number of employees (full-time equivalent)	150	250	125
Market orientation	Primarily Corporate	Primarily Corporate	Primarily Corporate
Number of managerial interviews (including line managers)	10	8	7
Number of line staff interviews	11	9	10
Total number of interviews	21	17	17

Table 2: Coding Coverage for Heterogeneous Interviews

	Total Coding Coverage			Coded for First Time		
	Case 1	Case 2	Case 3	Case 1	Case 2	Case 3
Interview 1:	23*	20*	22*	23*	20*	22*
Interview 2:	19*	18*	16*	5*	3*	1*
Interview 3:	20*	18*	10*	3*	5*	0*
Interview 4:	15*	18*	11*	1*	1*	0*
Interview 5:	18*	17*	12	1*	3*	1
Interview 6:	18*	12*	11	2*	0*	2
Interview 7:	17	18*	13*	2	0*	0*
Interview 8:	17	13	14	0	2	0
Interview 9:	14*	12*	15	0*	0*	2
Interview 10:	17	15	12	0	1	0
Interview 11:	15*	16	12	0*	0	0
Interview 12:	12	13	7*	1	0	1*
Interview 13:	16	12	12*	0	0	0*
Interview 14:	15	13	10	0	0	0
Interview 15:	16	12	12	0	0	0
Interview 16:	18*	11	12	0*	0	0
Interview 17:	17	6	13	0	0	0
Interview 18:	16*			0*		
Interview 19:	16			0		
Interview 20:	13			0		
Interview 21:	17*			0*		

* indicates manager interview