

# What are the minimum requirements of numbers used in a good case study?

## A scientific article

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### ABSTRACT

**Purpose** – This article aims to investigate data collection methods in order to answer what the minimum requirement of numbers in a good case study is. In order to find out the requirement of numbers a deeper literature review is made to find out how to collect the numbers.

**Design/Methodology/Approach** – After the introduction, the methodology describes how the sources to this article were collected through the use of databases. The literature review describes case studies, data collection methods and examples of case studies where a quantitative research has been made.

**Findings** – The findings states that there is no predetermined minimum requirement of numbers used in a good case study. The importance lies in being a good researcher and the researchers own competence.

**Practical implication** – An implication is that there are few articles published yearly with case study as a main subject.

**Originality/Value** – This article can provide a valuable conclusion that there is no minimum requirements of numbers in case studies, therefore the researcher do not have to follow any other requirements regarding numbers when collection data and writing a case study.

**Paper type** – Literature review

**Key words:** case study, data collection methods and quantitative analysis

## 1. Introduction

According to Yin (1994) a *case study* is one of several ways of doing social science research. When “how” and “why” questions are being posed, case studies are the preferred strategy. The investigator has little control over events and the focus is on a contemporary phenomenon within some real-life context. It is especially useful when boundaries between the phenomenon and its context are not clearly evident. Knowledge in the subject that is being investigated is often completely or partly missing, hence the case study research. Therefore the definition could be “an intensive study of a single unit for the purpose of understanding a larger class of (similar) units (Gerring, 2004). Case studies are usually based upon quantitative evidence but today qualitative data are also acknowledged. That is why multiple sources of evidence are being used (Fridlund, 1996; Gustavsson, 2003).

Gustavsson (2003) mentions that there are five steps to a case study research. First, there is planning and structure of the case study. Second, there is the literature review that includes data collection, analysis and an understanding between the literature review and the theory. Third, the assessment of quality, report writing and last the communication.

The noun *number* has a lot of definitions, but among all these the essence is that number is a sum of units and a word, symbol, letter or combination of symbols representing a number (Merriam-Webster, 2016).

Most case studies have at least a few charts and/or figures that illustrate the problem and/or give relevant background information (Solberg Sjøilen, 2006).

In order to use numbers in a good case study you need to collect data, the definition of data collection is “the collection of data from surveys, or from independent or networked locations via data capture, data entry or data logging” (WebFinance Inc, 2016).

The purpose for this scientific article is to study different types of data collection methods and then see if there is a connection between the amounts of numbers used in different case studies. Different fields of studies, the amount of numbers used and the results made from these variables will be studied and examined.

## 2. Methodology

This scientific article will use qualitative methods to answer the above-proposed question but will look at different quantitative methods in different case studies, books, websites and other scientific articles. The focus will be on data collection methods and numbers and how they are used in case studies.

The data for this scientific article have been collected through research within the subject given with the aim of answering the above question. The search words that have been used are “case”, “study”, “quantitative”, “methods” and “data collection”.

The scientific articles that have been used in this scientific article have been found through the use of databases such as Web of Science, Scopus, Sage and Google scholars. All these databases have been found via Halmstad University's website, more precisely via Halmstad University's library Internet catalogue. Through the library portal you have access to all the databases. The use of each one has been simultaneously to be able to compare and to get a deeper understanding of the researched question or definition. Three case studies have been used to see what field of study they have conducted their research in, their data collection method, numbers used and their results. New definitions will appear from these case studies, therefore a brief definition is stated within the literature review.

### **2.1 Secondary sources**

Secondary sources are material that have been collected and compiled previously for another purpose (Andersson, Christensen, Engdahl & Haglund, 2001). All of the following sources that have been collected and used for this scientific article are solely secondary sources.

### **2.2 Criticism of sources – secondary resources**

Due to the fact that this scientific article and the following literature review will only be based upon secondary resources it is necessary to take into account criticism of sources. The use of secondary resources comes with a numerous of weaknesses such as the quality of the research may be poor, there is a possibility that the information is incomplete and not in time with the current context or not specific enough to satisfy the researchers needs (Trueman, 2015).

### **2.3 Criticism of sources – books**

A multiple of the sources for this scientific article are books. The majority of the books that have been used to be able to write this scientific article are rather old. This means that some of the information may or may not be relevant today. However, only facts have been collected from these books but still some fact, methods or theories may have changed over time. Also, it is possible that the writers have put some of their own opinions in these books, which have to be considered.

## **3. Literature review**

### **3.1 Case studies**

Case studies are a pedagogical tool with the intent of giving background material for a discussion regarding a practical problem. They are often used, but not only, in situations that are socially complex and where it is difficult, if not impossible, to find a real correct solution. Therefore case studies can be used to practice problem solving and decision making (Wassermann, 1994). Consequently there are a lot of case studies

in areas of research such as business ethics, strategy and environmental studies. In all of these areas all individuals have different opinions that makes them socially complex areas (Solberg Sjøilen, 2006).

A case study can either be reported as a single case and usually it focuses intensively on a single case, or as a compilation of a series of cases, a so called case study research (Collin, Gerring & Mahoney, 2016). A series of cases studies more then one case contrary to a single case that only studies one case (Elman, Gerring, Mahoney, 2016; Fridlund, 1996). There are also mini-cases that normally cover just half a page, usually found in textbooks opposite from full length cases that can somewhere between five to fifteen pages (Solberg Sjøilen, 2006).

When you do a study it is important to limit the research, it is essential to accept the fact that everything cannot be done and covered. Otherwise the chances are that the information given is diffuse and irrelevant which consequently leads to the fact that you do not know how to continue the process and the research (Merriam, 1994).

Case studies have an important purpose of producing hypothesis and building theory (Kohlbacher, 2006).

### **3.2 Data collection methods**

In case studies different types of data collection methods can be used depending on the current research perspective. The researcher for a case study either accompanies or participates in a chain of events. The study can either be large or small when it comes to time and extent. Case studies “move-in-time”, it means it moves through all three dimensions of time – the past, the present and the future. During the case study the present becomes the past and the future becomes the present. Through case studies it becomes possible to get an insight in unexpected relationships that previously have been unclear or have been perceived different (Olsson & Sørensen, 2011).

Who, what and where questions can be researched through interviews, documents and surveys. But since case studies are supposed to answer how and why questions the research needs to be more detailed and deeper. So, in contrast to surveys, the number of units that is being studied in a case study is many less than in a survey. Contrary to an experiment the case study researcher has less control over the variables than if the experiment were used to investigate a situation. When you do a survey the data collected can come from a number of organizations and therefore be generalized of all the organizations of the same type. However, in a comparative case study that includes a number of organizations, the key is to replicate or compare the studied organizations to each other in a systematic way. This helps the exploration of different research issues (Ghauri, Gronhaug, Kristianslund, 1995; Gomm, Hammersley & Foster, 2000; Hamel, 1993).

Data collection, and especially the execution of a good case study, greatly depends on the researchers own competence. The one that is responsible for undertaking the data collection needs to be able to ask good questions, listen and interpret the answers they are being given and to do so they need to have a great knowledge of the question and proposition of the case study in mind. The researcher should follow a case study protocol when the data is being collected (Rowley, 2002).

**TABLE 1.** Case study protocol (Rowley, 2002)

1	An overview of the case study project
2	Field procedures
3	Case study questions

First, it is crucial for the researcher to have an overview of the case study project. Second, when the researcher do the necessary field procedures it is vital to use diverse sources of information and suitably arrange access to these sources. And thirdly, the case study questions that the researchers need to keep in mind when they are collecting the data for future analysis (Rowley, 2002).

### 3.2.1 Interviews

The most common way of interviewing is the semistructured interview. It means that the questions are predetermined. However, the interviewer may ask further questions for clarification. First step is to decide whom to interview, it should be a person who will dedicate time to being interviewed. Second, start by explaining the purpose of the interview. Third step is to decide how many interviews that needs to be done, if only one interview is being conducted you should stop when the desired data is collected. The place where the interview is supposed to take place has to be selected and the questions to be asked needs to be decided. Put time into question formation and write down the questions beforehand. Lastly you need to consider how the data will be collected. For example, tape record the interview, take notes or listen only (Griffiee, 2005).

The interviews can either be face-to-face interviews, a telephone interview or an audio-computer assisted self-interview (A-CASI). Face-to-face interviews

Conducting a telephone interview is usually seen as appropriate only for structured interviews (Fontana and Frey, 1994), short (Harvey, 1988) or in specific situations (Rubin and Rubin, 1995). Sensitive topics may be preferable for respondents to discuss on telephone then at a face-to-face interview due to the relative anonymity. However, it depends of the sensitivity, if the topics are emotionally painful it can be an advantage having a face-to-face interview. But, if the topics are regarding something embarrassing it can be better with a telephone interview (Hanrahan & Sturges, 2004)

A-CASI is a potential method for reducing under-reporting of sensitive behaviors. The respondent no longer needs to reveal sensitive information directly to a human interviewer, and the respondent does not need to be literate. Using A-CASI as data collection means that the respondent listens to pre-recorded questions, they then respond thru earphones that are connected to a computer. At the same time the text is displayed on a computer screen. The responses are completely private and the respondents do it all alone (Arasteh, Friedman, Jarlais, Perlis & Turner, 2004).

### 3.2.2 Questionnaires

The uses of questionnaires are one of the most common ways of collecting data. There is a lot of effort that goes into creating a good questionnaire that you can use when researching in areas such as business, social science or management. Research questionnaires can be distributed through a series of different ways, as an online questionnaire, face-to-face by hand, e-mail or through post. The questions that the respondents may be asked to answer could be about their attitudes, experiences, beliefs or facts such as their salary or age. One of the main advantages of using questionnaires as a data collection method is that you make contact and are able to gather responses from a large number of people from a lot of different places. However, when using this method it is important to consider whom to include in the survey (Rowley, 2014).

### 3.3 Quantitative case studies - three examples

Beerli and Martín (2004) did a quantitative case study of Lanzarote, Spain with focus on tourist characteristics and the perceived image of tourist destinations. Their methodology consisted of 616 tourists in Lanzarote that did a survey of a structured questionnaire. The data was collected at Lanzarote Airport and a system of quotas was made to be certain of that proportional allocation of tourists in each of every dimension such as gender, nationality and age. Beerli and Martín (2004) had seven hypotheses about the influence of personal factors on perceived image in the beginning of their case study.

	<b>Hypotheses</b>	<b>Result</b>
<b>H1</b>	The tourists' country of origin significantly influences the perceptual/cognitive and affective components of the perceived image of the tourist destination.	Confirmed
<b>H2</b>	The tourists' social class significantly influences the perceptual/cognitive and affective components of the perceived image of the tourist destination.	Confirmed

<b>H3</b>	The tourists' motivations, taken to be the advantages sought on the vacation, significantly influence the affective component of the perceived image of the tourist destination.	Partially confirmed
<b>H4</b>	The tourists' previous experience of making leisure trips significantly influences the perceptual/cognitive and affective components of the perceived image of the tourist destination.	Partially sustained
<b>H5</b>	The tourists' gender (male/female) significantly influences the perceptual/cognitive and affective components of the perceived image of the tourist destination.	Partly supported
<b>H6</b>	The tourists' age significantly influences the perceptual/cognitive and affective components of the perceived image of the tourist destination.	Partially confirmed
<b>H7</b>	The tourists' level of education significantly influences the perceptual/cognitive and affective components of the perceived image of tourist destination.	Confirmed

(Beerli & Martín, 2004)

Flores and Horn (2009) did a quantitative case study where they researched college persistence among undocumented students at the University of Texas in Austin, Texas. In 2001 the Texas House Bill 1403 was passed, is the first in-state resident tuition (ISRT) policy that benefited students that were undocumented. The data was collected through a unique longitudinal dataset that was provided by the University of Texas. This particular dataset provided information about admission, enrollment and course-taking information over a 10-year period. To measure the persistence behavior of the participants a Cox proportional hazard regression analysis were used. This regression analysis is the most popular regression techniques for survival analysis, it is used to relate several exposures or risk factors considered simultaneously to survival time (LaMorte, 2016).

The selection of participants was all students that were admitted and enrolled as freshmen in fall 2004 regardless if they were qualified for a ISRT or not. 6,818 students were enrolled as freshmen in 2004, however they only compared two groups consisting of 102 students that were eligible for a ISRT and 1,148 students that were self-identified as Latinos. Both of these groups are included in the full group of the 6,818 admitted students.

Results showed that 9% of the non-ISRT student graduated within four years in comparison to 11% of ISRT students. 69% of all students enrolled as freshmen in fall 2014 were also enrolled the last semester. The Cox proportional hazard regression analysis showed that a larger proportion of the students that were eligible for ISRT were also enrolled in all semesters that this study covered. Regarding survival

functions that were only a 1% gap between the two groups (non-ISRT and ISRT-student (Flores & Horn, 2009).

Baraldi, Gregori, Perna and Runfola (2016) conducted an extensive quantitative statistical analysis covering all the case studies that have been published in 10 years between 2002 and 2011 in 20 scientifically leading U.S. and European journals. Among all of the researched items, they researched number of authors, number of cases (single vs. multiple), data collection and number of interviews. The results were compiled with a correlation analysis. 25 % of all the published articles covered cases between four and ten. But, a great deal of articles used less than four cases. Eisenhardt (1989) recommend the number of case studies used in articles is between four and ten.

Baraldi et al., (2016) found that there were 352 case studies published from a total amount of 9596 published material from the examined journals. 150 articles (43%) did not state the number of interviews that had been done, and 175 (50%) did not mention the period when the data was collected. 77,6 % of the articles used interviews as their method to collect the data for their researched case study.

#### **4. Analysis**

When deciding how many numbers to use in a good study it is important to first decide which data collection method to use, and to determine which research perspective the case study should be focused on. In regards to the amount of data collection methods that can be used it is of more importance to find out which method is appropriate to use in each case study (Olsson & Sörensen, 2011). Also, the execution of a good case study greatly depends on the researchers own competence when it comes to data collection. The person in charges of undertaking the data needs to follow the case study protocol. It is necessary to decide who to interview and be able to know how many interview needs to be done and when the data desired is collected (Griffiee, 2005; Rowley, 2002). Also, the method for collecting the data could be through questionnaires, and the researcher need to be prepared that it goes in a lot of effort in order to design a good questionnaire (Rowley, 2014).

In Beerli and Martíns (2004) quantitative case study they used questionnaires in order to successfully collect their data. In beforehand they stated seven hypotheses, which is an important purpose when undertaking a case study (Kohlbacher, 2006). They could easily compile the data and draw conclusions and do an analysis from it. They had 616 respondents. Flores and Horn (2009) used the dataset from the University of Texas in order to collect their data, in other words they used already previously compiled data, a secondary source. And the focus was on 1250 students.

And in Beraldi et al., (2016) research they focused on 352 case studies out of a total amount of 9596 published articles from a 10-year period.

From these three examples of quantitative case studies the amount of numbers are different depending on what the research is about and which area of research that is being conducted. Flores and Horn (2009) had the biggest amount of students that they conducted a research about, however they did use a secondary source where all the data was already compiled. They did not have to set aside time for the data collection, but they did need to go through the data, which of course takes time as well. Beerli and Martín (2004) had a lot of participant, a total of 616. The fact that there are an uneven number of participants that answered their questionnaire is most likely because they collected the data at an airport and most likely stopped once they thought they had collected enough data. They did use quotas in order to make proportional groups. Baraldi et al., (2016) did a extensive research in order to get numbers on how many articles that had been published in the last ten years at the selected journals. However, the focus was on all the case studies that had been published, which were 352. In this case the researchers did not have control over the amount of numbers in their article since it had not been published more case studies than the amount they used. So in total the amount of numbers used in a good case study depends on the area of research, the access to potential data and what the researchers feel is sufficient data in order to success with their study.

## **5. Conclusion**

The conclusion is that there is no predetermined minimum requirement of numbers used in a good case study. The importance lies in being a good researcher and the researchers own competence. They need to understand and be able to recognize and find out how many sources, interview, respondents or participants that need to be included in a good case study in order to get a good result. Also, be able to consider the potential or lack of access to the wanted data and the possibility of some data to be harder to collect than other.

## **6. Implications**

An implication is the limitations that consist of the fact that not many articles is published yearly researching case studies and therefore develops new theories or information to use when writing new scientific articles about case studies.

## **7. Future studies**

Due to the implication of the small amount of published case studies each year there is a lot of potential in further research and studies within this subject.

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