How good are case studies as scientific products?

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Abstract - This study highlights the difficulties of using a case study in scientific research. Many researchers has written about the issue, but this study summarizes their arguments to give others a more clear picture of the problem and what has been discussed.

Purpose - The purpose of this study is to show the difficulty when deciding on if to use a case study in a scientific research, and if it is possible. The research should give better insight on the issue and give others a groundwork for their studies. The purpose is also to help others chose the right case studies when doing scientific research, i.e. give them the instruments to do so.

Design/methodology/approach - This study is done with a descriptive purpose. The literature and data used in this study is taken from respected databases and then analyzed and summarized for better understanding.

Findings - However a case study can be used in scientific research depends on the type of case and how it was chosen. It is important for a researcher to study Sekaran's (2003) Hallmarks of science, and see if the study with the case meets the criterias. Some criteras are more important than others, but all research with case studies, scientific or not, must meet Guba’s (1981) criterias for establishing trustworthiness in qualitative research.

Originality/value - The previous researchers are often very set in their opinions, and many talk down other fellow researchers’ point of view. By summarizing the different perspectives on this area of research, this study contributes to what is already there.

Key words - Case study, research, methodology

Introduction

“Elements of the case study format may be traced to antiquity and to the works of Aristotle, Herodotus, Thucydides, and others.” (Elman, Gerring & Mahoney, 2016, p. 375). The use of case studies as a scientific method has been discussed by many researchers, with different views and opinions. Researchers like Shenton (2004) and argue that it is impossible to see cases as a scientific products, while others argue the difference (Yin, 1994; Flyvbjerg, 1996). These disagreement have even been called “wars” between those practising qualitative and quantitative research methods (Kohlbacher, 2005). The most debated criticism of case study method
among researchers is whether a case study can be used to generalize or not (UK Essays, 2013).

**Literature review**

*What is a case study?*

Researchers states that using case studies in research enables them to answer questions like “how” and “why”, while also studying how a certain phenomenon is influenced by the context in the situation it is in (Baxter & Jack, 2008).

Case studies has existed for a long time, and has had its ups and downs. It is said that the methodology started in the middle of the 19th century with J.S. Mill’s study *A System of Logic* and later became influenced by different logicians. However, researchers was not entirely satisfied with the use of the method, so they began to integrate it into the mainstream of social science methods, which gave us a significant amount of literature on case study methods. This makes it that much more difficult to find a single description, which could depend on both the methodology’s success or failure. According to Elman et al. (2016) there is still a common denominator of a case study - it is viewed through a qualitative lens. A multimethod research where qualitative and quantitative are being researched together also exists (Lieberman, 2005), but to separate the both is still viewed as the best (Elman et al., 2016).

Case studies can actually be done by using either qualitative or quantitative data, and may come from different sources like fieldwork, archival records, verbal reports, observations etc (Yin, 1981). The key difference between the quantitative and qualitative research methods is that, when using case studies, quantitative work with only a few variables but many cases, and qualitative use many variables but only a few cases (Ragin, 1987). Elman et al., (2016) states a case study is first and foremost a qualitative research method, but some aspects can still be seen as quantitative, e.g. when selecting the cases to be used (Elman et al., 2016). Gerring (2007) believes that it can be one or the other, or a combination of them both. The many definitions vary on the field in focus and the person doing the defining (Simons, 2009). For example, Thomas (2011) explains that those from sociology, education and psychology often sees case studies as something only to be interpreted while those in medicine and law sees them as an aid when trying to exemplify or understand something usual or unusual. Simons (2009), as cited in Thomas (2011), analyzed a
number of case studies and found something that united them all, namely, wanting to study the complexity in real situations and to define case studies in other ways than the methods used for data collections. Simons (2009) also states that a case study should not be seen as a method of itself, but a design frame that can include many different theories. These findings lead her to the following definition of case studies:

Case study is an in-depth exploration from multiple perspectives of the complexity and uniqueness of a particular project, policy, institution, program or system in a “real life” context. (Simons, 2009, as cited in Thomas, 2011, p. 512).

Stake (2005) states similarly that whatever methods we choose to use, in the end, we always study the case. In other words, he explains that a case study is not defined by the methods used but simply by what is chosen to be studied.

Simons (2009) states that the purpose of using a case study is to research the uniqueness of the single case chosen. Even though other cases may be included for persuasion, the task is to understand the peculiarity of that one case. Lindvall (2007) explains that through using several analytical strategies, i.e. by asking different kinds of questions to the material, researchers using case studies can get the most out of their material.

*When to use a case study*

Case studies can be used in both descriptive and empirical research. When used in the first mentioned, the case aims at describing something we have seen or heard about. In other words the case does not affect what has already happened and had nothing to do with the result. In empirical research, they are being used to trigger different events between actors, which will be used when describing the result of the research. I.e, the writer is a contributing factor to the outcome (Søilen & Huber, 2006).

*The Hallmarks of Scientific Research*

Sekaran (2003) presents in his literature the eight hallmarks of scientific research, as listed below;
1. Purposiveness
2. Rigor
3. Testability
4. Replicability
5. Precision and Confidence
6. Objectivity
7. Generalizability
8. Parsimony

The purpose of these hallmarks is to distinguish scientific research from not scientific research. Purposiveness refers to knowing the purpose of the study, and what the authors want to achieve. The research method and theoretical base must reflect rigor, and add it to the study (Solberg Søilen, 2016). Lack of rigor could be drawing conclusions from a too small sample, or asking questions in a way that introduces biases (Sekaran, 2003). By using the right method and theory, one will “collect the right kind of information from an appropriate sample with the minimum degree of bias” (Sekaran, 2003, p. 23). The third hallmark, testability, refers to the ability test a logically developed hypotheses to see if the data found in the method supports the assumptions, questions or hypotheses developed in the problem analysis (Sekaran, 2003).

With replicability, Sekaran (2003) states that a scientific research should get the same outcome if done again, under the same or similar circumstances. The hypothesis should be a reflective of the real population, and the results should not be supported by chance. This gives us confidence in the research (Sekaran, 2003). Precision refers to how close the findings are to reality, based on the chosen sample, i.e. how accurate the results on the sample are to what is true in the universe. Confidence is what tells us the probability that our findings are correct, i.e. how big the risk of us being wrong is. Objectivity tells us that the researchers subjective values must be left outside the research. It is important to be objective when reading the results, it is irrelevant what the researcher thinks (Sekaran, 2003).

With generalizability Sekaran (2003) means to what extent the result can be used on other situations or populations. One should be able to take the end result and apply it to other, more general issues, not just the one that is being studied (Solberg Soilen, 2016). Sekaran (2003) tells us that the more generalizable a research is, the more useful and valuable it becomes. However, this does not mean that research found to be true in one
organization but not others unlike it, is bad research. As long as it can be generalized to identical situations and settings, it generates value (Sekaran, 2003). Parsimony refers to handling resources such as time, effort and money, in the most effective way. A scientific research should not be made difficult if it is not necessary.

**Case study as a research method**

“Case studies have been considered a research strategy or design, an evaluation method, and a reporting mode” (Cohen & Crabtree, 2006). Case studies is used in research to help us understand a complex issue or object by extending the knowledge and adding to previous research (Soy, 1997). It has been evolved over the past years and is now used in many scientific fields when trying to understand trends and specific situations (Shuttleworth, 2008). The case study can be used in many different ways as a research method. It can help us add knowledge to many different fields, e.g. psychology, sociology, business and even economics. Case studies can help us gain knowledge about phenomenons related to individuals, groups, organizations etc (Yin, 1994). However, using case studies in research has been questioned by many, since it is foremost qualitative research. Many claim that it is difficult to establish the trustworthiness that is necessary for a good scientific research (Shenton, 2004). Yin (1994) does not agree. He argues that research methods should not be arranged hierarchically, they all serve different purposes. He dismisses the idea that case studies only can be used in the exploratory phase of a case. “[...] case studies are far from being only an exploratory study. Some of the best and most famous case studies have been explanatory case studies” (Yin, 1994, p. 6).

There is much literature trying to establish the criterias for qualitative goodness (Tracy, 2010), and one of the creators for such a theory is Guba (1981). He established four criterias that he found important for qualitative researchers to consider to ensure the trustworthiness of the study;

a) credibility (in preference to internal validity);

b) transferability (in preference to external validity/generalisability);

c) dependability (in preference to reliability);

d) confirmability (in preference to objectivity).

Many have accepted these four criterias, and others argue the difference. The first criteria, credibility, aims at internal validity, i.e. is the author measuring what was intended? This is seen as the most important one by
many (Shenton, 2004). Creswell and Miller (2010) argue that there is a
general agreement that qualitative researchers need to be able to prove the
credibility of their study. Transferability, or external validity, is how well
one study can be applied on others (Shenton, 2004).

Transferability can be likened to what Sekaran (2003) refers to as
generalization. Shenton (2004) claims that it is impossible to generalize
findings from a qualitative project, such as a case study, because it is
specific to such a small population and environment. Erlandson, Harris,
Skipper and Allen (1993) argue that even conventional generalisability is
impossible since everything is dependent on the specific context in which
they occur. Stake (2005) argues that a single case, even though its
uniqueness, can be used to generalize since it could be seen as an example
of the broader group, and therefore the transferability criteria should not
be dismissed too quickly. However, one should still be careful when
pursuing such approach (Stake, Denzin & Lincoln, 2005). Patton (2015)
states that generalizability depends on what kind of case one chooses to
study. Eisenhardt and Graebner’s (2007) response to the issue of
generalizing is that the purpose of using case studies in research is to
develop a theory and not to test it. Johansson (2003) explains that the
generalisation of a case is not statistical, but rather analytical. With this he
means that they are based on reasoning.

Gube’s (1981) third criteria is dependability. This refers to reliability, i.e. if
the work were repeated in the same context, the same methods and the
same participants - would the result still be the same? This requires that
the method part in the study must be very detailed, otherwise other
researchers will not be able to test this criteria. This also allows readers of
the study to ensure that it follows the right research practices. To make
sure that the readers can understand the methods and their effectiveness,
Shenton (2004, p. 71-72) established three sections the text should include;

a) the research design and its implementation, describing what was
planned an executed on a strategic level;

b) the operational detail of data gathering, addressing the minuitae of
what was done in the field;

c) reflective appraisal of the project, evaluating the effectiveness of the
process of inquiry undertaken.
Confirmability is the last criteria for establishing trustworthiness in a qualitative study (Guba, 1981) which can be compared to what others may refer to as objectivity (Sekaran, 2003). Patton (2002, p. 50) explains the importance of objectivity in science as the following:

“"Objective tests” gather data through instruments that, in principle, are not dependent on human skill, perception, or even presence. Yet, it is clear that tests and questionnaires are designed by human beings and therefore are subject to the intrusion of the researcher’s biases by the very questioned asked.”

Patton (2002) also explains that researchers often unconsciously manipulate the statistics and make them bias to prove a hypothesis they hope will be true. He continues to explain how a researcher should not aim to be either objective or subjective, but rather neutral. With this, Patton (2002) means that any credible research strategy must adopt a naturalistic view on the problem, i.e. not trying to prove anything with the study. The researcher should rather test the problem, with no predetermined results to prove.

Flyvbjerg (2006), a well known Professor, decided to go to the bottom of case studies and their contribution as a scientific method. He started with looking up the definition of case study in Dictionary of Sociology and found the following;

Case Study. The detailed examination of a single example of a class of phenomena, a case study cannot provide reliable information about the broader class, but it may be useful in the preliminary stages of an investigation since it provides hypotheses, which may be tested systematically with a larger number of cases. (Abercrombie, Hill & Turner, 1984, p. 34, as cited in Flyvbjerg, 2006)

Flyvbjerg (2006) argues that parts of this definition is completely wrong, such as a case study “cannot provide reliable information about the broader class”, or that it can only be used in the preliminary stages of an investigation. It is the conventional perspectives and definitions that denies the importance of case studies in research. Others have argued that this kind of study only can be of importance when it is based on a general hypotheses, otherwise it is useless. These opinions became Flyvbjerg’s
(2006) starting point when explaining his five common misunderstandings about case studies (Flyvbjerg, 2006, p. 221);

 Misunderstanding 1: General, theoretical (context-independent) knowledge is more valuable than concrete, practical (context-dependent) knowledge.

 Misunderstanding 2: One cannot generalize on the basis of an individual case; therefore, the case study cannot contribute to scientific development.

 Misunderstanding 3: The case study is most useful for generating hypotheses; that is, in the first stage of a total research process, whereas other methods are more suitable for hypotheses testing and theory building.

 Misunderstanding 4: The case study contains a bias toward verification, that is, a tendency to confirm the researcher’s preconceived notions.

 Misunderstanding 5: It is often difficult to summarize and develop general propositions and theories on the basis of specific case studies.

 When arguing his first misunderstanding, Flyvbjerg (2006) explains that humans learn from intimate knowledge and experiences, and go from beginners to experts with the help of context-dependent knowledge, such as case studies. Case studies used in school can help students gain competence, whereas context-independent knowledge only takes them to the beginner level. He states that humans learn from their own actual experiences, which indicates that students can learn the most from case studies since they are examples of real events. All these statements leads Flyvbjerg (2006) to the conclusion that predictive theories cannot be found in human behavior, which makes the context-dependent knowledge more valuable than weak theories that may or may not be predictive.

 The second misunderstanding, that one cannot generalize on the basis of an individual case, is one of the things most criticised when using case studies in scientific research. According to Flyvbjerg (2006, p. 224) mostly amongst “proponents of the natural science ideal within the social sciences”. Flyvbjerg (2006) claims that one too can generalize from a single case, and that it depends on the case and how it was chosen.

 What Patton (2002) explains about a researcher being biased can be likened to Flyvbjerg’s (2006) fourth misunderstanding. Patton (2002) does not see it as a misunderstanding, but more like something that occurs occasionally since we are humans. Patton and Appelbaum (2003) explains how the researcher is subjective and influences the case study when
writing it, but that this does not necessarily mean that it decreases the validity.

**Findings and discussion**

Many theories has been created by different scientists to prove whether a case study can be used in scientific research of not, and many of these are very much alike. Starting with what Shenton (2004) and Guba (1981) refers to as transferability and Sekaran (2003) and Flyvbjerg (2006) refers to as generalizability. As previously mentioned, many argue that it is simply impossible to generalize from a qualitative research, since it is too specific for the current situation and population (Shenton, 2004; Erlandson et al. 1993). Others argue that it depends on the case chosen (Flyvbjerg, 2006; Patton, 2002). Flyvbjerg (2006) and Patton (2002) agrees on more than just the ability to generalize. They agree that cases can be used both to create hypothesis (exploratory research) and to prove it (explanatory research. Eienhardt and Graebner (2007) argues the difference.

Guba’s four criterias for establishing trustworthiness in qualitative research is very much alike Sekaran’s (2003) hallmarks of scientific research. Table 1 shows which criterias can be connected, i.e. where they refer to the same criteria but with different names.

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<th>Criterias for qualitative research</th>
<th>Hallmarks of Science</th>
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<td>Credibility</td>
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<td>Objectivity</td>
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*Table 1. A comparison of Guba (1981) and Sekaran (2003).*

All studies argue against each other, with the second more certain than the first. Findings has shown that older research is more against using case studies in scientific research. The comparison in Table 1 of Guba (1981) and Sekaran (2003) shows that qualitative research can be used in scientific research in some cases, but not others. The qualitative research misses some important characteristics to be able to be seen as scientific, according to Sekaran’s (2003) theory. Flyvbjerg’s (2006) five misunderstandings are also very much alike some of the hallmarks of
science. However, some important criterias are missing here too, some easier to gain than others. Lack of rigor could be drawing conclusions from a too small sample, according to Sekaran (2003), which research with case studies are accused of doing. Replicability, i.e. if you do the test again you should get the same result, is also hard to adapt on case studies.

Conclusions, limitations, and further research
These findings could be summarized as such that in some cases, case studies can be used, but they cannot cover all the hallmarks of science, which could be seen as a guide to what should be used in scientific research. However, a more thorough study as a continuance to this one, should be made to get more accurate and straight answers. This study tells researchers that if in doubt, they should look at the hallmarks of science, or similar models, and see whether or not their case studies meets the criterias. Some criterias are more important than others, of course, but to determine which are more important further and deeper research needs to be done.
References


