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Vlad Krotov

*University of Houston*, vokrotov@uh.edu

Leiser Silva

*University of Houston*, lsilva@uh.edu

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# Case Study Research: Science or a Literary Genre?

**Vlad Krotov**  
University of Houston  
vokrotov@uh.edu

**Leiser Silva**  
University of Houston  
lsilva@uh.edu

## ABSTRACT

Despite the wide-spread utilization of the case study method in Information Systems (IS), some researchers are still puzzled by the question of “how can you generalize from a single case?” Some researchers believe that findings derived from a single case study have little basis for generalizability beyond the immediate context and, therefore, cannot be used for predicting events in other contexts. According to Imre Lakatos, one of the most prominent philosophers of science of modern times, the ability to predict novel facts is what distinguishes science from pseudoscience. Hence, our main objective with this paper is to reflect whether the findings derived from the case study method can be regarded as scientific or not.

## Keywords

Case study method, Lakatos, demarcation principle, positivism, interpretivism, phenomenology

## INTRODUCTION

Case studies have become an indispensable part of the diverse family of research methodologies used in Information Systems (IS) (Orlikowski and Baroudi 1991; Alavi and Carlson 1992; Klein and Myers 1999). A number of publications focus on the case study research methodology, revealing techniques and philosophical assumptions (e.g. Benbasat et al. 1987; Eisenhardt 1989; Walsham 1995; Klein and Myers 1999; Dube and Pare 2003; Yin 2003). Despite the wide-spread utilization of the method, researchers are still puzzled by the question of “how can you generalize from a single case?” (Yin 2003, p. 10; Lee and Baskerville, 2003). Some researchers believe that findings derived from a single case study have little basis for generalizability beyond the immediate context (Lee and Baskerville, 2003) and, therefore, cannot be used for predicting events in other contexts. Within the context of generalizations, this paper examines if the results provided by the case study method (i.e. theoretical generalizations) have predictive power.

In this paper we draw from the ideas of Lakatos (1995), the philosopher of science who argued that the ability to predict novel facts is what distinguishes science from pseudoscience. According to this criterion of demarcation, if findings derived from a single case (e.g. one organization) cannot be used for predicting future events, then the findings derived from this method will contribute to stagnation of the field in which the method is applied. Hence, our main objective with this paper is to reflect whether the findings derived from the case study method can be regarded as scientific or not.

This problem of demarcation related to case study research in IS is discussed from two philosophical perspectives: positivism and interpretivism. The paper argues that the positivism cannot provide a philosophical justification of the extent to which theories derived from a single case can be used for predicting future events. Instead, we draw on Simon’s (1986) research on decision making and phenomenology to propose the philosophical underpinnings through which theoretical generalizations produced by the case study method can be considered to constitute predictions. The scientific position of the case study method is further strengthened by arguing that there are many practical problems in IS for which the case study method may constitute an adequate basis for predictions.

## LAKATOS’ DEMARCATION PRINCIPLE

According to Lakatos (1995), the ability to predict novel facts is what distinguishes science from pseudoscience (p. 5):

*...In a progressive research programme, theory leads to the discovery of hitherto unknown novel facts. In degenerating programmes, however, theories are fabricated only in order to accommodate known facts. Has, for instance, Marxism ever predicted a stunning novel fact successively? Never.*

Lakatos’ ideas run along the lines of the position towards social sciences of August Comte, a French philosopher who is often believed to be the “father” of sociology. Comte believed that social science should be able to explain past phenomena and predict future events (Coser, 1977).

Lakatos (1995) defines research programme as a research stream consisting of a “hard core” (fundamental laws or theories) and a “protective belt” of auxiliary hypotheses that protect the “hard core” from refutations. With the help of “hard core” theories and “protective belts”, both Marxists and Newtonians could explain phenomena. Nonetheless only Newtonians were successful in making predictions. Using Newton’s theories Halley predicted that a comet would reappear in 72 years, specifying to the minute the comet’s reappearance. Newtonians also predicted the existence and described the motion of small planets that were unobservable at that time. Both predictions were fulfilled. Marxism has never predicted a novel fact successfully. Marxism predicted absolute impoverishment of the working class. Marxism predicted that the first socialist revolution would take place in the most industrially developed country. Marxism predicted that socialist countries would not have conflicts. None of these predictions were fulfilled. With the help of auxiliary hypothesis, Marxism was able to accommodate these “abnormalities.” However, according to Lakatos (1995), retrospective accommodation of known facts does not qualify a research programme as “science”. Ability to make successful predictions is what distinguishes science from pseudo-science.

Lakatos’ position has been widely criticized because of its empirical focus (Hacking, 1983; Laudan, 1977). Indeed, while telling *what* science should do (predict future events), Lakatos provides little guidance on *how* “predictive” theories can be generated. Moreover, Lakatos’ position being reduced to the absurd may be equate science with sorcery - if a shaman can produce successful predictions then his “science” is as good as that of Newton and Einstein. We acknowledge the weakness of Lakatos’ empirical focus. However, looking at the issue from a purely pragmatic perspective, we also believe that if a tribal shaman in Guadalajara consistently predicts stock prices better than faculty members at NYU, then all finance majors at NYU should pack their belongings and go study finance from the shaman.

The ability to predict novel facts is closely related to the concept of generalizability, as the concept is defined in this paper. The case study method often produces theoretical generalizations from a single setting (e.g. a particular organizations) or a few settings (e.g. several organizations). If there are grounds to believe that a theoretical generalization derived from a single setting is generalizable to other contexts, then one can use those generalizations to predict novel facts in those other contexts. Conversely, if theoretical generalizations produced by the case study method are not generalizable beyond their immediate context, then it can be argued that this method produces pseudo-scientific stories that can be entertaining but have no scientific value.

## DEFINITIONS

### Definition of the Case Study Method

Before going into further discussion on the issue of generalizability, it is necessary to define the case study method. Yin (2003) defines the case study method as “an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident” (p.13). Benbasat, Goldstein and Mead (1987) provide an expanded definition (p. 370):

*A case study examines a phenomenon in its natural setting, employing multiple methods for data collection to gather information from one or a few entities (people, groups, or organizations). The boundaries are not clearly evident at the outset of the research and no experimental control to manipulate or manipulation are used.*

Walsham (1995) points out that even though Yin (2003) and Benbasat et al. (1987) take a rather positivists stance on case study research, they also share points of intersection with the interpretivist stance. For example, Yin’s (2003) view that the primary goal of the case study research methodology is to answer “how?” and “why?” questions would be shared by interpretivists as well (Walsham, 1995). Benbasat et al. (1987) definition also contains clear points of intersection with interpretivist philosophy. The definition suggests that the case study method does not attempt to distill knowledge from natural settings and interpretations with the help of experimental manipulations and controls. Dubé and Paré (2003) believe that the case study method “can be used with any philosophical perspective, be it positivist, interpretivist, or critical” (p. 598). Thus, whether the case study is positivist or interpretivist, the results suggest a theorization of a phenomenon, as the case concentrates on “how?” and “why?” questions. Yet, as hinted above, if the case study method cannot produce theoretical generalizations that have the ability to predict new facts, then its results (and the method itself) will contribute to the stagnation of the field where it used (i.e. IS).

### Definition of Generalizability

Many researchers in IS - a field that has been dominated by positivism (Orlikowski and Baroudi 1991) – view the concept of generalizability from the statistical standpoint, where findings derived from a sample are generalized to the population from

which the sample was drawn (Lee and Baskerville, 2003). The underlying belief in statistical generalization is that the sample represents the population. But the concept of generalizability is not limited to its statistical notion - “methodologists have long been aware of conceptions of generalizability beyond the statistical” (Lee and Baskerville 2003, p. 222). Lee and Baskerville (2003) propose a framework that identifies four general types of generalizability: from data to description, from description to theory, from theory to description, and from concepts to theory. In this research, generalizability is defined as “the validity of a theory in a setting different from the one where it was empirically tested and confirmed” (Lee and Baskerville 2003, p. 221). A “different setting” can be another organization or community.

Validity in different settings can be viewed as predictive generalizability. For example, after an in-depth study in Corporation Alpha, a researcher may propose a theoretical generalization that technology and organizational structure mutually influence each other (duality of technology), *ceteris paribus*. If in Corporation Beta (or in an array of other organizations similar to Corporation Alpha) technology and organizational structure do not influence each other, then the proposed theory cannot be deemed to be generalizable to other settings. One cannot use the theory to predict that in a particular corporation technology will shape organizational structure and organizational structure will shape the technology. The term generalizability, as used in this paper, refers to this predictive notion of generalizability, where a theoretical generalization holds true across contexts and, thus, can be used for predicting facts in other contexts.

The philosophical rationale behind adopting this definition of generalizability is that it can be aligned with Lakatos’ (1995) demarcation principle. According to this principle, science, unlike pseudoscience, is capable of predicting new facts. If a theory holds true in settings other than the one where it was tested and confirmed, we can use the theory to predict facts in those other settings. But if a theory cannot be used for predicting new facts, then according to Lakatos (1995), the theory is merely a retrospective accommodation of known facts, a part of a pseudo-scientific research programme.

Lakatos’ (1995) demarcation principle can also be used to evaluate an IS theoretical generalization from a pragmatic standpoint. Lee and Baskerville (2003) argue that business research cannot have a purely theoretical emphasis. Practitioners must be able to use an IS theories for solving business problems. If an IS theory is characterized by predictive generalizability, then managers can use the theories for predicting outcomes and, thus, making better decisions. The same criteria can be applied for the results obtained by the case method. If there are grounds to believe that a theoretical generalization derived from one (or a few) organizations can be used for predicting new facts about other organizations, then the findings of a case study will have value for managers. If not, then the findings will have little value from the practical standpoint

## **POSITIVIST APPROACH FOR EVALUATING GENERALIZABILITY IN THE CASE STUDY METHOD**

### **Positivism in Social Sciences**

Positivist philosophy is the dominant philosophical perspective in MIS (Orlikowski and Baroudi, 1991). Positivist ontology proposes the existence of an objective reality that is independent of individuals’ perceptions and contexts (Orlikowski and Baroudi, 1991; Walsham, 1993). Positivist epistemology states that knowledge is acquired by discovering this objective reality, which means discovering facts that are independent of individual subjectivity (Orlikowski and Baroudi, 1991; Walsham, 1993). A positivist social scientist sees the social world as analogous to the natural world (Hirschheim and Klein, 1989). This suggests that positivist science is best captured by the natural-science model of social science (Lee and Baskerville 2003, p. 229)

### **Positivist Concept of Generalizability**

The positivist concept of generalizability is usually based on statistical, sampling-based generalizability (Lee and Baskerville, 2003). Under this view, in order for a theory to be considered generalizable to a population, it has to be confirmed by a sufficiently large sample drawn from the population. Thus, “generalizability is a quality describing a theory that has been tested and confirmed in a variety of situations” (Lee 1989, p. 41). If a sufficiently large sample supports a theory, then we can use the theory for making predictions about the population.

It is interesting that this view on generalizability ignores the post-positivist view on science. According to Popper, the probability of any theory being true (e.g. “all swans are white”), no matter how much evidence there is (e.g. 1000 swans), is still zero (Lakatos, 1995). The fact that we have spotted a thousand white swans does not guarantee in any way that the next swan we spot will not be black. Thus, a theory cannot be proven by empirical data – it can only be falsified.

### Predictive Generalizability and the Problem of Induction in the Case Study Method

Lee (1989), looking at the case study method from the natural-science (positivist) point of view, states that (p. 41):

*No theory concerning MIS would be generalizable on the basis of a single case study, since the single case study would have tested the theory against the empirical circumstances of just a single setting. Instead, the theory concerning MIS would be generalizable to other settings only on the basis of actually being confirmed by additional case studies that test it against the empirical circumstances of those other settings.*

Lee's (1989) "solution" to the problem of generalizability in the case study method prohibits any possibility of prediction. Lee (1989) states that a "theory concerning MIS would be generalizable to other settings only on the basis of actually being confirmed by additional case studies that test it against the empirical circumstances of those other settings" (Lee, 1989, p. 41). Basing their argument on Hume's truism, which is the belief that induction or generalization is never fully justified, Lee and Baskerville (2003) repeat this pessimistic conclusion as to the predictive validity of case studies: "a theory generalized from the empirical descriptions in a particular case study has no generalizability beyond the given case". Because of the complexity of organizations and other social entities, each new organization can be viewed as a new setting. Thus, a theoretical generalization derived from one setting (e.g. one organization) is not generalizable to other settings (e.g. other organizations).

Lee (1989) defends case study method by saying that even in natural sciences a theory is not considered generalizable based on a single experiment – it is generalizable when it is confirmed by a number of experiments that test the theory "against other sets of empirical circumstances" (p. 41). "As such," Lee (1989) concludes, "generalizability possesses no more, and no less, of a problem for MIS case research than it does for the studies conducted in the natural sciences" (p. 41).

Lee and Baskerville (2003) go further in attacking sample-based generalization. Relying on Hume's truism, Lee and Baskerville (2003) argue that (Campbell and Stanley 1963, p. 17, c.f. Lee and Baskerville, 2003):

*...Induction or generalization is never fully justified... Generalization always turns out to involve extrapolation into a realm not represented in one's sample.*

The central objection to Lee's (1989) defense of the case study method is that, despite the presence of the problem of induction, predictive generalizability is probably a less severe problem in natural sciences. Theories in natural sciences are famous for their predictive ability (Pavitt, 2000, p. 155):

*Let us suppose that I were to kick a rock. Using the laws of physics and relevant information about the force and direction of my kick and the weight of the rock, I could predict with fair accuracy where the rock will end up as a result of my kick.*

Generating an accurate prediction is usually more problematic in social sciences. Weber's "ideal type" - a consistent and logical social structure – simply does not exist (Coser, 1977). Most social structures deviate from the ideal type (Pavitt, 2000, p. 155):

*Now let us suppose that I were to kick a person...The person may run away, or kick me back, or bring a lawsuit against me...*

If all people were "an ideal type", all kicked individuals would behave predictably (e.g. they would all kick back). But since most people deviate from the ideal type, predicting an action of person is problematic.

The problem of induction exists in both natural and social sciences. But the problem of induction equally discredits both social and natural sciences. However, better success in making predictions puts natural sciences in a more favorable position on the dimension of Lakatos' demarcation principle.

To solve the problem of generalizability Benbasat et al. (1987) and Yin (2003) propose using multiple case studies. In this sense, Benbasat et al. (1987) argue that "multiple cases yield more general research results" (p. 373). Indeed, increasing the number of cases to allow for better generalizability is a legitimate solution from the positivist perspective. However, this solution contradicts the definition of case study method. The definition of a case study cited earlier calls for examining phenomenon in its natural settings. By increasing the sample size of cases being investigated, one is aiming at distilling facts from the "natural setting". With the help of inductive logic one is moving from particularities "of finite bodies of data to general theories" (Rosenberg, 2000, p. 4); that is, a finite sample is used to arrive at general conclusions that transcend particularities of individual sample points. In the context of the case study method, if a theory is derived from a sufficiently large number of cases, then one can claim that the effects of individual contexts have been neutralized; they have been eliminated in the process of aggregation. But this is not a goal of the case study method - "a case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between

phenomenon and context are not clearly evident” (Yin, 2003, p. 13). Thus, to solve the puzzle of generalizations of case studies’ results, exponents of this method (e.g. Yin, 2003; Walsham, 1993) propose that case studies should produce analytic generalizations.

### **Analytic Generalization**

Yin (2003) acknowledges that a theory derived from a single case is not generalizable in a statistical sense - it cannot be used to predict facts about the whole population. Instead, he argues, the case study method should generate analytic generalizations; that is, case study findings are generalizable to “theoretical propositions and not to universes or populations” (p. 10). In discussing the idea of analytic generalizations Yin (2003) writes that (p. 33):

*...a previously developed theory is used as a template with which to compare the empirical results of the case study. If two or more cases are shown to support the same theory, replication can be claimed. The empirical result may be considered even more potent if two or more cases support the same theory but do not support an equally plausible rival theory.*

Yin’s (2003) concept of analytical generalization does not provide any basis for claiming that the results derived from a single case can be used for predicting events in other contexts. This is problematic since from a positivists perspective, if a theory is not generalizable “to universes or populations”, then there are no basis to believe that the theory will hold true in other settings and, thus, cannot be used for predicting new facts. After all, a theoretical generalization can be derived from very rare cases. But even if the selected case is not an outlier, what are the grounds to believe that the theoretical generalization will hold true in another organization given the complexity of organizational structures? If Yin (2003) does not answer these questions, then the problem of generalizability remains, despite the proposal of the concept of analytic generalization.

As it was shown in this section, positivist approach to case studies does not provide any sound explanation of how a theoretical generalization derived from a single case can be used for predicting new facts. Positivist philosophy does not go further than admitting that a theoretical generalization derived from a single case is not generalizable to populations or suggesting solutions that simply diminish the strength of the case study. Thus, we will argue that an interpretivist stance would provide more solid philosophical underpinnings for justifying the demarcation of the case study method and its results as science as it was proposed by Lakatos (1995).

### **INTERPRETIVIST APPROACH FOR EVALUATING GENERALIZABILITY IN THE CASE STUDY METHOD**

Walsham (1995) argues that from the point of view of interpretivism, case study findings are generalizable, in part, in terms of them contributing to rich insights about the phenomenon. In essence, the interpretivist approach to the case study method suggests that such a method describes, in detail, the social structures of the phenomenon being studied. Bhaskar (1979) takes the following stance on the predictive generalizability of social structures (c.f. Walsham 1995, p. 79):

*...Social structures do not exist independent of the actions and conceptions of the human agents in them, and the generative mechanisms of such structures are not space-time invariant. Thus, generative mechanisms identified for the phenomenon in the social sciences should be viewed as “tendencies”, which are valuable in explanations of the past data but are now wholly predictive for future situations.*

Indeed, even though a theoretical generalization derived from a single case (or a few cases) cannot wholly predict future facts, it would be naïve to argue that these findings offer no basis of prediction. How many bodies does a doctor need to dissect to predict that every human being has a heart? Given that the doctor has adequate tools for establishing this, one or a few dissections may suffice. In a similar manner, how many times does a person have to be beaten up before he or she can predict that rude behavior in a bar is likely to result in a fight? Probably one or a few fights will suffice (that will depend on the analytical abilities of the experimenter!). Knowing prior cases allows us to make predictions. Having participated in several cases of ERP implementations, an IT manager can predict, to some extent, the outcome of another implementation.

### **Case Study and Expert Decision Makings**

Research on decision making by Herbert Simon provides some insights as to how case studies can allow for predictions. Simon (1986) argues that, in making decisions, experts rely, in part, on a big number of patterns stored in their memory. For example, a chess master holds in his mind about 50,000 different chess patterns - situations that can occur at different phases of a chess game. A medical diagnostician must know thousands of configurations of symptoms in order to be able to provide diagnosis. When an expert is presented with a new problem, he or she extracts properties of this new situation and matches them with a mental “database” of previously stored patterns. When a match is found, an expert makes a diagnosis or makes a

move in a game of chess based on his previous knowledge. They can project what is going to happen if they do not intervene.

Accordingly, it can be argued that case studies allow for predicting future events using a similar mechanism. A case study, in an interpretivist sense, provides rich insights about a particular case. When read by an expert, the case becomes a part of the expert's "mental database" of patterns. When faced with a new situation, the case will serve as a basis for predicting the outcomes. The precision of the prediction will be largely based on the extent to which the new case possesses properties similar to the previously stored pattern, or on the individual's capacity to figure out the analogies.

### Phenomenology

Phenomenology also proposes a philosophical ground that can be used to explain how a single case can serve as a basis for making predictions. An interpretive case study, when read by a professional, can be viewed as an experience that gives birth to "essences" that shape professionals' intuition. Boland (1985), drawing on the works of Husserl, explains the mechanism that forms intuition in the following manner (p. 193):

*The intuition of essence is the end result of a repeated process of purifying experience and stripping away presuppositions that normally go unquestioned. Through a series of "reductions", successive layers of taken-for-granted assumptions are "bracketed" and set aside.*

A case study can also be viewed as an experience shaping intuition and, thus, enabling the ability to predict. Rich insights provided by an interpretive case study can help to shape a better understanding of "essences". Every new experience with a patient can give a doctor a better understating of the "essence" of a particular illness, enabling him or her to make better predictions about other patients.

### Predictive Power of Interpretive Case Studies

Because of the infinite complexity of most social phenomena, neither "mental databases" nor "essences of intuition" are likely to generate accurate predictions. However, this is also the problem with statistic-based predictions, which are impractical given the complexity and uniqueness of situations encountered in the social world. There may be no prior sample of cases of a particular IS implementation – the IS may be one of its kind. Moreover, gathering information about prior cases of IT projects may be either impossible or too costly. Finally, prior cases may be too complex for quantification. Under these circumstances, a prior case can provide the only ground for making a prediction. An interpretivist case study can reveal generative mechanisms and variables involved in an ERP implementation. Using the generative mechanisms, a manager may roughly predict how the implementation will evolve. Thus, the case study method, when it investigates novel, unique, or complex phenomenon, may be the only available tool for making predictions. This, according to Lakatos' demarcation criterion, grants the case study method the honorary title of "science".

### CONCLUSION

We have demonstrated that positivist philosophy is incapable of supporting the claim that the case study method can produce findings that can be used for making predictions. In fact, some positivist researchers who have embraced this method honestly admit that it does not allow for predictive generalizability. This raises some doubts about the practicality, as well as, scientific status of the case study method and the findings that it can produce. The interpretivist stance, on the other hand, justifies the validity of research based on the case study method. From this stance it can be argued that the results produced by case studies are incorporated as "mental patterns" or as experiences shaping intuition that assist individuals in making predictions and/or decisions. Of course, these predictions may lack the precision of predictions made by natural science. However, in certain situations the case study method can be viewed as the only valid, scientific method for generating findings that can be used for predicting new facts and, thus, contribute to the IS field to be a "progressive research programme".

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