Building theories from case study research: the progressive case study
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ABSTRACT
Meredith (1998) argues for more case and field research studies in the field of operations management. Based on a literature review, we discuss several existing approaches to case studies and their characteristics. These approaches include; the Grounded Theory approach which proposes no prior literature review in the substantive area under study (Glaser, 1992: 31) versus Eisenhardt (1989) and Yin (1994) who propose a more directed study with a priori constructs. We then propose an alternative approach which we call the progressive case study. This approach combines strengths of both approaches such as the informative aspect of Grounded Theory and a more plan able approach such as Yin and Eisenhardt propose. We also describe that case studies are not simply a set of interviews and provide examples on the amount of data that might be collected in a detailed case study. Furthermore, we provide direction for analyzing qualitative data in cases.

Keywords: case study research

1. INTRODUCTION

In the recent past, several calls have been made for more case and field research studies in the field of operations management (Meredith et al., 1989; Meredith, 1998). Analysis of publications in the field of Operations Management show that only a small fraction of the published papers are based on this type of methodology (Voss, 1995; Meredith, 1998; Scudder and Hill, 1998; Pannirselvam et al., 1999). We conclude that this type of research, although established in other disciplines, is relatively new for Operations Management scholars. The purpose of this paper is to address this issue by providing descriptions of several case methodology approaches. We start with a discussion on case study research and how this differs from other empirical methodologies. This is followed by a discussion of the well established case methodologies of Yin, Eisenhardt, and Glaser and Strauss. For each of these methods, several characteristics are described which include: the level of preparation, the role of existing literature, timing of case selection, case selection criteria, the number of cases, data analysis techniques, and the goal of this type of study. We proceed to present an alternative approach; the progressive case study approach. This approach combines strengths of both Yin's approach and the Grounded Theory approach which can lead to better research results. Furthermore, Meredith (1998) discusses the low frequency of case study research publications in Operations Management and how this is partly due to unfamiliarity. Another goal of this paper is to increase the awareness on case study research methods and the advantages that this type of research can offer.

2. CASE STUDY RESEARCH

Empirical research in Operations Management is mostly conducted through the use of surveys (Flynn et al., 1990; Scudder and Hill, 1998; Pannirselvam et al., 1999) but another alternative is case study research. Case study research and survey research differ with regard to their paradigm.

2.1 Rational/existential and natural/artificial

Meredith et al. (1989) provide a framework for research paradigms based on two dimensions: the rational/existential dimension (relating to the epistemological structure) and the natural/artificial dimension (relating to the source and kind of information used).

Rational research conforms to the traditional deductive approach whereas existential research conforms to an inductive approach (Meredith et al., 1989: 305). Case study research is more existentially oriented than survey research because it includes the context of the

phenomenon as part of the object of study. It doesn't assume that the phenomenon under study can be isolated from the context or that the facts or observations are independent of the laws and theories used to explain them as is the case for survey research (Meredith et al., 1990).

Natural research is empiricism, i.e. deriving explanation from concrete, objective data, whereas artificial research is subjectivism, i.e. deriving explanation from interpretation and artificial reconstruction of reality. Case study research is, according to Meredith et al. more naturally oriented compared to survey research because it deals more with direct observations of object reality compared to people's perceptions of object reality (Meredith et al., 1990). However, this depends on the exact definition of a case study since case studies may contain several data gathering techniques such as interviews and archival analysis.

2.2 Positivist/postpositivist and interpretivist
Guba and Lincoln (1994) provide similar insights as Meredith et al. (1989). Guba and Lincoln (1994: 108) describe research paradigms based on ontological (what is the form and nature of reality and therefore, what is there to know about it), epistemological (what is the nature of the relationship between the knower or would-be knower and what can be known) and methodological (how can the inquirer or would-be knower go about finding out whatever he or she believes can be known) assumptions.

Survey research relies on self-reports (perceptions) and should be designed to develop or test a theory. The theory should be carefully defined by reference to the literature and logical thought (Flynn et al., 1990). This fits best with a positivist or postpositivist stance (Guba and Lincoln, 1994). This testing oriented research is often claimed to be "true research" (Meredith et al., 1989: 304).

Case study research is used to investigate a specific phenomenon through an in-depth limited-scope study. It is useful in early phases of research where they may be no prior hypotheses or previous work for guidance. The researcher may not even know what the dependent variables are. However, the case method has also been used to study the behavior of dependent variables, to provide counter-examples to prior hypotheses, to investigate established areas where contradictions have arisen, and even to allow analysis without variables (Meredith et al., 1989: 311). More existentially oriented approaches (such as case studies) are concerned more about the correspondence of their findings to the real world than to their coherence with existing theories or laws (Meredith et al., 1989: 307). This fits best with an interpretivist paradigm (Guba and Lincoln, 1994; Schwandt, 1994).

In conclusion, survey research and case study research are both empirical research methods. They differ in their view on reality, the goal of research, the type of data that is collected, the 'objectivity' of this data, and the analysis methods with regard to this data.

3. CASE RESEARCH ACCORDING TO YIN
Yin's (1994) work on case study research is probably the most cited on case methodology. According to Yin (1994: 4) case studies can be exploratory, descriptive, or explanatory. Yin (1994: 13) defines a case study 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". Yin (1994) provides prescriptive statements on conducting case studies that have many similarities with the guidelines for experiments. Case studies can be viewed as "quasi-experimental", i.e. situations in which the experimenter cannot manipulate behavior but in which the logic of experimental design may

still be applied (Yin, 1994: 9). In other words, Yin's case study methodology is based on positivist/postpositivist ideas. This type of paradigm is deductively or testing oriented.

Yin's (1994) work shows this orientation in the detailed preparation that is required of a case study researcher. Yin (1994: 19) provides guidelines for a case study research design (an action plan for getting from the initial set of questions to be answered to some set of conclusions (answers) about these questions). The design has five components: the study's questions, its propositions (if any), its unit(s) of analysis, the logic linking the data to the propositions, and the criteria for interpreting the findings. For the research design, theory development is essential (Yin, 1994: 27). The developed theory must be tested though replications (Yin, 1994: 36) in the empirical case situations. Yin's case research design is based on making sure that replications are achieved, i.e. the same methods are applied in each case so that findings can be compared. Yin states "An important step in all of these replication procedures is the development of a rich, theoretical framework. The framework needs to state the conditions under which a particular phenomenon is likely to be found (a literal replication) as well as the conditions when it is not likely to be found (a theoretical replication). The theoretical framework later becomes the vehicle for generalizing to new cases, again similar to the role played in cross-experiment designs." (Yin, 1994: 46).

The selection of multiple cases is based on experimentation logic, i.e. replication logic. Each case must be carefully selected so that it either (a) predicts similar results (a literal replication) or (b) produces contrasting results but for predictable reasons (a theoretical replication) (Yin, 1994: 46). Cases can be selected at the beginning of the research study, i.e. in the design phase, based upon the theoretical framework and expected results. Yin explains that replication logic is different from the sampling logic used in surveys. In sampling logic, a number of respondents are assumed to "represent" a larger pool of respondents. This allows statistical generalization. Case studies, using replication logic, allow analytic generalization, in which 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 may be claimed. The empirical results may be considered yet more potent if two or more cases support the same theory but do not support an equally plausible rival theory (Yin, 1994: 31). The number of cases (replications) depends on the certainty that a researcher wants to have about the multiple-case results. Yin states "For example, you may want to settle for two or three literal replications when the rival theories are grossly different and the issue at hand does not demand an excessive degree of certainty. However, if your rivals have subtle differences or if you want a high degree of certainty, you may press for five, six, or more replications" (Yin, 1994: 50). Note, that the replication logic implies validation (testing, see e.g. (Glaser and Strauss, 1967: 23)) and that each case study should cover the same exact research questions and approach.

The positivist/postpositivist orientation also follows from the criteria that Yin applies to evaluate case study research. Yin (1994) mentions four criteria for case study research: construct validity, internal validity, external validity, and reliability. These criteria are commonly used in the positivist and postpositivist paradigms.

Overall, Yin's discussion is permeated by a concern for 'objectivity' similar to those in the positivist and postpositivist approaches. In those types of studies the researcher is independent of the research object and this independence is very important for objectivity. Yin's discussion on research design shows a similar approach where Yin proposes several measures to 'demonstrate' the researcher's 'independence' from the research data and how his more rigorous and methodologically sound case studies (Yin, 1994: 19) lead to 'objective' conclusions. In addition, this case approach is oriented on investigating each case in a similar way, see e.g. (Swanborn, 1996: 23). Hence, the necessity for a detailed case-study protocol.

Furthermore, the positivist and postpositivist approaches generally follow a deductive, testing oriented approach where theories are postulated at the beginning of the study. Yin follows a similar format. It is noteworthy to mention that Yin does not highlight 'interpretative' issues which are considered by others such as Meredith et al. (1989) and Guba and Lincoln (1994) as a characteristic of case studies.

4. GROUNDED THEORY RESEARCH

The Grounded Theory approach, initially developed by Glaser and Strauss (1967) provides quite a different viewpoint. In contrast with the deductive/testing approach proposed by Yin (1994), Glaser and Strauss emphasize an inductive, theory developing approach (Glaser and Strauss, 1967: 5). In short, the Grounded Theory approach is based upon a continuous cycling between empirical data collection and data analysis to develop concepts through a coding process which allows the generation of theory. Multiple cases allow a deeper understanding of some concepts but can also lead to new insights or refinement of earlier insights. This is quite different from the replication/validation approach followed by Yin (1994) where theory is "developed" at the beginning of the research and subsequently tested in case settings. This validation process can lead to new insights as well but it is primarily driven by pre-existing theoretical notions, concepts, or codes. In contrast, in Grounded Theory, a theory is generated from data. This means that most hypotheses and concepts not only come from the data, but are systematically worked out in relation to the data during the course of the research (Glaser and Strauss, 1967: 6).

In contrast to Yin (1994), in Grounded Theory there is no initial preconceived framework of concepts and hypotheses (Glaser, 1978: 44). The role of literature in Yin's approach versus Grounded Theory is quite different. For Yin (1994) theory development is essential because the cases are meant to verify the theoretical framework. In Grounded Theory, reading the theoretical literature should be avoided until after the discovered framework is stabilized (Glaser, 1978: 51) so that the researcher can enter the research setting with as few predetermined ideas as possible (Glaser, 1978: 3). The (initial) role of literature in Grounded Theory is to create theoretical sensitivity. Theoretical sensitivity is "an ability to generate concepts from data and to relate them according to the normal modes of theory" (Glaser, 1992: 27). Three types of literature are distinguished: (1) non-professional and popular, (2) professional literature related to the substantive area under research, and (3) professional literature that is unrelated to the substantive area (Glaser, 1992: 31). At the beginning of a Grounded Theory study it is vital to be reading, but in unrelated fields (Glaser, 1992: 35). Only after the concepts have emerged from the empirical data should the researcher read the literature in the substantive area under research (Glaser, 1992: 33).

The method for generating a theory that is proposed by Glaser and Strauss (1967: 21) is comparative analysis. They contrast this method with analytic induction which is similar to the notion of analytic generalization as mentioned by Yin (1994). Glaser and Strauss (1967: 104) explain analytic induction as: "[c]oncerned with generating and proving an integrated limited, precise, universally applicable theory of causes accounting for a specific behavior. It tests a limited number of hypotheses with all available data, consisting of numbers of clearly defined and carefully selected cases of the phenomena. The theory is generated by the reformulation of hypotheses and redefinition of the phenomena forced by constantly confronting the theory with negative cases, cases which do not confirm the current formulation. In contrast to analytic induction, the constant comparative method is concerned with generating and plausibly suggesting (but not provisionally testing) many categories, properties, and hypotheses about general problems. Some of these properties may be causes, as in analytic induction, but unlike analytic induction others are conditions, consequences,

dimensions, types, processes etc… Further, no attempt is made by the constant comparative method to ascertain either the universality or the proof of suggested causes or other properties." (Glaser and Strauss, 1967: 104).

Data collection is based on theoretical sampling which is the process of data collection for generating theory whereby the analyst jointly collects, codes and analyzes his data and decides what data to collect next and where to find them, in order to develop his theory as it emerges (Glaser and Strauss, 1967: 45). This is in sharp contrast with the replication logic used by Yin which requires comparable cases. In the Grounded Theory approach cases are not used to compare across the same domain but rather, they are used to create additional insight, i.e. enrich theoretical concepts. According to Glaser and Strauss (1967: 48) "By contrast, data collected according to a preplanned routine are more likely to force the analyst into irrelevant directions and harmful pitfalls. He may discover unanticipated contingencies in his respondents, in the library and in the field, but is unable to adjust his collection procedures or even redesign his whole project. In accordance with conventional practice the researcher is admonished to stick to his prescribed research design, no matter how poor the data. If he varies his task to meet these unanticipated contingencies, readers may judge that his facts have been contaminated by his personal violation of the preconceived impersonal rules." (Glaser and Strauss, 1967: 49). The latter is indeed reflected in Yin's work where he states "A final reminder is that a case study design is not something completed only at the outset of the study. The design can be altered and revised after the initial stages of a study, but only under stringent circumstances…In the event of a multiple-case design, the selection of cases may have to be modified because of new information about the cases. In other words, after some early data collection and analysis, an investigator has every right to conclude that the initial design was faulty and to modify the design…At the same time, an investigator must be careful, not to shift, unknowingly the theoretical concerns or objectives. If these rather than the cases themselves, are changed, the investigator can correctly be accused of exercising a bias in conducting the research and interpreting the findings. The point is that the flexibility of case study designs is *in selecting cases differently from those initially identified* (with appropriate documentation of this shift) but not in changing the purpose or objectives of the study to suit the case(s) that were found" (Yin, 1994: 52).

The number of cases in a Grounded Theory study can not be stated at the outset of the research. The criterion for judging when to stop sampling pertinent to a category is the category's theoretical saturation. Saturation means that no additional data are being found whereby the researcher can develop properties of the category. As he sees similar instances over and over again, the researcher becomes empirically confident that a category is saturated (Glaser and Strauss, 1967: 61).

Overall, the Grounded Theory approach (Glaser and Strauss, 1967; Glaser, 1978; Glaser, 1992) provides a very different method of doing case study research than the method provided by Yin (1994). The main differences are that Grounded Theory is inductive and not deductive, Grounded Theory is not based on validation (through the replication logic) of an existing theoretical framework but on generating a theoretical framework by constantly comparing and interpreting empirical data and developing theoretical concepts/constructs based on these data. In other words, this kind of case study is such that each case is not investigated in a similar way but rather, the learning from one case is used for the investigation of the next case, see e.g. (Swanborn, 1996: 23). The end result of Grounded Theory is an ever developing, unproven theory that can be formulated as a set of proposition or hypotheses where the importance of the theory is the generated insights through new concepts. It is not a theory that has been validated through empirical testing in a quasi-

experimental format (cases) that leads to a degree of certainty about the validity of this particular theory or theoretical framework.

5. EISENHARDT'S APPROACH
Eisenhardt (1989) provides an approach that lies somewhere in-between Yin's approach and the Grounded Theory approach. Much of her thinking aligns with the Grounded Theory approach, i.e. it is inductive. But there are elements where she follows a more planned approach. For example, she proposes selecting cases early in the research design, i.e. before entering the field. This is not in accordance with the Grounded Theory approach where case selection is based upon earlier findings, i.e. after entering the field.

6. THE PROGRESSIVE CASE STUDY
The above discussion highlights some of the main differences between Yin's deductively oriented approach that follows positivist/postpositivist thinking and the inductively oriented Grounded Theory approach. We propose a case study approach that combines strengths of both approaches. One of the strengths of Yin's approach is that his replication logic provides a "degree of certainty" about the theoretical framework. The disadvantage is that the preconceived theoretical framework may be theoretically limiting compared to the openness to new insights in the Grounded Theory approach. We propose a mix of the two methods. Our goal is to outline an inductive (theory developing) case-study approach that is oriented in the interpretivist paradigm where the outcome is some theory that should not be considered validated but rather it contains concepts and possible relationships which creates new insight (grounded in empirical data) and that can be tested in subsequent research. We consider credibility of the study the most important criteria. Credibility is not only achieved by following positivist/postpositivist verification/validation methods but can also be achieved by following other techniques, in particular triangulation techniques in interpretivist studies. Triangulation refers to the use of multiple measurements to improve accuracy of interpretation.

We will assume that a multiple-case study approach will be followed, although, as Yin (1994) shows, this isn't always necessary. The first case in the series is, in a sense, a defining case because it provides the initial empirical insights and gives the researcher a sense of what kind of data can be collected, the richness of these data etc. In the case study method that we propose, we are dealing with three issues: the preparation for the first case, the credibility of the interpretation of case findings, and the selection of subsequent cases.

6.1   The preparation and role of literature
For Yin (1994) it is necessary to conduct an extensive literature review at the start of the research because this literature review allows the development of a theoretical framework which is then validated and adjusted through empirical case study data. In the Grounded Theory approach, a substantive literature study is discouraged because it has limited ability to generate new insights. Yet, despite the openness of the Grounded Theory approach and consequently the potential for new insights, it is possible that the results of this type of research are a duplication of what is already known. Ultimately, scientific contributions are based upon the contributions made to the existing body of knowledge, i.e. the substantive literature. We therefore propose an intermediate approach. Rather than using the literature to develop a theoretical framework for testing purposes (i.e. literature is carefully analyzed and used for design purposes) and rather than not using substantive theory at all (with the purpose of staying completely open to any issues that may arise in the field), we propose that substantive theory is read at the beginning of the research but only to create awareness of

what is known. Therefore, the literature is not analyzed and used to generate a theoretical framework but it is read so that the author is sensitive to important areas in the substantive field which allows the researcher to direct the case study data collection in promising areas.

The preparation for the case study is therefore much less directed than that proposed by Eisenhardt (1989) and Yin (1994). It does not involve a detailed case study protocol but rather it serves primarily to become aware of the broad issues in the substantive area and may formulate some "sensitizing concepts", i.e. concepts that need to be developed further during the case studies. In addition, the researcher will, if he/she is not yet aware of it, have to become familiar with data analysis techniques, and the researcher will have to formulate a broad research objective and find an appropriate first case.

6.2   Credibility of the case findings

The Grounded Theory approach offers an excellent mechanism for generating theory by using the constant comparative method. We propose a similar mechanism. An important characteristic is that this method involves a continuous cycling between data collection and data analysis. In every single case, the data that is collected next is determined by the analysis of the previous data, i.e. on a day-to-day basis. Note that this is quite different from the traditional positivist/postpositivist approach as for example in surveys. In surveys all data is collected first, and then analyzed. A similar method is proposed by Yin. We follow the Grounded Theory approach because it allows the development of new insights. It is also an important mechanism to "build" credibility in the findings. We strongly support the use of triangulation techniques, e.g. the use of multiple data sources or methods.

In practice, what this means is that the researcher starts with a rough idea about what he/she wants to learn from the empirical world. This learning will come through interpretation of data which leads to codes. Let's say the researcher goes into the field and has an open interview with an informer. This interview leads to a certain insight, i.e. a concept, about a situation that is deemed important by the researcher based on his/her research goal. Glaser and Strauss stress the importance of field memo's in this regard. The researcher then decides to gain more knowledge about this concept, i.e. to develop this concept further. This is established through triangulation. For example, the researcher interviews several other people to gain insight into their ideas about this concept. Note that this doesn't mean that direct questions have to be used. Furthermore, the researcher may decide to look at available documentation which potentially provides additional insight into this concept. The researcher may also apply additional techniques or other sources. Each of these new "bits of information" are analyzed and compared with earlier findings about the concept. This leads to a further development of the concept. Analysis techniques such as for example developing a causal networks can be used as well for creating further insight. Miles and Huberman (1994) provide a range of helpful techniques. Combining the insights of the different data sources and methods provides credibility in the interpretation of the researcher. Another way of viewing this comes from Swanborn (1996). He describes the "problem" with case studies in an insightful way. He states (our translation); Viewed formally, the central problem with case-studies is the fact that the number of units is smaller than the number of variables. Because of this, the researcher can apply almost any model or theory to the data of the case (Swanborn, 1996; 91). Swanborn (1996) uses the "degrees of freedom" to illustrate this. The larger the number of data-points, the higher the degree of freedom, which makes it harder to fit a theory. Therefore, if a suitable explanation can be found, it is more convincing. A disadvantage of case-studies is the limited degrees of freedom. Swanborn (1996) therefore suggests to use techniques that increase the degrees of freedom. For example through using multiple researchers, using different data sources etc. From our perspective this means that

the interpretation of the data is more credible because techniques such as triangulation etc. are used because these increase the degrees of freedom.

Whether the researcher continues to focus on a particular concept or not depends upon the interest of the researcher (is the concept an important new idea). It also depends upon whether new things keep coming up in the data or not (theoretical saturation). At the end of the first case, the researcher has a number of concepts that are more or less developed based upon the available data in that case. Each of these concepts has to be relevant to the overall research objective. Note that the credibility of findings can probably not be communicated by providing the data from the study and letting the reader judge for him- or herself as is common in positivist/postpositivist studies. Instead, the credibility of the findings has to be established by the credibility of the research process, i.e. the researcher has to demonstrate how findings were interpreted, and how there is a high degree of freedom (for example by explaining how triangulation was used). Therefore, presenting a case study that is based on just one or a couple of interviews within an organization is inherently weak. Similarly, if only one type of data source, e.g. public records, is used, then the credibility of the findings is low.

6.3 Selection and interpretation of multiple cases

The selection of subsequent cases is similar to the selection of the next data to be collected inside a case, i.e. it depends on what is already known, which concepts provide promising new insights, which concepts need further development, how much theoretical saturation already occurred, and what kind of practical data is available. This is known as snowball sampling (Miles & Huberman, 1994). Selection of cases occurs not at the beginning of the research project, but rather, happens throughout the project whenever there is a need for another case. We also suggest that for the multiple-case study, an aspect of replication is used. In other words, subsequent cases provide two purposes: 1) it allows the further development of concepts and new insights, and 2) it allows the replication of earlier findings.

The further development of concepts and new insights is a strength of the Grounded Theory approach and is used here in a similar fashion. Hence, additional cases may lead to previously unidentified concepts and/or further development of previously identified concepts. The credibility of these insights has to be build in every case in a similar way, i.e. through triangulation.

The replication logic provides a mechanism to build credibility as well but in a different way, i.e. through validating earlier findings in a new setting. This validation is not the primary purpose and does not need to be accomplished by an "exact copy" of the case approach in each case, i.e. following a strict protocol. Rather, it can be handled more quickly in subsequent cases by providing limited 'tests' to determine whether similar concepts played a role. If there are indications that different factors play a role, then this should lead to the development of new insights, i.e. concepts. Therefore, at the case level, constant comparisons of cases is also conducted.

Using multiple-cases in this manner provides strengthening of previously established concepts in subsequent cases while simultaneously allowing the development of new insights. This is why we termed this approach the progressive case study.

7. EXAMPLE

Based on the above we conducted an in-depth multiple-case study. To provide a sense of the amount of time it takes, the amount of data collected, and the triangulation issue, we will provide a brief description of our project.

We conducted a multiple-case study that consisted of four cases. This multiple-case study was focused on the process of technology transfer, i.e. the relocation of production

activities from one country to another country. This happens in for example sub-contracting or licensing. During each of these case studies we were positioned inside the case company.

The first case study took three months and involved the transfer of an entire aircraft manufacturing line, i.e. this was a large and complex case. During these three months, three different data collection methods were used. People were interviewed and company archives were analyzed. The case was historical and although the manufacturing line still existed, no manufacturing was taking place any more. Therefore observations were limited. The interviews were initially open but were often followed by more closed-oriented interviews to confirm or reject concepts. Overall, approximately 34 interviews were held with 10 people. These people, held different positions at the time of the transfer. Most were involved in technical aspects but some quality people were also interviewed. It must be noted that the word "interview" is loosely used here. In some instances these interviews were structured interviews that lasted more than an hour. In other instances they included short conversations with people to gain additional insight or to get feedback on an idea. Roughly 4500 pages of documentation were compiled on this technology transfer project. These included the initial contract, information on the technology, planning and progress documents, communication documents and field memos which contained information based on interviews and conversations with respondents. It did not involve technological documents such as drawings and other design information and it also did not include additional industry information (this was collected but not included in the case data-base).

After the first case study was conducted, several concepts were known that needed further development. One of these concepts was that the technology transfer of an entire aircraft manufacturing line was so complex that from the case it appeared that it was very difficult to manage this type of project and to control this type of project. For example, it was very hard to keep track of small delays and how they could eventually influence the completion date of an aircraft. Therefore the "size" of the technology was chosen as a primary mechanism for the selection of the second case, i.e. a "small" technology was selected. The second case involved the transfer of aircraft cockpit manufacturing. This transfer was based in the same company but provided a different context that allowed further insight into this particular aspect of "size". Because we were already familiar with the company, we were able to complete this case in approximately 1.5 months. Time savings occurred due to familiarity with people and easier identification and access to those people for interviewing purposes as well as easier identification and access to documents sources. Overall, approximately 78 interviews were held with 18 people in a variety of roles. Roughly 1750 pages of field data were compiled which included the contract, technology information, planning and progress information, written communication, and field memos. Additionally, observation techniques were used because the project was on-going.

After the second case study sufficient insight was gained on the issue of "size" but another issue came up. This issue was the "quality of the information" that was transferred. This issue was also encountered after the first case but at that time deemed less important for further development than the issue of "size". Now, since "size" was better understood, a selection was made for a third case to look at the "quality of information" issue. The issue was that in both the first and second case, informants indicated that much of the information that was transferred (both included old technologies) was outdated and this created problems in production. A third case was therefore selected with a relatively new technology to be able to explore this issue further. The third case was again based in the same company but it involved a newly developed small technology, i.e. the transfer of aircraft tail production (of a newly designed aircraft). Because of familiarity we were also able to complete this case in approximately 1.5 months. Overall, approximately 181 interviews were held with 34 people.

These included interviews outside the company because towards the end of this case, awareness was raised about issue with the overall environment (i.e. national issues such as culture and working conditions) and several people in other organizations were interviewed to gain additional insight. Approximately 1500 pages of documentation were compiled similar to the earlier cases. In this instance, observation techniques were also used.

After the third case study it was felt that the concepts of "size" and "quality of information" were sufficiently developed but another concept "environment conditions" was raised. Therefore a fourth case was selected that allowed further development of the environmental conditions. The first three cases involved technology transfer from a developed country to a developing country. Since the application of technology in the developing country was less smooth than in the developed country, the fourth case was chosen so that it involved a technology transfer from a developed country to a developed country. The case involved the production of a skin panel, i.e. a small technology that was well-established. For the four cases, this means that although each of them added insight into particular aspects, they also had much in common. If the second case is taken as a "base for comparison" it follows that each case is comparable with the second case but adds insight into one additional concept.

	"size of technology"	"accuracy of information" which is linked to "age of technology"	"environment conditions"
Case 2	Small	Established technology	Developing country
Case 1	Large	Established technology	Developing country
Case 3	Small	New technology	Developing country
Case 4	Small	Established technology	Developed country

This fourth case took three months, i.e. similar to the first case. Overall, approximately 69 interviews were held with 31 people in various positions. Observation techniques were also applied and approximately 3250 pages of documentation were compiled similar to the earlier cases.

During and after each case study a case study report was written that contained the methodology, the findings of the study, the lessons learned and for example case selection criteria. This process of writing the case study reports took approximately as much time as the time spent in the field. A confidential part of the case study report included keys to connect the findings as reported in the case study report with the actual data collection. For example, in a case study report, it would mention "interview 18". A key was provided that provided information on when this interview was held, with whom, the topic (linking it with the research questions), and where the actual interview information was stored, i.e. where in the collection of field data. In other words, the findings of each case study included essentially the interpretation of the data and the development of new concepts but the case reports provided "evidence" for the interpretations by referencing the specific data that led to those conclusion. For example, a conclusion may have been reached based on several interviews in combination with some documents, therefore these interviews and documents were referenced in the case report and through the "confidential key", the actual interview data and documents could be traced. Each of these case reports was approximately 100 pages A-4.

This example shows the richness of data that can be achieved with in-depth case studies. This is because of the extended exposure to empirical data. For example, if a survey is conducted and replies are received from 600 respondents and each respondent took approximately 10

minutes to fill in the survey then we could say that the exposure to data was approximately 6000 minutes or approximately 2.5 weeks. This is much less than the exposure of nine months in the multiple-case study above.

Despite this richness there are some disadvantages of doing this type of inductive research. First, as noted by Meredith et al. (1989: 304), the testing approach (deductive) is generally considered "true research". Publishing inductive research is therefore faced with challenges with regard to the acceptability of the inductive research design. This is related to the reviewers' and editors' understanding of inductive research. Second, the enormous amount of data can make it very difficult to publish the findings in a journal article that is by necessity limited in length.

8. CONCLUSION
This paper discussed several different case study methodologies. On the one hand is the more deductively (validation) oriented approach from Yin (1994) on the other hand is the more inductively oriented (developing) approach from Glaser and Strauss (1967). Based on these "extremes" another approach has been proposed: the progressive case study approach. This approach is mostly aligned with the inductive approach. It uses Grounded Theory principles to develop new theory and uses snowball sampling for case selection. However, it also uses validation techniques by checking in similar information in subsequent cases (i.e. replication logic). Case study research leads to potentially much more and richer empirical data than for example surveys but there can be drawbacks. In particular more inductive and interpretivism oriented case studies are typically considered of lesser quality than testing oriented designs. Furthermore, the particular techniques, as for example highlighted by the Grounded Theory approach are less well known which makes publishing results in journals more challenging and it is challenging to condense the amount if data in an article format.

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