



Qualitative case studies in operations management: Trends, research outcomes, and future research implications

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ABSTRACT

Our study examines the state of qualitative case studies in operations management. Five main operations management journals are included for their impact on the field. They are in alphabetical order: *Decision Sciences*, *International Journal of Operations and Production Management*, *Journal of Operations Management*, *Management Science*, and *Production and Operations Management*. The qualitative case studies chosen were published between 1992 and 2007. With an increasing trend toward using more qualitative case studies, there have been meaningful and significant contributions to the field of operations management, especially in the area of theory building. However, in many of the qualitative case studies we reviewed, sufficient details in research design, data collection, and data analysis were missing. For instance, there are studies that do not offer sampling logic or a description of the analysis through which research outcomes are drawn. Further, research protocols for doing inductive case studies are much better developed compared to the research protocols for doing deductive case studies. Consequently, there is a lack of consistency in the way the case method has been applied. As qualitative researchers, we offer suggestions on how we can improve on what we have done and elevate the level of rigor and consistency.

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1. Introduction

Since the early 1980s there have been calls for empirical research methods in response to the over-reliance on the predominant analytical research paradigm in operations management (OM) (Buffa, 1980; Chase, 1980; Flynn et al., 1990; Meredith et al., 1989; Swamidass, 1991; Wood and Britney, 1989). More recently, there have been calls for more relevance and rigor when conducting empirically based research (Boyer et al., 2005; Eisenhardt and Graebner, 2007; Fisher, 2007; Roth, 2007). Academics in the OM field responded with predominantly deductive survey-based empirical studies (Scudder and Hill, 1998). Recently there have been a number of reviews of empirical research, focusing on specific topics such as operations strategy (e.g. Boyer et al., 2005), interdisciplinary and inter-organizational research (e.g., Buhman et al., 2005), sustainability (e.g., Kleindorfer et al., 2005), new product development (e.g., Krishnan and Loch, 2005), quality management (e.g., Schroeder et al., 2005), and supply chain management (e.g., Kouvelis et al., 2006). There have also been other studies that reviewed the state of survey research methods and data collec-

tion techniques (Gupta et al., 2006; Rungtusanatham et al., 2003; Scudder and Hill, 1998).

As an alternative to survey-based research, other OM scholars have promoted the use of qualitative case study research (Lewis, 1998; McCutcheon and Meredith, 1993; Meredith et al., 1989; Voss et al., 2002). We define a qualitative case study as an empirical research that primarily uses contextually rich data from bounded real-world settings to investigate a focused phenomenon (adapted from Benbasat et al., 1987; Bonoma, 1985; Meredith et al., 1989; Meredith, 1998; Roth, 2007; Yin, 1994). This approach has appealed to researchers, as the field of OM has many emerging areas of research such as the integration of OM with other functional areas of the supply chain (e.g., Hines et al., 2002; Pagell, 2004). The intent is to build and extend theories (Eisenhardt, 1989; Yan and Gray, 1994) and to explore and better understand emerging, contemporary phenomena or issues in their real world settings (Flynn et al., 1990; Meredith, 1998).

This paper seeks to examine the state of and research outcomes from qualitative case studies in the OM field, as captured by the *inductive* and *deductive* articles published in five main OM journals (Barman et al., 2001, 1991; Olson, 2005). There have been similar papers in disciplines outside the OM field. For instance, Dubé and Paré (2003) reviewed the rigor and quality of case studies published in leading information systems journals during the period 1990–1999. We are not aware of any similar papers in the OM dis-

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cipline, and we intend to fill this void. The purpose of our paper is four-fold. (1) It provides a summarizing review of the numerous guidelines for undertaking *inductive*-based case study research. (2) It captures the state of the scarce literature for undertaking *deductive*-based case study research. (3) It provides a review of the current state (1992–2007) of qualitative case studies and performs a gap analysis between the guidelines and the current state. The journals include four US-based journals and one European-based—*Decision Sciences* (DS), *International Journal of Operations and Production Management* (IJOPM), *Journal of Operations Management* (JOM), *Management Science* (MS), and *Production and Operations Management* (POM).¹ (4) It provides a review of theoretical contributions made by the use of qualitative case studies and identifies subsequent opportunities to improve such theoretical contributions.

We begin by reviewing the literature on qualitative case-study methods, for both inductive and deductive approaches, focusing on the various research frameworks and guidelines that have been proposed to facilitate increased usage and level of rigor. After this, we present our research methodology and the results of our analyses. We then focus on the details of contributions made by the qualitative case studies, relative to the existing guidelines. We end with a general discussion and implications for future qualitative case studies.

2. Literature review

Across various management disciplines there has been recognition of the importance of bringing clarity and increased rigor to theory building and testing from case studies. A number of articles have attempted to provide guidance as to how to undertake such research from a variety of disciplines—management (Bittektine, 2008; Eisenhardt, 1989; Eisenhardt and Graebner, 2007; Harris and Sutton, 1986; Langley, 1999; Yin, 1989, 1994), information systems (Benbasat et al., 1987; Cavaye, 1996; Lee, 1989), marketing (Bonoma, 1985; Hillebrand et al., 2001; Johnston et al., 1999), and operations management (Meredith et al., 1989; Stuart et al., 2002; Voss et al., 2002). Based on this extant literature, we identify the key areas of consideration (i.e., inductive or deductive) and methodological approaches (i.e., sampling, data collection, and analysis).

We have divided the literature review into two sections—one on inductive qualitative case studies and the other on deductive qualitative case studies. To the best of our knowledge, we are the first to explicitly consider both inductive and deductive case approaches in a single review. In general, there has been much more extensive literature discussing the former, and our review reflects this state.

2.1. Inductive use of qualitative case studies

Much has been written about how to conduct an inductive case study (e.g., Eisenhardt, 1989; Meredith, 1998; Yin, 1989). We looked for basic requirements that are common to the articles that have provided such guidance.

2.1.1. Justification of research approach

An important consideration for undertaking theory building case studies is to clearly articulate the rationale behind why such research is being conducted (Eisenhardt and Graebner, 2007). Justifications can include: there is a gap in existing theory that does not adequately explain the phenomenon under investigation (Benbasat et al., 1987; Eisenhardt and Graebner, 2007; Meredith,

1998; Rothlisberger, 1977); the research is exploratory and therefore calls for case research to build theories (Meredith, 1998; Yin, 1989); the research is explanatory (i.e., asking “how” and “why” types of questions) and the context and experiences of actors are critical (Benbasat et al., 1987; Bonoma, 1985), especially the experiences of managers so as to increase the practical relevance of the findings (Fisher, 2007).

2.1.2. Research focus and specification of unit of analysis

When attempting to build theory from case studies, researchers should have a clear focus to collect specific data in a systematic manner (Mintzberg, 1979). This focus helps to define the research question, the types of data to be collected and the types of organizations to be approached (Leonard-Barton, 1990; Pettigrew, 1990). Although research questions may evolve over time and constructs may be modified (Eisenhardt, 1989; Voss et al., 2002), there must be focus which helps maintain consistency throughout data collection and analysis (Benbasat et al., 1987).

Once the research focus has been specified and the research questions have been articulated, the unit of analysis must then be clearly specified (Yin, 1989; Dubé and Paré, 2003). When the unit of analysis is unclear, this influences the research questions and outcomes (Yin, 1989). Dubé and Paré (2003: 610) suggest that clearly defining the unit of analysis “is critical if we want to understand how the case relates to a broader body of knowledge.” Markus (1989: 23) further suggests that in exploratory research, clearly stating the unit of analysis “helps to define the boundaries of a theory which in turn set the limitations in applying the theory.” A clearly stated unit of analysis can help identify applicable extant literature that can help clarify the phenomenon under investigation.

2.1.3. Research purpose and role of existing theory

Case studies are used primarily to develop new theories (e.g., Benbasat et al., 1987; Gersick, 1988; Harris and Sutton, 1986; Van de Ven, 1989). Researchers employ an inductive logic, utilizing a variety of methods to collect primarily qualitative data from which to develop relevant and testable theories (Eisenhardt and Graebner, 2007; Fisher, 2007; Roth, 2007; Voss et al., 2002).

An important question arises then as to the role of existing theories in this theory-building process. On the one hand, the grounded-theory approach, proposed by Glaser and Strauss (1967), is based on pure inductive logic, where the new theory is derived strictly from the data. On the other, Eisenhardt (1989) has suggested that this “clean slate” approach has generated confusion over role of extant literature and existing theories in the use of case studies for theory building purposes. She has proposed that this approach, as implied by the grounded theory approach, is impractical, since the study’s purpose, site selection, and data gathering require some rationale or preconceived ideas. Subsequently, a number of articles have suggested the use of *a priori* constructs to help shape the initial design of theory building research (Bourgeois and Eisenhardt, 1988; McCutcheon and Meredith, 1993; Voss et al., 2002). However, such *a priori* constructs are only to be considered as tentative and may not be in the resultant theory (Eisenhardt, 1989; McCutcheon and Meredith, 1993). In the end, the higher the level of consistency between the emergent theory and existing theory, the higher the external validity achieved.

2.1.4. Sampling issues, case selection, and number of cases

Instead of statistical sampling from the defined population, case study researchers utilize a theoretical or biased sampling approach where cases are chosen for theoretical reasons (Glaser and Strauss, 1967; Meredith, 1998; Eisenhardt, 1989; Yin, 1989). Cases are chosen that either predict similar results or contrary results (Yin, 1989). The use of polar extreme-types has also been suggested where cases

¹ We also considered *Manufacturing and Service Operations Management* (MSOM) as a sixth potential journal, but it had not, since its inception in 1999, published any qualitative case study papers that met our sampling criteria.

have sharply contrasting characteristics (Miles and Huberman, 1984; Pettigrew, 1990; Yin, 1989). Leading companies have been used for the usefulness of the results for benchmarking purposes (Choi and Hong, 2002; Fisher, 2007). In this regard, when building theory from case studies, the selection of cases should be carefully thought out rather than opportunistically derived (Benbasat et al., 1987).

A question then arises as to the number of cases that researchers should select. Voss et al. (2002), recognizing this dilemma, suggest that the fewer the number of cases, the greater the opportunity for depth of observation. However, multiple cases can augment external validity and help guard against observer bias. In particular, for theory building purposes, the use of multiple cases is likely to create more robust and testable theory than single case research (Eisenhardt, 1989; Eisenhardt and Graebner, 2007; Yin, 1994). Eisenhardt (1989: 15) specifically suggested that in the range of 4–10 cases “usually works well.” She cautioned that if less than four it may become difficult to capture the complexity of the real world and if more than 10 it may become difficult for the researchers to cognitively process the information. Dyer and Wilkins (1991) countered this suggestion by arguing that single case studies enable the researcher to capture in much more detail the context within which the phenomena under study occur. Single case studies may be useful for longitudinal research (Narasimhan and Jayaram, 1998; Voss et al., 2002) and can be used if they are extreme exemplars or opportunities for unusual research access (Yin, 1994).

2.1.5. Data collection and analysis

There are several data sources: interviews either structured (interview tool remains fixed) or semi-structured (interview tool is updated based on emerging data), observations (e.g., plant tour, attendance at meetings), and archival sources (e.g., documents, historical records, organizational charts, and production statistics). While some researchers have used only one method (e.g., observation in Gersick, 1988), others have used multiple methods for the purpose of “triangulation” of data from different sources (e.g., Eisenhardt, 1989; Choi and Hong, 2002). Using multiple data sources (Jick, 1979) provides increased reliability of data (Benbasat et al., 1987; Boyer and McDermott, 1999; Hyer et al., 1999; Leonard-Barton, 1990) and stronger substantiation of constructs and propositions (Benbasat et al., 1987; Eisenhardt, 1989; Voss et al., 2002). Another form of triangulation is the use of multiple investigators (Dubé and Paré, 2003; McCutcheon and Meredith, 1993). Benbasat et al. (1987) and Eisenhardt (1989) suggested that the use of multiple investigators leads to a better ability to handle the richness of the contextual data and more confidence in research findings.

At the core of theory building is data analysis (Dubé and Paré, 2003; Eisenhardt, 1989; Glaser and Strauss, 1967; Stuart et al., 2002; Yin, 1989). It needs to occur simultaneously and incrementally with data collection (Glaser and Strauss, 1967). Obtaining overlap between data collection and analysis allows the researchers to capture the reality that the data bring (e.g., McCutcheon and Meredith, 1993). Constructs and their relationships are adjusted as data are collected. Such adjustments may come from the addition of cases to pursue a particular emerging theme (e.g., Gersick, 1988), the addition of questions to an interview protocol (e.g., Harris and Sutton, 1986), and the addition of data sources in existing case studies (e.g., Burgelman, 1983; Sutton and Callahan, 1987).

2.1.6. Organization of results

The biggest challenge behind data analysis is to demonstrate the objectivity of the process through which the data and field notes are developed into conclusions (Eisenhardt, 1989; Miles and Huberman, 1984; Van Maanen, 1988). The first step in this process

is *within-case analysis*, where a single case description is offered and the emerging constructs and their relationships are delineated. At this stage, detailed, descriptive write-ups are created. Despite being descriptive, such case write-ups are core to the creation of insights (Gersick, 1988; Pettigrew, 1990), although there are no standardized formats for such write-ups (Yin, 1989). Case write-ups are deemed to be analysis as a result of the decisions that researchers make as to what the emerging issues are and how they should be captured in the write-ups.

Cross-case analysis is the act of comparing and contrasting the patterns emerging from the detailed case write-ups (Benbasat et al., 1987; Eisenhardt, 1989; Yin, 1989). Eisenhardt (1989) warns to guard against leaping to conclusions based on limited data. Nisbett and Ross (1980) and Miles and Huberman (1984) also warn against allowing the vividness or status of respondents to unfairly influence the case write-ups. Several articles (e.g., Eisenhardt, 1989; Miles and Huberman, 1984; Yin, 1989) articulate how to engage in cross-case analysis and overcome these pitfalls. The researchers should select two cases at a time and compare them noting the differences and similarities and repeat this procedure until all cases have been considered. Alternatively, they may select a few constructs based on the extant literature that describes the phenomenon of interest and then look for the evidences that address these constructs. Ultimately, the focus is on looking for similar patterns. But when differences occur they are not discarded until the uniqueness of the situation is clarified as having contributed to the difference. Another approach is to divide the data by its source (Bourgeois and Eisenhardt, 1988; Eisenhardt and Bourgeois, 1988). Findings from one form of data source are then corroborated by similar findings from another form of data.

2.1.7. Presentation of research outcomes

One of the ongoing challenges with case study research is how to present the research outcomes (Eisenhardt and Graebner, 2007; Miles and Huberman, 1984)—more specifically, how to draw and validate conclusions from data analysis (Miles and Huberman, 1984). It is not an easy task for researchers to present their data and defend the process, in the form of a “chain of evidence” which the reader can “readily follow” (Benbasat et al., 1987) as to how the researchers arrived at their research outcomes from the data that was collected.

Miles and Huberman (1984) have proposed numerous tactics for drawing case conclusions and to present findings. However, as far as the documentation of the report is concerned, many authors agree that there is no standard form (Miles and Huberman, 1984; Yin, 1989, 1994). For single-case studies it has been suggested that researchers present a detailed narrative supported by quotations from key informants and other forms of evidence (Yin, 1989). The narrative is thought to be closely intertwined with the theory (Eisenhardt and Graebner, 2007). For multiple cases this challenge becomes even more critical and difficult. It requires a careful crafting and presentation of data to make the outcome self-evident to the readers. The use of tables and visual displays is often promoted as the way to convey and summarize the rich empirical evidence within case studies (Eisenhardt and Graebner, 2007; Miles and Huberman, 1984; Voss et al., 2002).

2.2. Deductive use of qualitative case studies

Although the majority of the OM case studies have taken the inductive, theory-building approach, a small number of authors have proposed their use for deductive, theory-testing purposes (McCutcheon and Meredith, 1993; Meredith, 1998; Voss et al., 2002). This proposal to test existing theory is in line with other studies in the general business disciplines: management (Bitektine, 2008; Bryman, 1988; Eisenhardt, 1989; Langley, 1999; Pinfield,

1986; Yin, 1994); information systems (Benbasat et al., 1987; Cavaye, 1996; Darke et al., 1998; Lee, 1989); and marketing (Bonoma, 1985; Hillebrand et al., 2001; Johnston et al., 1999). However, while we agree that qualitative case studies can be used for deductive purposes, it should be noted that despite the number of authors that propose and support the use for such purposes only a few offer insights as to how to actually undertake such research (Bitektine, 2008; Pinfield, 1986; Johnston et al., 1999). As such, the literature for deductive use compared to the inductive use of qualitative case studies is in need of further development.

2.2.1. Standing criticisms and potential solutions

There have been criticisms for using qualitative case studies for deductive, theory-testing purposes (Bitektine, 2008; Hillebrand et al., 2001; Johnston et al., 1999). These criticisms may have simply arisen from the lack of familiarity of qualitative methods (Bitektine, 2008; Roth, 2007); nevertheless, many researchers trained in positivist traditions have criticized theory-testing based on qualitative case studies on the grounds of “ambiguity of inferred hypotheses” and the “selective bias” (Bitektine, 2008: 161). Here, the concern is over the degree of freedom that a researcher has to formulate hypotheses and the natural inclination to peek into the data. An additional concern is the risk of selectively looking for evidence that fit the *a priori* stated hypotheses.

The over-arching approach that has been proposed for the deductive use of qualitative case studies is that of *confirmation* (or falsification) of the appropriateness of a theory (Bonoma, 1985; Bryman, 1988; Johnston et al., 1999; Ross and Staw, 1993; Yin, 1994). Johnston et al. (1999) proposed three main requirements for using qualitative case studies for such confirmation purposes: (1) the case study must begin with an *existing theory* for the development of research hypotheses; (2) a systematic and logical research design should be followed; and (3) researchers should implement evaluation criteria to independently assess potential biases and to ensure the methodological rigor. These requirements are founded on the assertion that case studies are not to be viewed as “sampling units” in inferential statistics but rather as “individual studies” that are used to confirm or falsify a theory (Cavaye, 1996; Yin, 1994). In other words, lack of generalizability to the sampling population is not of main concern. What is important is the contextual data from case studies that are used to confirm or falsify a theory.

Following the development of the hypotheses, the systematic research design should incorporate: the clear definition of the unit of analysis, the careful selection of appropriate cases (Johnston et al., 1999) and triangulated data sources driven by the nature of the specific research questions (Bonoma, 1985; Yin, 1994). Concerning the selection of cases, the authors recognize that while a single case is possible, multiple cases are more compelling and make the research more robust. They also suggest that the cases be chosen to complement each other, in terms of similar contexts and or polar extreme types or to specifically investigate rival hypotheses (Johnston et al., 1999).

To overcome potential researcher bias, the issues of internal and external validity need to be considered together with reliability and objectivity (Johnston et al., 1999; Yin, 1994). One possible approach that can be utilized here is the use of multiple researchers (see also Dubé and Paré, 2003; McCutcheon and Meredith, 1993), similar to the suggestions by Benbasat et al. (1987) and Eisenhardt (1989) for inductive research, which leads to a better ability to handle the richness of the contextual data and more confidence in research findings.

2.2.2. Two proposed approaches: use of competing theories and longitudinal data

Eisenhardt (1989) suggests that the confirmation approach can take two subsequent forms: namely examining the appropri-

ateness of competing theories (Johnston et al., 1999; Keil, 1995; Pinfield, 1986) and utilizing a *longitudinal approach* (Anderson, 1983; Bitektine, 2008; Eisenhardt, 1989). Both approaches adopt the logic of confirmation/falsification of the appropriateness of a theory discussed above. They entail articulating a theory into a set of hypotheses and then comparing them against data either to confirm or falsify them. Key here is to devise ways to maintain objectivity and to guard against researchers' personal bias. The competing theories approach helps researchers minimize personal bias that may enter into the analysis by selectively looking for evidence that fit the hypotheses. The presence of competing theories would force the researchers to choose one theory over another. The longitudinal approach is similar to the “prospective case design,” which is borrowed from the medical field (Bitektine, 2008). Here, hypotheses are formulated first in a prospective manner and then the qualitative data are collected at in different points across time.

Pinfield (1986) demonstrated an approach to enable the comparison and evaluation of two theoretically-derived perspectives of the organizational decision-making process (see also Keil, 1995). This approach was loosely based on two earlier approaches used by March and Olsen (1976) and Kagan (1978). Following the careful description of the two competing decision-making perspectives (e.g., structure vs. anarchic) across multiple dimensions, Pinfield (1986) collected data from multiple (four) sources to avoid interpretive bias. Utilizing a single case study of a complex decision making process within a single organization, five dimensions were drawn from the theoretically derived perspectives and considered in the analysis—decision definition, goals and technology, participation, contextual dependence and time. In doing so the author made qualified recommendations as to the most appropriate theoretical perspective.

The use of longitudinal data builds on the application of the principles of prospective study design adapted from the field of medicine where cases are used to investigate suspected ailments. It uses “a comparison of a pattern of observed outcomes (on several variables) with some pattern of expected values derived from a given theory” (Bitektine, 2008: 162). This approach is akin to Popper's (1968) approach to falsifying theory—using a proposition under consideration to “predict outcomes for specific cases and subsequently investigate these cases to see whether the theory holds true for them” (Hillebrand et al., 2001: 652). The “falsification” of the theory arises when the theory under consideration does not hold true for the predicted outcomes. This pattern-matching technique (Campbell, 1966; Yin, 1994) allows for “outcome evaluation on multiple dimensions, where as little as one actual observation for a given dimension is available” (Bitektine, 2008: 162).

In fact, both approaches of competing theories and longitudinal data utilize pattern matching (Campbell, 1966; Yin, 1994). All that the pattern matching requires is “a theoretical pattern of expected outcomes, an observed pattern of effects, and an attempt to match the two” (Trochim, 1989, p. 360). In essence, the researchers are looking for patterns in the emerging data and then comparing the patterns against the theoretically derived hypotheses. Because the focus is on these patterns involving *a priori* determined constructs, there is less opportunity for making Type 1 error (i.e. false positive). In competing theories, emerging patterns are compared against multiple theories, and in use of longitudinal data, emerging patterns are compared against the prescribed theories over time. For example, Keil (1995) in examining the escalation of commitment in information systems tested three theories of escalation and, in doing so, used the theories as a template (i.e., stated hypotheses) for pattern matching. Also, Lee et al. (1996) in testing a model of voluntary employee turnover used pattern matching when the theorized essential features for a given decision path are judged to occur across multiple cases.

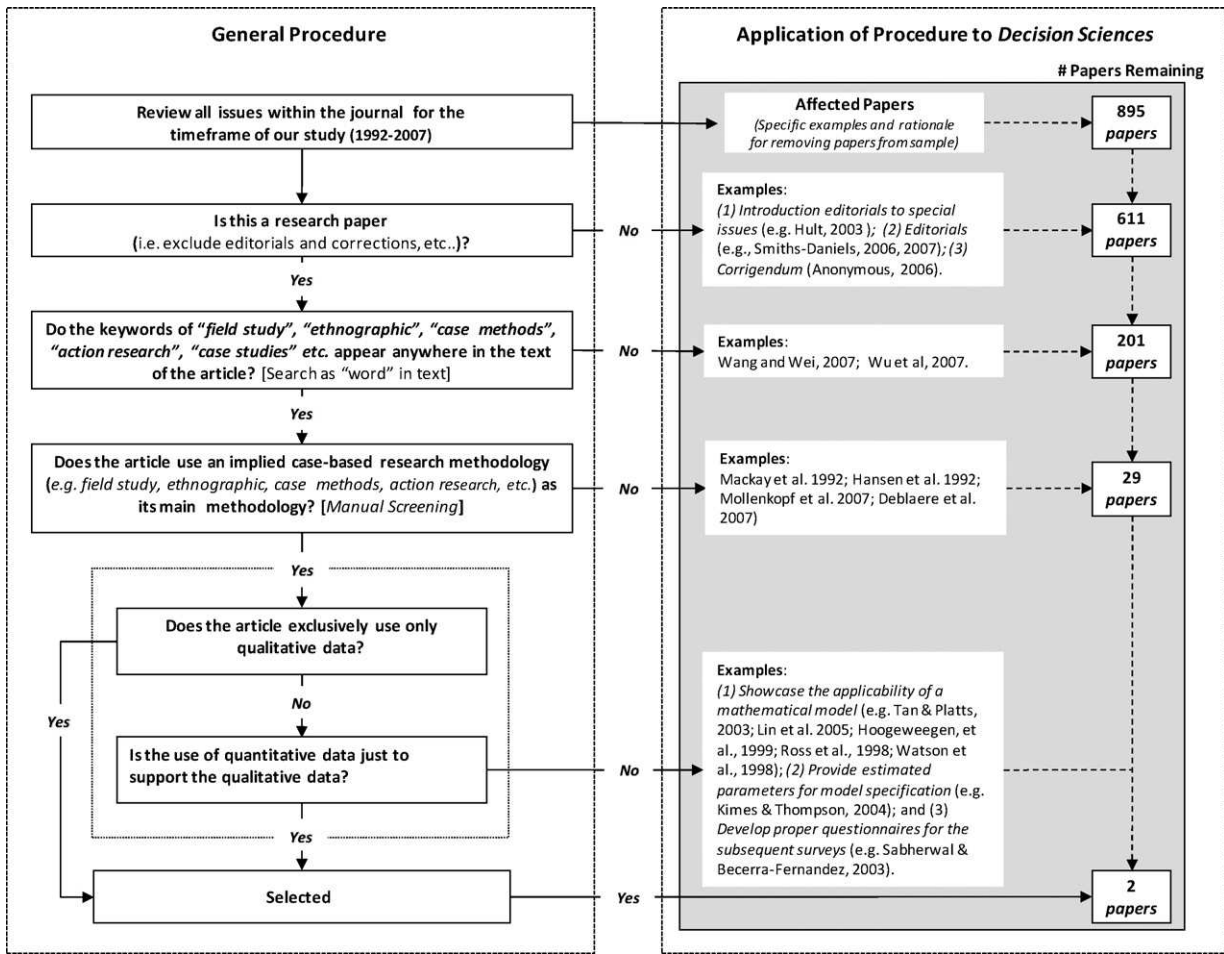


Fig. 1. Article sampling criteria and their application using Decision Sciences as an example.

2.3. Summary of the literature review

It is clear from the literature reviews in Sections 2.1 and 2.2 that the methodology for inductive case study purposes is significantly more developed and comprehensive than that for deductive case study purposes. This disparity between the levels of sophistication of the two research approaches is further evidenced by our analysis of the deductive articles in our sample that appear to have adopted an inductive logic and applied this to case studies for theory testing purposes. For instance, we found only three papers that partially followed the longitudinal approach and two papers that partially followed the competing theories approach out of a total of 35 deductive papers. Therefore, we have classified the research outcomes of these articles based on their stated approach and claimed outcomes rather than based on the emerging protocols we learned from our literature review. Such outcomes from the published articles range from "confirmation/falsification" to "revised frameworks or hypotheses" to "descriptive insights."

3. Methodology

Our goal is to report on the state of qualitative case study research. The published articles in five journals that met our definition of qualitative case studies became our data source. The five journals listed were selected on the basis of quality and impact (e.g., Journal of Operations Management, Management Science, etc.). Considerations were also given to geographic coverage (i.e., we wanted to include a leading European journal) and their stated acceptance

of qualitative case studies (i.e., International Journal of Operations and Production Management).

3.1. Time horizon and article sampling

The time horizon for our research is 16 years, beginning in 1992, when POM was inaugurated, to 2007. We reviewed all the publication issues of the five journals during the specified time period. There were in total 5526 articles published from 1992 to 2007. We excluded any editorial articles or corrections to earlier articles. Fig. 1 illustrates the process of sampling using DS as an example. In this process, we first looked to see if the paper used some form of qualitative methods. We then applied our definition of qualitative case studies as articulated previously. Initially, we found 461 case-based articles that used either qualitative or quantitative or a mixture of both methods (for references, see under Supplemental Materials at <http://www.journaloperationsmanagement.org/>). By utilizing our sampling criteria we ended up with the total of 204 qualitative case studies—two from DS, 150 from IJOPM, 32 from JOM, 11 from POM, and nine from MS (for references, go to the same web address shown above).

3.2. Coding

We have coded all 204 qualitative case studies by the coding criteria shown in Table 1. Two of the researchers coded all of the articles and then the third researcher reviewed all of the coding. Through the coding process, inter-coder agree-

Table 1
Coding criteria.

Coding criteria	Description of criteria
Year of publication	In what years were the articles published?
Article authors	Who were the authors of the article?
Journal	Which of the five journals was the article published in?
Major focus of article	What was the major focus of the article?
Unit of analysis (UofA)	What unit of analysis was adopted by the case study(ies) (Yin, 1989)?
Statement of unit of analysis	To what extent was the unit of analysis clearly stated?
Justification of research approach	To what extent had the authors justified their choice of research approach?
Mode of research	Did the authors follow an Inductive or deductive mode of research?
Degree of alignment	Bearing in mind the stated research goal, how appropriate were the selected cases?
Theoretical lens	Which theories or literatures influenced the authors' framing of the research?
Methodology	Did the authors use a single, multiple or longitudinal case study approach?
Sampling strategy	What was the logic behind the case sampling—theoretical or convenience?
Case selection strategy	If theoretical sampling was adopted, what kinds of strategies were used to select cases?
Number of cases	How many cases were selected for the research?
Data sources	Were there multiple sources of data, such as interviews, observations, and/or documents?
Data source triangulation	How much data triangulation was adopted and in what form?
Role of existing theories	Were existing theories used to develop constructs and/or used to examine the findings?
Data analysis	To what extent were within and cross-case analyses carried out?
Research outcomes	What types of findings were produced, such as frameworks, propositions or descriptive insights?

ments remained in the 80–85% range. Any issues or exceptions were discussed and resolved by all of the researchers through consensus.

Once we were able to ascertain the unit of analysis, we examined each article and determined whether the article provided sufficient justification for the adoption of a case study as the selected research approach. We determined what primary research topic that the article was focusing on (which is presented in Table 3 below) and whether the articles had clearly stated the unit of analysis and in what context it occurred. Regarding the use of existing theories, we looked to see if any theories were being used to frame the research, or if no theories were used, then what bodies of literature were being used. We also examined each article to determine what sampling approach had been adopted. We determined how many cases were being used. We reviewed the data collection techniques used and examined the data analysis approaches deployed. Lastly, we reviewed the research outcomes of each article. Appendix A contains a more detailed explanation of the evaluation criteria, the scales that were adopted, and the rationale for the scales.

3.3. Analysis approach

We summarized all coding results on a large spreadsheet. Classifying qualitative case studies by their research orientation (i.e., inductive or deductive) and the form of their research outcomes (i.e. frameworks, propositions, or insights), we reviewed each category in depth. We looked for common patterns across each of the categories, but whenever a deviation occurred, we investigated it further (Poole and Van de Ven, 1989). To reduce all research topics to a few categories, the three researchers engaged in a Q-sort activity. Each person independently grouped the individual topics into a smaller number of key categories, and then all three discussed discrepancies together. Overall, we found about 85% agreement among the sorters. Any issues or exceptions were discussed and resolved by all of the researchers through consensus.

The purpose of the present research is descriptive and inductive and was not conducive to inferential statistics. Also, the research entailed census rather than survey. We have used a qualitative trend and pattern analysis to develop a greater understanding of contributions from qualitative case studies in OM and to identify potential opportunities for improvement. We have presented these analytical results in the forms of tables and figures.

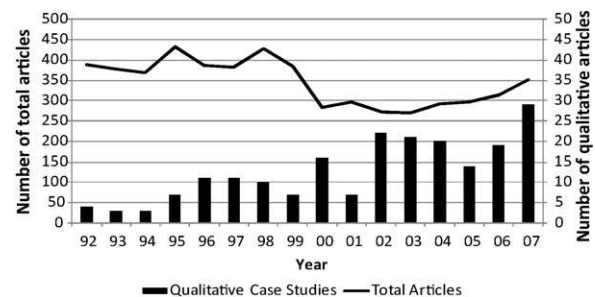


Fig. 2. Number of qualitative case studies vs. total number of articles.

4. Analysis, results and implications

In this section we present the analysis and general trends. We focus on the differences between the inductive and deductive case studies, in terms of the research outcomes and the underlying methodological issues that relate to the rigor of such studies.

4.1. General trends for qualitative case studies

Over the period 1992–2007, as evidenced in Fig. 2, qualitative case studies constitute a very small portion of the published papers. Nonetheless, while the total number of articles shows in general a decreasing trend, the number of case studies shows an increasing trend. The growth has come slowly but steadily from an average of 1.4% of the total number of articles published in these journals for 1992–1996 to an average of 6.8% for 2003–2007.

4.1.1. Qualitative case studies by journal

Of the five journals in Table 2, IJOPM has published the largest number of qualitative case studies (150), followed by JOM (32), then by POM (11), MS (nine) and lastly DS (2). The post hoc column in Table 2 captures articles that took one approach in the main body of research and then adopted the other in a post hoc analysis.

As seen in Fig. 3, it appears that 2000 was a watershed year for the qualitative case study methodology in IJOPM, when 15 papers were published. Besides IJOPM, JOM and POM have been taking the lead in publishing qualitative case studies. JOM has been consistently publishing case studies, at least one article every year. POM published qualitative case studies actively from 1996 to 2007, with the exception of 1999–2000 and 2005–2006 when no qualitative case studies were published.

Table 2
Case studies by Journal and Research Orientation.

Journal	Total	Inductive	(%)	Deductive	(%)	Adoption of post hoc analysis (Ind-Ded or Ded-Ind)
DS	2	2	1	0	0.0	None
IJOPM	150	119	58.3	31	15.2	2 Ind-Ded, 6 Ded-Ind
JOM	32	29	14.2	3	1.5	2 Ind-Ded, 1 Ded-Ind
MS	9	8	3.9	1	0.5	None
POM	11	11	5.4	0	0.00	1 Ind-Ded
Total	204	169	82.8	35	17.2	

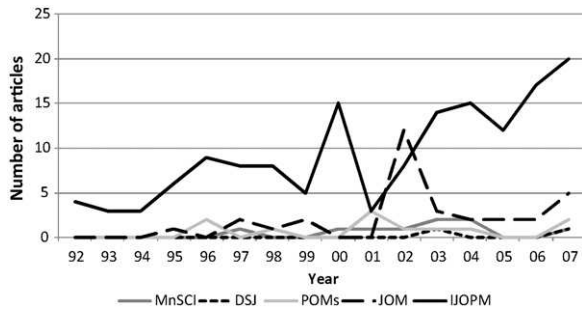


Fig. 3. Number of qualitative case studies by year.

4.1.2. Qualitative case studies by topic

Based on the identification of the primary topic for each article, Table 3 presents the 14 major OM topic areas that used a qualitative case study method. The area with the most qualitative case study publications is manufacturing strategies. Initially, the high number of qualitative case study publications in the area of manufacturing strategies seemed to be counter-intuitive. Qualitative case studies are typically used for exploring an area not previously studied, yet the topic of manufacturing strategies in general has been studied intensively for several decades (e.g., Hayes and Wheelwright, 1979; Miller and Roth, 1994; Skinner, 1980). However, a closer look at the focus of study revealed that a large number of qualitative case studies in this area were integrative in nature, for instance, combining theories in manufacturing strategies with other areas such as contingency theory (Sousa, 2003; Sousa and Voss, 2001), modularity (Salvador et al., 2002), and engineering (Narasimhan and Jayaram, 1998; Voss and Winch, 1996). The integrative studies provided arti-

cles with rich areas for theory building in previously well studied areas.

4.1.3. Qualitative case studies by research outcomes

We examined the qualitative case studies for their research outcomes, as shown in Table 3. For 169 inductive articles, 38 or 22.5% produced forms of frameworks or models. For example, Wu and Choi (2005) developed a typology of supplier-supplier relationship configurations, supported by eight propositions related to the interactions between competing suppliers. In Danese et al. (2006) a model of the sequences of improvements in pharmaceutical supply networks was developed. Thirty-four or 20.1% developed formally stated propositions; for example, Grutter et al. (2002) developed nine propositions relating to work team performance in South African manufacturers. An additional example can be found in Krajewski et al. (2005), where eight propositions were developed relating to the reaction strategies adopted by suppliers in build-to-order supply chains.

For deductive-oriented qualitative articles, twelve or 34.3% provided forms of confirmation/falsification of theoretically derived hypotheses. For example, in Jensen and Szulanski (2007), the article's original hypotheses were confirmed (i.e., that the use of templates increases the effectiveness of knowledge transfer). In Lewis (2000), the author refuted their initial hypothesis that becoming lean does not automatically result in improved financial performance for an organization. Ten or 28.6% provided revised hypotheses/frameworks as their research outcomes. For example, in Bititci et al. (2005), revised hypotheses concerning how existing performance measure can be used for measuring performance in extended enterprises were produced. In Mosey (2005) the author produced a revised framework for understanding how small and

Table 3
Research outcomes by topic and mode of research.

Topic	Inductive research outputs (n = 169)								Deductive research outputs (n = 35)								Overall	Totals
	Framework		Propositions		Descriptive insights		Inductive sub-totals		Confirm vs. falsify		Revised framework or hypotheses		Descriptive insights		Deductive sub-totals			
	n	(%)	n	(%)	N	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)		
Manufacturing strategy	11	6.5	1	4.1	42	24.9	60	35.5	5	14.3	5	14.3	4	11.4	14	40.0	74	36.3
Org. behavior	4	2.4	2	1.2	6	3.6	12	7.1	3	8.6	0	0.0	3	8.6	6	17.1	18	8.8
Integration	4	2.4	4	2.4	6	3.6	14	8.3	2	5.7	1	2.9	0	0.0	3	8.6	17	8.3
Strategic sourcing	7	4.1	2	1.2	6	3.6	15	8.9	0	0.0	2	5.7	0	0.0	2	5.7	17	8.3
Perf. measurement	1	0.6	1	0.6	10	5.9	12	7.1	0	0.0	2	5.7	1	2.9	3	8.6	15	7.4
Service operations	2	1.2	6	3.6	3	1.8	11	6.5	0	0.0	0	0.0	3	8.6	3	8.6	14	6.9
Demand chain mgmt.	4	2.4	2	1.2	4	2.4	10	5.9	0	0.0	0	0.0	0	0.0	0	0.0	10	4.9
Knowledge mgmt.	1	0.6	2	1.2	5	3.0	8	4.7	1	2.9	0	0.0	0	0.0	1	2.9	9	4.4
Plant mgmt.	1	0.6	1	0.6	6	3.6	8	4.7	1	2.9	0	0.0	0	0.0	1	2.9	9	4.4
Supply chain mgmt.	1	0.6	2	1.2	4	2.4	7	4.1	0	0.0	0	0.0	1	2.9	1	2.9	8	3.9
Environmental mgmt.	0	0.0	4	2.4	3	1.8	7	4.1	0	0.0	0	0.0	0	0.0	0	0.0	7	3.4
Inventory mgmt.	0	0.0	1	0.6	2	1.2	3	1.8	0	0.0	0	0.0	0	0.0	0	0.0	3	1.5
Project mgmt.	2	1.2	0	0.0	0	0.0	2	1.2	0	0.0	0	0.0	0	0.0	0	0.0	2	1.0
Retail strategy	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	2.9	1	2.9	1	0.5
Totals	38	22.5	34	20.1	97	57.4	169	82.8	12	34.3	10	28.6	13	37.1	35	17.2	204	100

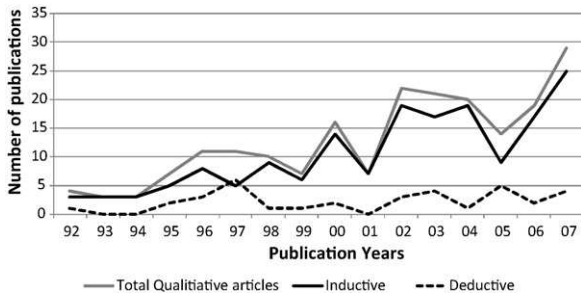


Fig. 4. Qualitative case study articles—inductive vs. deductive (1992–2007).

medium-sized enterprises (SMEs) develop a dynamic capability for new-to-market product development.

4.1.4. Qualitative case studies by research orientation

Of the 204 qualitative case studies included in this study, most adopted the inductive approach. Ones that used deductive approach were clearly in a minority. As shown in Table 3 above, 169 (82.8%) were inductive (i.e., theory building) and 35 (17.2%) were deductive papers (i.e., theory testing). We note that 31 of the 35 deductive, theory-testing articles came from IJOPM. Nevertheless, the number of deductive case studies exceeded our expectations, especially given the criticisms surrounding this approach as discussed under the literature review. As evidenced by Fig. 4, while the number of qualitative case studies that adopted the inductive approach has increased significantly since 2000, the number of case studies that adopted the deductive approach has shown a slow decline.

4.2. Inductive vs. deductive case studies: key patterns and differences

We now offer the results of a more detailed analysis, based on Table 4. While the case studies have produced some significant contributions in terms of their research outcomes, all articles have been examined for potential ways to improve quality and rigor. They are examined in light of the differences between the research outcomes and what our earlier literature review informed us about the requirements of a scholarly case study.

4.2.1. Inductive qualitative case study papers

Table 4 is reframed into Figs. 5 and 6. According to Fig. 5, the research outcome categories of the “Framework” and the “Proposition” consistently scored higher, in terms of the percentage of articles that met the research design criteria, than the “Descriptive Insight” research outcome category over all of the methodological design issues. For example, in terms of justification of case research approach, 28 of 34 (i.e., 82.4%) of articles that produced propositions and 24 of 38 (i.e., 63.2%) of articles that produced

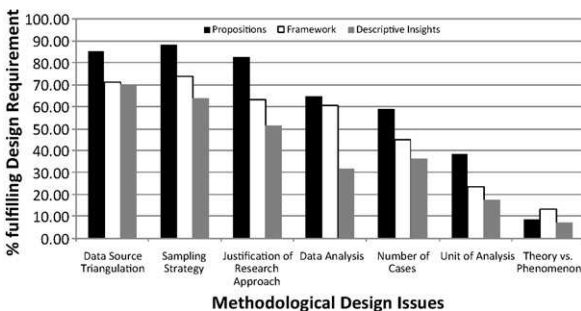


Fig. 5. Inductive articles (by research outcome) fulfilling methodological design issues.

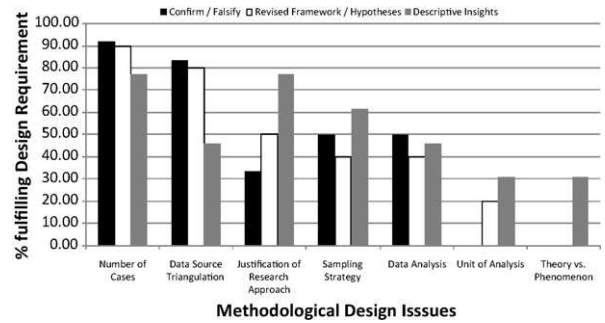


Fig. 6. Deductive articles (by research outcome) fulfilling methodological design issues.

frameworks provided at least partial or full justification for their choice of research approach compared to only 50 of 97 (i.e., 51.5%) of articles that produced descriptive insights. Fig. 5 would suggest that, generally speaking, the articles in the “Framework” and “Proposition” research outcome categories were methodologically more rigorous than the articles in the “Descriptive Insight” research outcome category.

4.2.1.1. Justification of research approach. The majority (102 of 169, i.e., 60.4%) of inductive case studies provided at least some justification for their choice of the case study methodology as their research approach and why they were undertaking an inductive study, as recommended by Yin (1989) and Eisenhardt and Graebner (2007). It should be noted that the majority of cases that did not justify their use of case study method were from IJOPM. Justification of the case methodology is associated with certain types of research outcomes. For cases that did not justify the use of case methodology, about half (i.e., 48.5%) ended with descriptive insights only. For cases that did justify the use of case methodology, only about a quarter (i.e., 27.8%) ended with descriptive insights. The remaining majority of articles developed either a theoretical framework or set up formal propositions. This pattern of relationship between the justification of case approach and research outcome may have suggested that case approach justification is one of the salient indicators of an overall rigorous case study design which produces meaningful results.

4.2.1.2. Unit of analysis (UOA). Overall, for inductive articles there are more case studies that did not clearly state their UOA (76.9%) than those that did (23.1%). This is seen as a potentially significant area for improvement because clearly stated unit of analysis makes a difference in terms of the resulting research outcomes (Dubé and Paré, 2003; Markus, 1989; Yin, 1989). A higher percentage of studies that clearly stated their UOA were able to derive frameworks or proposition compared to those who produced only descriptive insights (56.4% vs. 38.5%).

4.2.1.3. Theory vs. phenomenon. Overall, a small percentage of case studies used an existing theory as opposed to a phenomenon occurring in the literature to frame the research. An existing theory (i.e. transaction cost economics, resource based view, etc.) adds validity to the conclusions one may draw from the data whether inductive or deductive, whereas a phenomenon pertains to the specific context in which the case studies are conducted (i.e. service operations, knowledge management, etc.). According to Table 4, case studies that focused on a phenomenon occurring in the literature increased the likelihood of deriving descriptive insights as opposed to a framework or formal propositions.

4.2.1.4. Sampling approach. Discussion of the sampling approach is universally important and is explicitly expressed across different methodologies. For the case articles we reviewed, the majority used

Table 4
Summary comparison of inductive and deductive research outputs (by methodological issues).

	Inductive research outcomes (n = 169)						Deductive research outcomes (n = 35)					
	Framework or propositions		Descriptive insights		Total		Confirm/falsify		Rev frame/hypos or descriptive insights		Total	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Justified research approach												
Yes	19	11.2	13	7.7	32	18.9	1	2.9	5	14.3	6	17.1
<i>Partial</i>	33	19.5	37	21.9	70	41.4	3	8.6	10	28.6	13	37.1
No	20	11.8	47	27.8	67	39.6	8	22.9	8	22.9	16	45.7
Totals	72	42.6	97	57.4	169	100.0	12	34.3	23	65.7	35	100
Unit of analysis												
Clearly stated	22	13.0	17	10.1	39	23.1	0	0.0	6	17.1	6	17.1
Not clearly stated	50	29.6	80	47.3	130	76.9	12	34.3	17	48.6	29	82.9
Totals	72	42.6	97	57.4	169	100.0	12	34.3	23	65.7	35	100
Theory vs. phenomenon												
Theory	8	4.7	7	4.1	15	8.9	0	0.0	4	11.4	4	11.4
Phenomenon	62	36.7	84	49.7	146	86.4	12	34.3	19	54.3	31	88.6
Neither	2	1.2	6	3.6	8	4.7	0	0.0	0	0.0	0	0.0
Totals	72	42.6	97	57.4	169	100.0	12	34.3	23	65.7	35	100
Sampling strategy												
Theoretical	58	34.3	62	36.7	120	71.0	6	17.1	12	34.3	18	51.4
Convenience	5	3.0	13	7.7	18	10.7		5.7	6	17.1	8	22.9
Random	1	0.6	1	0.6	2	1.2	0	0.0	1	2.9	1	2.9
No logic offered	8	4.7	21	12.4	29	17.2	4	11.4	4	11.4	8	22.9
Totals	72	42.6	97	57.4	169	100.0	12	34.3	23	65.7	35	100
Number of cases												
1	11	6.5	34	20.1	45	26.6	6	17.1	9	25.7	15	42.9
2	4	2.4	6	3.6	10	5.9	1	2.9	1	2.9	2	5.7
3	8	4.7	13	7.7	21	12.4	2	5.7	2	5.7	4	11.4
4–10	37	21.9	35	20.7	72	42.6	2	5.7	7	20.0	9	25.7
>10	12	7.1	9	5.3	21	12.4	1	2.9	4	11.4	5	14.3
Totals	72	42.6	97	57.4	169	100.0	12	34.3	23	65.7	35	100
Triangulated data sources												
Yes	56	33.1	68	40.2	124	73.4	10	28.6	14	40.0	24	68.6
No	15	8.9	22	13.0	37	21.9	0	0.0	9	25.7	9	25.7
Not stated	1	0.6	7	4.1	8	4.7	2	5.7	0	0.0	2	5.7
Totals	72	42.6	97	57.4	169	100.0	12	34.3	23	65.7	35	100
Data analysis												
Within & cross-case	45	26.6	31	18.3	76	45.0		5.7	7	20.0	9	25.7
Within-case only	12	7.1	41	24.3	53	31.4	6	17.1	10	28.6	16	45.7
Cross-case only	11	6.5	22	13.0	33	19.5	4	11.4	6	17.1	10	28.6
None	4	2.4	3	1.8	7	4.1	0	0.0	0	0.0	0	0.0
Totals	72	42.6	97	57.4	169	100	12	34.3	23	65.7	35	100

theoretical sampling (71%), the remaining used approaches ranging from convenience sampling (10.6%) to random sampling (0.6%). We should note that 29 cases (17.2%) did not mention their sampling logic at all. Of the cases that did not use theoretical sampling, 72.4% of these cases only produced descriptive insights. In comparison, of the case studies that adopted theoretical sampling, only 51.7% resulted in producing descriptive insights. All of the 21 articles (12.4%) under descriptive insights that did not offer sampling logic came from IJOPM.

4.2.1.5. Number of cases. Seventy-two (42.6%) articles were in line with the ideal number (i.e. between 4 and 10 cases),

as suggested by Eisenhardt (1989). Of 76 articles that used less than 4 cases, 34 (20.1%) articles used a single case, all of which produced descriptive insights. For 21 (12.4%) articles that used over ten cases, there was a tendency to derive more framework/proposition than purely descriptive insights.

4.2.1.6. Data sources. Overall, 124 out of 169 (73.4%) inductive articles used triangulated data sources. In terms of research outcomes, the use of triangulated data sources had a big impact on the development of formal propositions or frameworks, whereas only 22.2% (16 of 72) of articles did not use triangulation. This percentage is

higher for cases that produced descriptive insights at 30%, i.e. 29 of 97 articles.

4.2.1.7. Data analysis. For inductive studies that used both within and cross-case analysis, the majority of them (45 out of 76 or 59.2%) were able to derive either a theoretical framework or formal propositions. This percentage is much lower for cases that used only within case or only cross-case analysis.

4.2.1.8. Summary of inductive qualitative case study papers. The inductive articles that were more rigorous with their research design managed to produce frameworks or propositions as an outcome of their research compared to those that were less rigorous. When examining the differences between the three main research outcomes (i.e. frameworks, propositions and descriptive insights), we found three key drivers: (1) justification for choice of case-based research methodology, (2) clearly stated unit of analysis, and (3) the use of multiple case studies leading to both within and cross-case analysis. All of these three drivers represent significant opportunities for improving the methodological rigor and contributions. Along with the three drivers we also found that case based studies are doing better with issues relating to the use of theoretical sampling, the use of triangulated data sources, the choice of an appropriate number of cases with which to undertake their research, and the use of theory and phenomena drawn from the literature in framing their research. Finally, in terms of the research outcomes, the articles that produced only descriptive insights represent a significant opportunity for potential improvement. While making some basic contribution in terms of the insight they provide, further work remains to move the theory building element of these articles to the point where they can begin to be tested.

4.2.2. Deductive case study papers

A more confusing picture is shown in Fig. 6. We could not detect any patterns between the methodological design categories and the level of rigor. Under justification of research approach, sampling strategy, unit of analysis and theory vs. phenomenon, the descriptive insight articles appear more rigorous compared to the other two research outcome categories. Then, the situation is reversed for the remaining three categories—number of cases, data source triangulation and data analysis. Perhaps, this was to be expected given there are no explicit guidelines published for using case studies for deductive, theory-testing purposes. We also note that there are articles that unquestioningly apply an inductive logic to deductive case studies, for instance, using within-case and then cross-case analysis rather than treating each case as a separate entity for confirmation/falsification purposes.

4.2.2.1. Justified research. For theory-testing, a survey methodology is typically considered a preferred choice and it is clearly not intuitive to use case studies for such a purpose. Therefore, providing methodological justification for using case studies for deductive purposes would be even more important than it would be for inductive research. However, over 45% of the deductive articles did not offer any justification for using case-based research, compared to less than 40% for inductive articles. When at least some justification is offered, the tendency is to use the inductive-based logic (e.g., the nature of their research questions).

4.2.2.2. Unit of analysis. Overall, 29 (82.9%) articles did not clearly state their unit of analysis, which represents a very significant opportunity for improvement. Despite overwhelming majority, the issue of whether articles clearly stated their unit of analysis does not seem to have impacted the research outcome.

4.2.2.3. Theory vs. phenomenon. Surprisingly, most studies (31 or 88.6%) used an emerging phenomenon derived from the extant literature. Existing theory was only used in four (11.4%) of deductive papers with none of them being able to provide confirmation or falsification of the selected theory, or even revision of the framework or hypotheses drawn from the theory. Instead they all derived only descriptive insights.

4.2.2.4. Sampling approach. For deductive case studies, the majority of articles (18 or 51.4%) used theoretical sampling (51.4%), followed by convenience sampling (8 or 22.9%) and no logic offered (8 or 22.9%) and random sampling (1 or 2.9%). No clear patterns emerged in terms of the sampling approach and the resulting research outcomes.

4.2.2.5. Number of cases, data sources and data analysis. For deductive case studies, 15 (42.9%) articles used a single case, in line with the notion of confirming or falsifying an existing theory. There are no distinctive patterns relating the number of cases used and the research outcomes for deductive case studies. Overall, deductive case studies appear to have adopted an inductive logic for the presentation of their data analysis. While only a single case is needed for confirmation/falsification purposes, additional cases can certainly add further plausibility to the conclusion. Of the 35 total deductive cases, 9 (25.7%) presented within-case combined with cross-case analysis, and 10 (28.6%) presented only their cross-case analysis. As such, these articles employed an inductive logic based on replication, rather than treating each case as a separate “confirming/falsifying” entity.

4.2.2.6. Summary of deductive qualitative case study papers. Our research reveals a more troublesome picture in terms of deductive case-based research. Given the lack of specific guidelines in the literature, it is surprising to see 35 of 204 papers attempting to utilize case-based research for theory-testing purposes. At the same time, it is unfortunate to see that in many instances articles appear to have simply adopted an inductive logic for their deductive research. This apparent decision manifested itself into some serious “methodological” problems related to the justification of the research approach, unit of analysis, the use of theory vs. phenomenon, and data analysis.

5. Discussion and implications for future research

In response to the calls for more qualitative case studies, the OM field has seen a slowly but steadily increasing trend since 1992. The trend is especially notable in IJOPM and JOM, although the percentage of case articles compared to total articles still remains small. Based on our observations, we believe the OM field will continue to see increasing numbers of qualitative case studies, and if so, it becomes more imperative that the OM field takes stock of what we have done as a field and clearly delineate the areas of improvement.

We offer what we perceive to be the typical profiles of case studies using inductive and deductive approaches. We then conclude by making suggestions for future research. In particular, we propose a methodological model for conducting qualitative case studies for deductive, theory-testing purposes.

5.1. Typical profiles of inductive and deductive studies

The typical inductive paper is focused on describing a phenomenon, using theoretical sampling of multiple cases. There is evidence for some triangulation when conducting data analysis with within and cross-case comparisons. However, it only partially

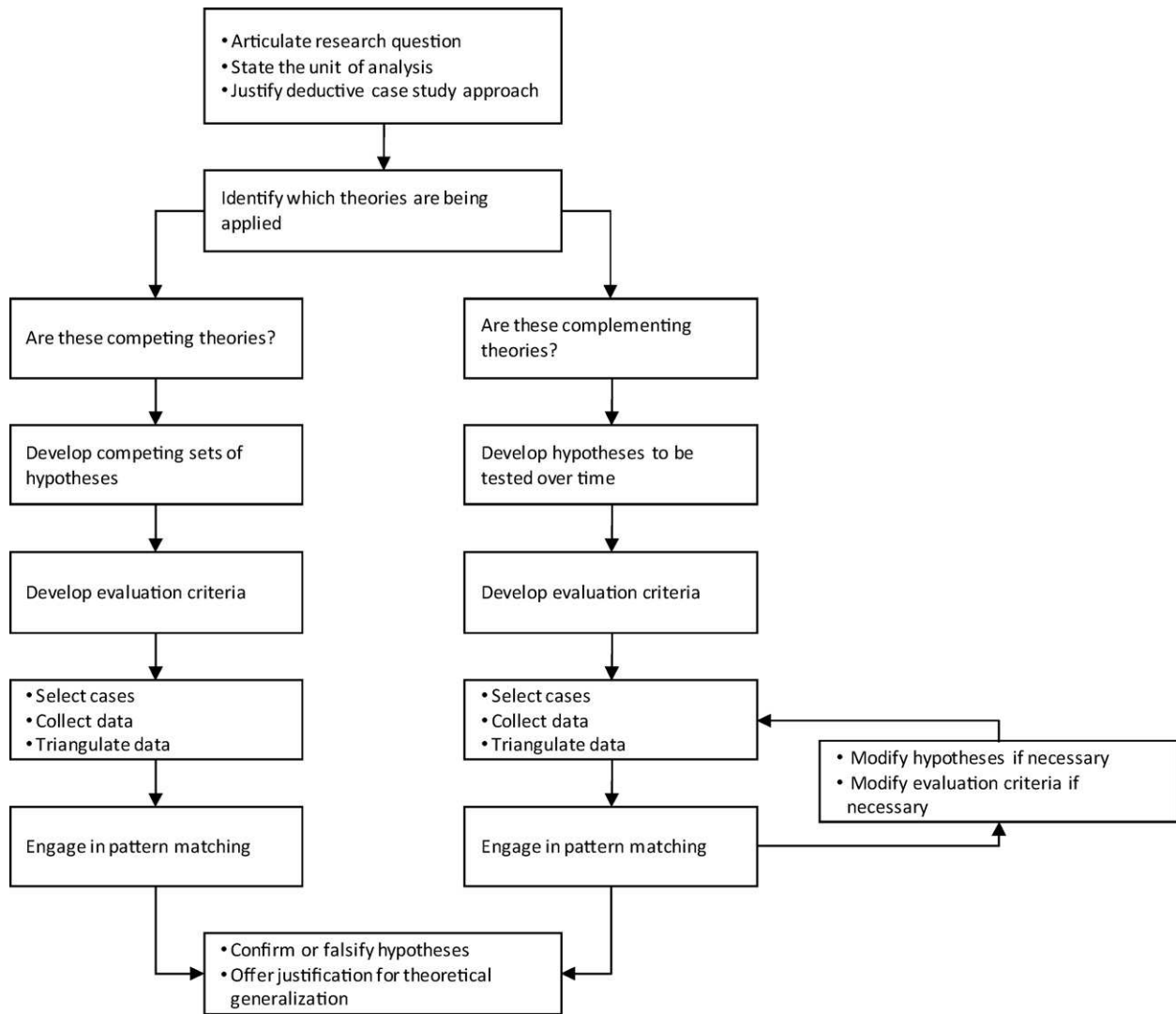


Fig. 7. Suggested approach to conducting deductive case studies.

justifies its research idea and may not clearly state its unit of analysis. It ends up offering some insights but falls short of advancing new propositions or theories.

The typical deductive paper is focused on revising existing frameworks/hypotheses or describing a phenomenon, using a single case with within-case analysis. However, it does not clearly articulate research questions and its unit of analysis. In the absence of clear research protocols, it adopts inductive logic for deductive purposes. For instance, the qualitative data that support hypotheses are compiled inductively and then are used for deductive means to claim support. It imparts a strong impression that the authors selectively chose evidence to justify confirmation of their hypotheses.

Overall, the typical profiles of both approaches lack some details in how the study is framed and how the analysis is conducted. If so, the basic scientific mode of inquiry that would call for transparency and repeatability could be compromised. Nonetheless, moving forward, we believe the OM field is in a good position to improve our research practices involving inductive approach as its protocols are well developed. However, the deductive case studies research protocols are still being developed and debated.

5.2. Moving forward with case study research

From our examination of 204 inductive and deductive case studies published during the period 1992–2007, we have found that the use of qualitative case studies has made some contributions to the OM field in terms of theory building in new areas and also from integrating existing theory with new contexts. However, despite these positive contributions there are some clear lessons that the OM field needs to heed for theory building and testing purposes, which would increase the rigor and perceived quality of our research, and possibly lessen some of the doubts about the use of this particular methodological approach.

Firstly, for inductive, theory building studies, researchers should follow, and academic journals should seek to encourage researchers to follow, the significant guidelines that have emerged for the use of qualitative case studies for theory building. Secondly, for theory testing purposes, there needs to be a concerted effort within the OM field to develop some standards, or at least some degree of consensus beyond the thoughts of Yin (1989) over whether qualitative case can be used for theory testing, and if so, on what basis and how such case studies should be undertaken.

To begin this process, we recognize that the extant literature points toward two approaches for using qualitative case studies for theory-testing (Eisenhardt, 1989), based on the overarching form of confirmation of the appropriateness of a theory. Firstly authors could assess the appropriateness of *competing theories* (e.g. Eisenhardt, 1989; Pinfield, 1986; Keil, 1995), and secondly, authors could follow an approach based on the collection of *longitudinal data* (e.g. Bitektine, 2008). We offer Fig. 7 as a broad framework to take a step toward creating an approach for conducting qualitative case studies for deductive purposes.

Research questions first need to be stated clearly and the unit of analysis identified. Then, the logic of deductive mode of inquiry should be presented. Here, it should no longer be one that argues exploratory purposes, because the mode is theory testing and not theory building. Applicable existing theory or theories should be discussed. If competing theories, competing sets of hypotheses should be developed. If single theory or complementary theories, a longitudinal study should be planned.

The competing theories approach is based on the careful delineation of multiple dimensions drawn from at least two competing theories (Pinfield, 1986). These dimensions are then evaluated for their appropriateness against data derived from a case study. The evaluation criteria are identified before data collection, and case study data is collected from multiple sources to avoid interpretive bias. The theoretically derived dimensions are considered in the analysis through pattern matching (Yin, 1994) and qualified recommendations are made as to the most appropriate theory. When discussing the final results, theoretical generalization, as opposed to statistical generalization, should be addressed.

The underlying logic of the longitudinal approach is in essence similar to that of the competing theories approach in that the data collection and analysis in multiple points in time helps guard against interpretive bias. However, the longitudinal nature of the approach gives rise to some fundamental differences (Bitektine, 2008). After formulating research questions and selecting theories, an initial case study is identified and the data collection and analysis are conducted. Once the exercise of pattern matching reveals which hypotheses are supported and which are not, a set of modified hypotheses may be formulated. Key here is to keep in mind that the researchers are engaged in a deductive mode of inquiry, and modifying the hypotheses does not mean changing the research questions or constructs. A new set of evaluation criteria may be developed as well. These steps are repeated across different points in time until the outcomes have answered the research question. In this process, certain aspects of the theories may be confirmed while some other may be falsified.

Our study has examined the state of qualitative case studies in OM. The case studies will continue to explore new areas of the OM field (i.e. service operations or sustainable supply chains) but will also be used to integrate existing topics and theories (i.e. manufacturing strategy) with new theories and perspectives. Such approaches will lead to new and significant contributions to the OM field. The significantly higher number of inductive case studies published over the period 1992–2007 is reflective of the more advanced development of theory-building research protocols (Eisenhardt, 1989; Meredith et al., 1989; Stuart et al., 2002; Voss et al., 2002). At the same time, our study points out how researchers in the OM field need to improve on offering sufficient details in research design, data collection, and data analysis when they engage in qualitative case studies. In particular, it calls for a need to develop methodological protocols for deductive case studies.

Appendix A. Evaluation criteria, scales and rationale

Measured items for methodological issues	Rating scales and rationale
Justification for case research	"Yes"—A statement of why the case method was adopted appeared in the research together with a clear explanation of why the case research method is appropriate. For example, if "an exploratory study" was used as the justification of the case method, the research provided a clear explanation of the gaps in the literature to validate the "exploratory" claim
<i>Was the reasoning for using a case research method provided? If so, how well was the reasoning?</i>	"Partial"—A statement of why case method was used (for example, an exploratory study) appeared in the research but there was no or only limited explanation of the rationale to validate the initial "exploratory" claim "No"—No attempt of defending the choice of case method appeared in the research
Unit of analysis	"Clearly stated"—The research provided an explicit statement of the unit of analysis
<i>Was the unit of analysis explicitly stated?</i>	"Not clearly stated"—No explicit statement of the unit of analysis was provided in the research
Theory vs. phenomenon	"Theory"—The research was framed by existing theory such as Transaction Cost Economics, Resource-based View, etc.
<i>Was the research grounded in existing theory or phenomenon?</i>	"Phenomenon"—The research was framed by an existing stream of literature such as Inventory Management or Project Management "Neither"—The research was not framed by existing theory nor existing literature
Sampling strategy	"Theoretical"—Cases(s) were selected for theoretical purposes, for example, to select polar extremes where cases exhibited extremely high or extremely low value on the constructs of interests
<i>How did the researcher(s) decide on which case(s) to choose?</i>	"Convenience"—Case(s) were selected out of convenience of the researchers, for example, the case companies were located within close geographical proximity of the researchers "Random"—Case(s) were randomly chosen "No logic offered"—No discussion appeared in the research regarding how the case(s) was/were selected
Number of cases	We noted the number of cases examined in each research article and then grouped them in 5 categories: 1, 2, 3, 4–10 and greater than 10. The range of 4–10 was drawn from the recommendation by Eisenhardt (1989)
<i>How many cases were examined in the research?</i>	
Triangulated data sources	"Yes"—More than one source of data was collected and used to validate the findings, for example, company documentation was reviewed in addition to interviews with key informants
<i>Was there more than one source of data used to validate the research findings?</i>	"No"—Only one source of data was collected and used "Not stated"—No discussion of the data sources appeared in the research
Data analysis	"Within & Cross-case"—Both within and cross-case analyses were provided
<i>How were the research results presented?</i>	"Within-case"—Only within case analysis was provided "Cross-case"—Only cross case comparison was provided "None"—No within or cross case analysis was provided

Appendix B. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.jom.2010.06.002.

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