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Abstract title: On the role of Objects and Observation in Engaged Qualitative Research

Martin Spring, Lancaster University Management School, m.spring@lancaster.ac.uk, +44
(0)1524 592739

Juliana Bonomi Santos, Lancaster University Management School,
j.bonomisantos@lancaster.ac.uk, +44 (0)755 2142017

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Abstract

In OM case study research, methodological practices have been adopted in order to provide assurances of research quality. As well as a concern with research design, these often emphasise data collection and analysis methods revolving around the recording, transcription and subsequent analysis of data from interviews, sometimes using data analysis software. Such analyses are then ‘triangulated’ by the use of ‘observations and documentary evidence’, but the nature of this is often vague. In contrast, this paper argues that the role of observations and the cognition, by researchers and research subjects alike, of objects such as products, machines, diagrams and software programs, is seriously under-played. This seems a particularly important opportunity for OM, a discipline centrally concerned with making and using ‘things’. Using specific examples from recent research experiences, we propose a more insightful approach to truly ‘qualitative’ qualitative research.

1. Introduction

The case study method plays an important and growing role in operations management (OM) research. According to Craighead and Meredith (2008), this method represented 7% of the papers published in several OM journals in 1977, a number that increased to 34% in 2003. Also, a review conducted by the authors on the case studies published from 2005 to 2009 in the Journal of Operations Managements revealed that 62% used qualitative methods as the main source of data, the left amount applied quantitative problem-solving techniques, simulations or surveys. This review also showed the works of Eisenhardt’s (1989), Yin (1994), Meredith (1998), Voss et al. (2002), McCutcheon and Meredith (1993), Handfield and Melnyk (1998) and Miles and Huberman (1984) as some of the mostly used in the research planning process. OM is constantly trying to understand and manage complex interactions of people, market requirements, processes, inter-firm relationships, assets,

required capabilities and technologies to deliver products and services to customers. So in-depth analysis of firms operations in day-to-day context can be very helpful to answer different questions, identify new concepts and understand connections. For this reason, maybe, operations management researchers are increasingly using qualitative techniques to investigate specific cases.

Case study can be presented as a methodology; nevertheless a case is an object of study and, as such can be explored through different methodological options. (Stake, 1998). In this sense, simulations, intra-company surveys, in-depth interviews and ethnography are all alternative ways to explore particular cases and the methodological choice must be related to the singularity that will be explored. Qualitative research is useful to study phenomena in their natural settings, interpret and make sense of them, producing in-depth understanding of why and how things happen (Denzin and Lincoln, 1998). A point stressed by many case method authors is the importance of triangulation. Qualitative data can be highly exposed to bias due to the high level of involvement and the need of interpretation of the researcher (Boyer and Swink, 2008) and convergence in data resultant from different methods enhances validity. Nevertheless, the use of multiple methods may do more than just eliminate bias, it can uncover unexpected aspects about a phenomenon providing deeper and better understanding since strengths of different techniques are combined. In this sense, no method should be preferred and the choice of which one to use must be related to the phenomenon explored (Jick, 1979).

Nevertheless, it appears that OM does not fully explore the benefits of triangulation, by relying predominantly on interviews. When reviewing the case studies published in the *Journal of Operations Management*, it was possible to map that 24 out of the 25 qualitatively analyzed cases used mainly interviews. Also, seven cases used only this method, but no case used exclusively any other method. Observation was combined with interviews in 10 cases

and quantitative methods in eight. Authors did present the type of interviews design, time and protocols, but rigor in describing the secondary sources was lower; mainly authors just mentioned having “toured” facilities to understand operational process and reviewed documents (Closs et al., 2008; Hyer et al., 2009; Krajewski et al., 2005; Smith et al., 2009; Wu and Choi, 2005). This interview-centric view is also reinforced theoretically in Voss et al. (2002) work, which presents interviews as the main source of data and observation, informal conversations, internal surveys and documental analysis as complementary ones.

As researchers, we tend to neglect non-verbal data. Because interviews provide access to the stock of knowledge individuals have (Flick, 2009), they may require less time from the researcher in the field and shift responsibility for data generation from the researcher to the interviewee, interviewing can appear more attractive than observation. However, a part of this knowledge is more implicit, difficult to explain verbally or to write down and manifests itself in form of attitudes and actions (Polanyi, 1967). Watching and listening to people in daily situations and asking questions can help researchers gain access to this covert expertise (Hammersley and Atkinson, 1995). Objects and other visual data may complement speech by easing descriptions and explanation of concepts. Often, verbal data only makes sense in conjunction with objects. Thus, the role of observations and the cognition, by researchers and research subjects alike, of objects such as products, machines, diagrams and software programs, is seriously under-played in the OM field, a discipline centrally concerned with making and using ‘things’. The fear of subjectivity that surrounds non-verbal data could be one reason for this, but we argue that when properly applied and combined with interviews, this type of data produces deeper understanding and rich insights on phenomena of study and even more rigorous research.

Drawing on the observation and visual data literature, on personal experiences of the researchers and examples, this paper will attempt to provide a useful way to use observation

and objects in OM research. The remainder of this paper is organized as follows. We start exposing how the use of observation and cognition of objects can provide insights to the OM field. Next, a discussion about subjectivity of non-verbal data and the ways to minimize its influence on research results is present and some cases applying these methods in the operations management research are unveiled. The paper ends with conclusions and suggestions for interested researchers.

2. Some insights on observation and visual data

Although the theory of knowledge is not the focus of this paper, the notion tacit knowledge and how it is transferred is important to understand how non-verbal data can provide deeper understanding of operations management processes. Tacit knowledge, a name given by Michael Polanyi (1967), is the ability humans have to perform tasks without being able to verbally explain how they do it. Polanyi's own words - "we know more than we can tell" - are perhaps the best way to represent this concept. When a significant part of an activity involves this kind of knowledge, passing it on may be quite difficult (Collins, 1985). According to Nonaka (1991), this can be done by translating it into a set of codes that can be understood by others or by social interaction between humans. While in the first case, efforts must be made to define signs, objects, documents, words to correctly represent acts, in the later the sharing process can occur even without words, just through observation.

Operations management involves studying business processes (Boyer and Swink, 2008), which are frequently rooted in tacit knowledge. Therefore people may not be consciously aware of general process notions when interviewed, but would reveal these through showing examples of particular processes, and then discussing these. Also, interviewees may be able to say what happens in general, but then observation and discussion of specific examples reveals that there are lots of exceptions. In these situations, observation associated with visual data can be a suitable method to understand activities. In companies, visual data (e.g.

photographs, films, maps, diagrams, charts, tables and prototypes to mention a few) are usually used in the knowledge decryption process because they provide accurate and easy-to-use records. In both cases, verbal data is part of the knowledge generation process, but it only makes sense because visual data allowed deeper understanding of phenomena.

This combination of on-time observation, use of objects and interactive dialogs provides great opportunity for understanding complex phenomena, identifying their causes and correlations of underlying constructs. Individual personal knowledge triggered by visual stimulus enables easy understanding of quite complex issues. One simple example can be found in process layout design; it is quite complex to explain all the operations, movements, delays and storages in the construction of large ships. But an experienced researcher asking questions to a naval engineer while walking around in the ship construction area may easily grasp process efficiencies and bottlenecks.

The main restriction to the use of observation and cognition of objects is perhaps subjectivity. As mentioned, the interpretation of figures and facts is done through a researcher's lens. Different observers may see "reality" and look at objects in alternative ways, once individuals sense-making is related to their social, cultural and intellectual background (Hammersley and Atkinson, 1995). Engineers may examine complex prototypes with relative comfort but not analyze surgical procedures in the same way surgeons do. Thus, this type of data is socially constructed. A second sort of bias may derive from higher levels of researchers' involvement in the field. Observation usually requires researchers to spend more time in contact with organizations than conducting interviews, which can distort their perspectives and make them lose focus of relevant investigation points (Denzin and Lincoln, 1998). However, this should not prevent OM investigators from benefiting from these methods.

In general, qualitative data are exposed to different sorts of sociological bias (e.g. perceptions, interpretations, incompleteness, social desirability), but whether non-verbal data is more subjective than verbal it is difficult to tell. While the first is exposed to greater influence of an observer's cognitive skill, the second relies on a respondent's memories, personal opinions and filters (Denzin and Lincoln, 1998). Since bias is present anyway, there is no reason for the OM field using interviews as the main data collection tool, as suggested by Voss et al. (2002). Based on benefits associated with the use of observation and objects to explore complex concepts, our field could be losing relevant insights. Instead, researchers should apply the most suitable methods for exploring their research questions (Jicks, 1979) and try to minimize subjectivity impacts.

One way to do that is through reflexivity. Researchers must think about themselves while collecting and interpreting data; how their presence affects results and how their previous knowledge influences analysis outcomes (Flick, 2009). Their commitment must be with knowledge generation, while political and theoretical convictions must be left aside (Hammersley and Atkinson, 1995). Self-awareness, however, may reduce subjectivity, but never eliminate it. Another is by using within and across methods triangulation.

Across methods conciliation of data is well disseminated throughout the literature. It involves using a high variety of material to capture accurately the breadth and depth of reality (Denzin and Lincoln, 1998). Using data from interviews, narratives, life stories, surveys, observations and secondary quantitative data, documents, pictures, objects can help fill in the blanks and find missing links. As a by-product, the confrontation of different methods increases research external validity by eliminating distortions and confirming impressions (Jick, 1979). Within-methods triangulation on the other hand is less popular, especially in the OM field, but it increases internal data consistency by using different "scales" to measure the same concept (Pedhazur and Schmelkin, 1991). In the case of observation for OM research, it

could be executed by using different levels of researcher participation during the observation combined with alternative research protocols structures and types of objects analyzed. Researchers could observe meetings or speeches, interact with organizations' employees while analyzing machines, prototypes, project chats, process flowcharts, products and conduct on-the-job interviews to get insight on the same phenomena. Each of these activities should be previously planned and accompanied by structured or unstructured protocols. Structured protocols provide focused data and can be used in the quest for specific evidence, while unstructured are indicated to allow more flexibility and get insights on unfamiliar issues (Flick, 2009). Convergence between the different data collection tools indicates great data reliability.

Qualitative data is, in one way or the other, exposed to alternative types of bias. When using observation and cognitive interpretation of objects, the influence of researchers' backgrounds on data collection and analysis and level of involvement are important issues. Awareness and triangulation should be used to overcome these limitations, allowing OM researchers to benefit from deeper, broader and sometimes easier understanding of phenomena. The next section presents some applications of these methods in the OM field.

3. Practical applications

The first case presented in this section is about the demand planning process of a consumer goods company located in Brazil, where observation and visual data were used as the main data collection methods. The second example unveils the use of objects in fieldwork and discusses the role of previous cognitive skills of the researcher.

Case 1

The first case presented is about the demand planning process of a consumer goods company located in Brazil. The motivation for studying this company emerged after the second author

of this paper and a fellow researcher saw a thirty percent reduction in the sales forecast error associated with the implementation of a structured demand planning system. The focus was to understand the contributions of quantitative tools and qualitative processes to this reduction and how these two aspects of demand planning interacted, therefore the unit of analysis was the demand planning process. Since researchers had a good long-term relationship with the company, access was easily granted. The initial plan was to conduct interviews with employees related to the demand planning process, but after the first interview with the supply chain manager it became clear that it would not be possible to answer the research question using exclusively this method. So an approach based on observation, interviews, sales forecast indices and demand planning software evaluation was designed.

Two interviews of two hours each were conducted with the supply chain manager to understand the creation of the demand planning process, to map demand planning flow, to identify the people in charge of each stage and to get some insights on what to focus at. Interview protocols were unstructured; with only these four cited topics pre-defined. Both interviews are taped and transcribed. After the interviews, the researchers defined the observation format and scope. Three types of observation were employed: 1) on-the-job interviews with marketing product manager, demand planners and supply planner; 2) non-participant observation of fortnightly production planning meetings (involved marketing, sales and supply chain management teams to plan next periods sales); 3) observation of the sales forecast number generation and roll-out during one month associate with questions asked to one employee assigned to help during the research. Observation protocol were structured but researchers still allowed themselves to make notes on non-covered issues. All notes were taken on time, by the two researchers independently. To analyze the demand planning software, the researchers went through the training that new employees were

submitted and then had access to the system to “learn by doing”. When questions emerged, they were addressed to the employee assigned to help. After learning to use the software, researchers discussed and wrote down the main qualitative and quantitative aspects of it and how it promoted the interface between departments. No protocols were used for this method. Finally, the sales forecast error data for two years was calculated. The period covered the pre- and post-demand planning system implementation. In total, researchers stayed three months in contact with the company with at least two visits of half-day per week. After careful data analysis, conciliation between and within methods, the researchers had several insights on the phenomena. Roughly, some key points were that qualitative aspects account for most of the sales forecast error reduction, but without the quantitative number generated by the demand planning system the demand planning process cannot function. Marketing, sales and operations departments need the number as a baseline to start discussing, but what refines the number are individuals' expertise, pressures for selling some products and interdepartmental efforts.

After critically analyzing the methods employed, both researchers agreed that results could not have been reached without understanding of the demand planning software and the observation of daily routines. Researchers' presence had small influence on employees' behavior, since no sensitive issue was addressed. Also, it was easy to keep on the track and collect mainly relevant data, since the research focus was very clear and did not involve any emotional connection. Probably the most important subjectivity issue of this research was regarding the researchers' backgrounds; both had previously worked with demand planning, one as a consultant and another as a demand planner. This previous knowledge of the field allowed the researchers to understand more easily how the software worked and the relevance of each stage of the process but during the data analysis different points of view emerged.

Several points required additional discussion and even feedback from the company to be solved.

Case 2

The second example concerns the importance of objects and the relationship between the use of objects in fieldwork and the prior understanding and technical experience of the researcher. One of us (Martin Spring) is researching a firm producing high-specification engineering components. The firm is interested, in various ways, to provide more added-value services as well as ‘just’ making components. The research has involved several months of exploratory meetings and workshops with the management team to explore and develop service-rich approaches. To complement this, a series of meetings with individual managers, focusing on specific examples of development projects, was carried out.

One of these projects concerned the re-design of the manufacturing process for a complex part. In broad terms, the innovation was to shift from producing the part by buying in sand castings and then machining the part to the final dimensions, to machining the part from a solid piece of metal. This brought control in-house, removed dependence on external casting suppliers, and led to quality and delivery speed improvements at no additional cost. It could be achieved by the sophisticated integration of CAD-CAM modeling tools with the firm’s in-house machining capabilities. An important point for the present discussion is that Martin (the researcher) has an industrial background in designing cutting tools and machining processes. The “interview” was with the Chief Manufacturing Engineer, beginning at his desk in the Engineering office. Within a minute of the discussion starting, the Chief Engineer produced a large sand-casting from under his desk and showed it to Martin. The discussion then proceeded via an adjoining desk/computer terminal where process modeling software was being used to the use of stereolithographic model of a similar part, and another computer

screen that showed the capacity utilization of the licences for the CAD-CAM software that would be required to carry out the project.

Two important things are happening here. One is that various critical issues – for example, the the ‘complexity’ of the part - are made immediately manifest by seeing it and being shown the processes that may be used to make it. Of course, that it is complex is only apparent because of the technical knowledge of the observer or, at least, the extent and nature of the complexity and the implications of that for manufacturing it are much better understood by Martin than by someone who doesn’t know anything about manufacturing processes. There is a triangular relationship between the Chief Engineer, the object and Martin: the dialogue occurs to a greater or lesser extent both through and about the object. It is not ‘just talk’ and makes much less sense on its own. Importantly, the depth and subtlety of understanding is much greater than it would have been without the objects being used.

A second and related point is that the ‘common ground’ of the Chief Engineer and Martin mean that conversation proceeds with a great implicit use of indexicality. For example, once it is stated that the part is currently made by sand-casting, Martin can access from his prior experience a fairly detailed understanding of the advantages and disadvantages, trade-offs and implications of this process – and hence of the desirability of an alternative – without any of these having to be articulated in the discussion. Some are, but much remains implicit. These data would not be ‘collected’ by recording and transcribing the speech that took place, but permit a much richer and more nuanced understanding of the issues. Note that ‘observation’ is not used as a ‘different’ form of data to ‘triangulate’ the speech (in the sense of ‘confirming’ or corroborating what the interviewee says, but that the various aspects are complementary and mutually defining).

4. Remarks and conclusions

The operations management field tends to neglect non-verbal data, probably because interviews provide good access to information and individuals' knowledge. However, a part of this knowledge is difficult to explain verbally or to write it down and manifests itself in form of attitudes and actions (Polanyi, 1967). Operation management involves several business processes that are based upon this kind of knowledge, so watching daily situations, following processes up, understanding how products, machines, systems work in conjunction with verbal data can be an useful way to explore several phenomena of our field. The cases presented show some evidence of this statement. The main restriction to the use of these methods is subjectivity. However, it can be overcome with the use of reflexivity and triangulation. Qualitative data, in general, are exposed to different sorts of bias and it is difficult to tell whether non-verbal data is more subjective than verbal. So, this point should not prevent OM researchers from using these valuable techniques when applicable.

Also, there are some important aspects to consider when these methods are adopted as a data collection technique. First, is that it requires longer periods of contact with the field and may provide an additional constrain while negotiating access. Secondly, it may not be possible or even interesting for research purposes to observe everything; pre-planned theoretical sampling, as proposed by Glaser and Strauss (1967), can help drive efforts towards better results. Thirdly, this kind of approach may be more difficult to replicate in other cases, but maybe that what researchers learn from some cases may not need to be replicated after all. Finally, it may be more difficult to access what can and cannot be disclosed, since much of what is seen may not be explicit. Confidentiality contracts should address this issue to avoid stress between the parts.

References:

- Boyer, K. K., & Swink, M. L. 2008. Empirical elephants - why multiple methods are essential to quality research in operations and supply chain management. *Journal of Operations Management*, 26: 7.
- Closs, D. J., Jacobs, M. A., Swink, M., & Webb, G. S. 2008. Toward a theory of competencies for the management of product complexity: six case studies. *Journal of Operations Management*, 26: 21.
- Collins, H. 1985. *Changing order*. London: Sage publications, Inc.
- Collins, H. 1993. The structure of knowledge, *Social Research*, 60:7.
- Craighead, C. W., & Meredith, J. 2008. Operation management: evolution and alternative future paths. *International Journal of Operations and Production Management*, 28(8): 17.
- Denzin, N. K., & Lincoln, Y. S. 1998. *Collecting and interpreting qualitative materials*. London: Sage publications, Inc.
- Eisenhardt, K.E., 1989. Building theory from case studies. *Academy of Management Review*, 14:18.
- Flick, U. 2009. *An introduction to qualitative research* (4th ed.). London: Sage publications, Inc.
- Glaser, B.G., & Strauss, A. L. 1967. *Discovery of Grounded Theory. Strategies for Qualitative Research*. Chicago: Aldine Publishing Company.
- Hammersley, M., & Atkinson, P. 1995. *Ethnography: principles in practice* (2nd ed.). London: Routledge.
- Handfield, R.B., Melnyk, S.A., 1998. The scientific theory-building process: a primer using the case of TQM. *Journal of Operations Management*, 16 (4):18.
- Hyer, L. N., Wemmerlöv, U., & Morris Jr., J. A. 2009. Performance analysis of a focused hospital unit: the case of an integrated trauma center. *Journal of Operations Management*, 27: 17.
- Jick, T. D. 1979. Mixing qualitative and quantitative methods: triangulation in action. *Administrative Science Quarterly*, 24(Dec): 11.
- McCutcheon, D.M., Meredith, J.R., 1993. Conducting case research in operations management. *Journal of Operations Management*, 11 (3): 17.
- Meredith, J., 1998. Building operations management theory through case and field research. *Journal of Operations Management*, 16:13.
- Miles, M.B., Huberman, A.M., 1984. *Qualitative Data Analysis: A Source-book of New Methods*. London: Sage Publications, Inc.
- Nonaka, I. 1991. "The knowledge creating company." *Harvard Business Review*, 69, (Nov-Dec):8.
- Polanyi, M. 1967. *The tacit dimension*. New York: Doubleday Anchor.
- Pedhazur, E. J., Shmelkim, L. 1991. *Measurement, Design and Analysis: an integrated approach*. Hillsdale: Lawrence Erlbaum Associates Publishers.
- Smith, A. D., Plowman, D. A., Duchon, D., & Quinn, A. M. 2009. A qualitative study of high-reputation plant managers: political skill and successful outcomes. *Journal of Operations Management*, 27: 16.
- Stake, R. E. 1998. Case studies. In N. K. Denzin, & Y. S. Lincoln (Eds.), *Strategies of qualitative inquiry*: 346. London: Sage publications, Inc.
- Voss, C., Tsikriktsis, N., Frohlich, M., 2002. Case research in operations management. *International Journal of Operations & Production Management*, 22 (2): 24.

- Wu, Z., & Choi, T. Y. 2005. Supplier-supplier relationships in the buyer-supplier triad: building theories from eight case studies. *Journal of Operations Management*, 24: 26.
- Yin, R., 1994. *Case Study Research: Design and Methods*. London: Sage Publications, Inc.