

How to publish operational excellence case studies in the IJLSS: a viewpoint article

1. Introduction: why this viewpoint?

The *International Journal of Lean Six Sigma* encourages the publication of papers presenting applications and cases of lean six sigma and other methodology in operational excellence. Examples include reports of green and black belt projects, cases where practitioners solved complex problems using techniques from operational excellence (e.g. [Ren et al., 2022](#)), as well as descriptions of the deployment of operational excellence or continuous improvement in a particular organization (e.g. [Duggan et al., 2022](#)) and other applications of process improvement in practice (e.g. [Ahmed et al., 2022](#)). Potentially, such publications presenting real cases and applications are a rich source of information from which scholars can study the challenges of applying and deploying theory in operational excellence in the complex and messy environment of a real organization. Many such papers submitted to this journal, however, fail to live up to that potential.

The typical outline of such unsuccessful case reports is:

- *Goal*: We did an interesting project in company X. The goal was to improve a production process.
- *Case description*: We followed the DMAIC or alike roadmap accumulating in a factorial experiment or another method. From this, we identified valuable process improvements, which we subsequently implemented.
- *Conclusions*: The new process settings saved the company lots of money, i.e. yielded substantial benefits.

Where such case reports typically fall short, is that they are not much more than a description of the work that was done and the results that were obtained. There are often few or no lessons drawn from the case, and there is typically little reflection on whether these lessons may be generalized, or effort to integrate these lessons into a more coherent new theory relevant to the field of operational excellence. We do believe that case reports are a valuable contribution to the field, of merit of being published. To help researchers considering to submit a case report to this journal, we propose a framework intended to guide researchers in presenting case reports such that they make a more valuable contribution, and as part of the endeavor to build up a body of knowledge on deploying operational excellence in practice.

To avoid confusion, it is important to distinguish traditional case-study research from *postmortem* case reports. There are two essentially different types of papers that present applied cases, and authors should clearly decide which category their particular contribution fits in. On one hand, there are papers presenting cases that were set up from the start as vehicles for gathering scientific evidence for a research project. We refer to such papers as case-study research, and in operations management, this is an established form of empirical research, as in [Eisenhardt \(1989\)](#), [Voss et al. \(2002\)](#) and [Ketokivi and Choi \(2014\)](#).



Section 4 provides procedural guidance for researchers that aim to start a research project based on case studies and subsequently report the findings of such studies in a journal such as this.

On the other hand, there are case reports, commonly presented as case-study research but essentially different. Such papers typically present an interesting application, done by practitioners, that in retrospect is thought to offer generalizable lessons to the field and therefore merits publication. Such cases were not originally set up as research projects, and such papers are not true research papers. We will refer to such contributions as case reports, and in the first part of this viewpoint, we offer guidelines for structuring them such that the lessons learned are presented clearly. Both case reports and case-study research are important elements of an iterative-learning, action-driven research process, where a field builds up knowledge and understanding by trying out insights in practice and learning from the experience. We argue that design science offers a useful paradigm for understanding the roles of case reports as well as case-study research in this iterative learning cycle, and design science also offers the concepts and building blocks for our proposed reporting guidelines. The next section offers a brief introduction in design science, identifying the concepts that we will use in the subsequent sections that present our proposed guidelines.

2. Design science and the role of cases in operational excellence research

Papers based on applied cases are a helpful contribution to the research community for building up knowledge about the application of methodology, methods and techniques in practice. Cases play an important role in many of the so-called applied sciences, such as engineering, medicine and management science. What such sciences have in common, is that they aim to develop actionable knowledge: How to build a bridge? How to cure a patient? How to improve a business? Applied sciences develop techniques, methods, approaches and prescriptions, and accumulate knowledge about their effective use in practice. Contrary to explanatory sciences, such as physics, biology and psychology, the goal is not to find truth (is a theory proven?) but to establish effectiveness (does a technique work?). Historically, the applied sciences were, mistakenly, seen as a derivative of theoretical science; engineering seen as merely applied physics, and medicine seen as merely applied biology. Simon's *The Sciences of the Artificial* identified the applied sciences as autonomous bodies of knowledge and coined the term design science to characterize what they do (Simon, 2019).

In recent years, many applied sciences have adopted formalizations of the approach of design science as a useful paradigm for developing actionable knowledge, such as management science (Denyer *et al.*, 2008; Van Aken *et al.*, 2016), engineering (Hevner, 2007; Akoka *et al.*, 2023) and medicine (Gray, 2017). At the heart of design-science research is the design cycle, where an artifact (technique, method and approach) is created and iteratively refined based on testing it out in the relevant context (Hevner, 2007). The design of the artifact is guided by a knowledge base, consisting of scientific theories and methods in the relevant field, as well as experience and expertise. Successful artifacts are ultimately added to the knowledge base. The design cycle also interacts with the application domain, which determines the requirements for the artifact, and which is also the testing bed for evaluating subsequent designs.

The field of operational excellence studies methods, techniques and approaches for improving processes and operations. In the terminology of design science, these are *prescriptions*, having the general form: in a context C, this approach or intervention I, is likely to result in outcome O, which we can understand as the effect of the working mechanisms M (Denyer *et al.*, 2008). This so-called CIMO logic captures the general

objectives of research in operational excellence, where we study the variety of contexts in which operational excellence is applied, what outcomes we pursue by applying our methods, techniques and approaches, what interventions are and are not effective and what mechanisms may explain that some interventions are effective and others are not.

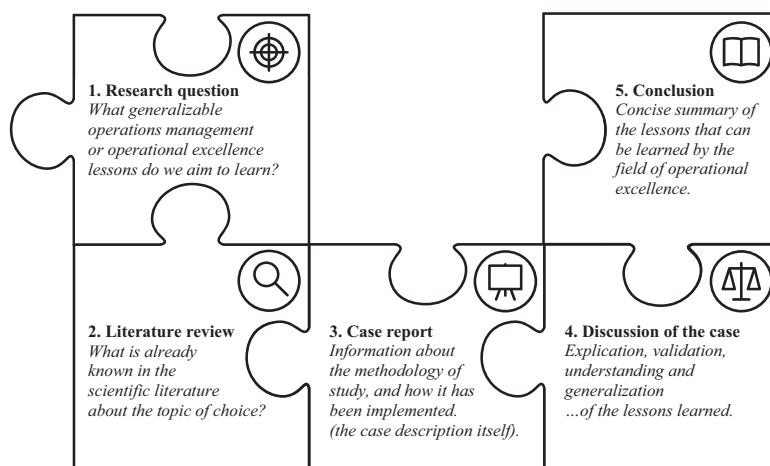
Cases, both in the form of postmortem case reports and in the form of case-study research that is carefully designed beforehand, document the contexts and outcomes of applications, and thus are a primary source of experiential evidence for designing and continuously improving techniques and theory in operational excellence. The next sections offer guidance for presenting cases such that they can be used in this iterative process of testing, evaluating and reflecting that helps the field to refine its understanding.

3. Procedural guidance for the presentation of case reports

Design science offers the concepts and terminology for our proposed format for case reports, and we propose the following structure for such submissions to the *International Journal of Lean Six Sigma* (Figure 1). The structure facilitates the iterative design and improvement cycle of design-science research, where we test an operational excellence approach in practice (as documented in the case report) and then reflect on the outcomes, formulate the lessons to be learned from the experience and integrate them in the existing literature. Below, we clarify each of the sections in this structure.

3.1 Introduction section identifying the research goal

Authors are encouraged to submit a case report if they believe that there are some generalizable lessons to be learned from it for the theory and practice of operational excellence. It is difficult to see what the value would be of publishing routine applications of known approaches. Therefore, authors are encouraged to identify in the introduction section what generalizable lessons they are after. The research goal should be related to what we can learn about operations management, operational excellence or continuous improvement; it should be discerned from the project objectives within the case itself. Legitimate research goals for a case report involve generalizable lessons about the contexts in which operational



Source: Authors' own creation

Figure 1.
Guiding structure for
manuscripts
presenting a case
report

excellence methods are applied, the specific interventions that were done in the case, the outcomes of the interventions or the mechanisms that did or did not make them effective. Examples include:

- cases identifying a new type of problem, for which operational-excellence techniques might be useful (e.g. sustainability performance improvement, system complexity reduction and advanced automation optimization);
- cases identifying a class of problems for which currently no approaches are available;
- cases presenting a novel approach for a relevant type of problem;
- cases presenting a modification of a known approach to adapt it to a novel application context;
- cases presenting the application of known methods in a new domain and identifying relevant complications in doing so (e.g. new business function, new industries and new cultural context);
- cases identifying limitations to the effectiveness or applicability of known techniques;
- cases showcasing how methods in operational excellence addressed unresolved complex problems; and
- cases identifying open questions about the application of operational excellence for further scientific research.

Besides stating the research goal, the introduction should also establish its academic and managerial relevance. Naturally, relevant and recent scientific references should be used. Inspired by [Colquitt and George \(2011\)](#), we advise the following structure for the introduction.

3.2 Literature review

The second principle is that the description of the case should be preceded by a review of relevant literature as a basis for understanding the effects of the interventions. This begins with a high-level introduction of the field, after which the research on the topic of interest is presented (what is known, what is not known?). This shows the current state of knowledge about the implemented methodology, technology or method, the context of application and the distilled research goal, and it helps the authors to articulate more clearly which question or problem in the current knowledge they aim to address by presenting the case. Based on [Sparrowe and Mayer \(2011\)](#), the following structure is advised ([Table 2](#)).

3.3 Case description

This section presents – as a narrative – the case that the authors contribute to literature. For the case report, we propose the structure of [Table 3](#), which is again based on the CIMO logic. The presentation of the case should allow an objective assessment of what went well and what did not, and therefore, the narrative should report successes as well as complications, mistakes or failures.

3.4 Discussion of the case

After the case description itself, there should be a proper analysis of the case from the perspective of the research goal, aimed at pinpointing a generalizable lesson. What can the

field of operational excellence learn from the reported case implementation? What new insights or new questions for further research does the reported case yield? The result of this analysis should ideally be a conclusion of the form: “In a context C, this approach or intervention I is likely to result in outcome O, which we can understand as the effect of the working mechanisms M.” If the case study does not seem to offer such new insights, but is merely a demonstration of the practitioner’s prowess in applying known theory, the value of publishing it is, in our opinion, unclear. For analyzing the case, we propose the structure in [Table 4](#) (after [Denyer et al., 2008](#)):

3.5 Conclusions

In the conclusions section, the authors summarize concisely the lessons that they propose can be learned by the field of operational excellence from the presented case. In addition, implications for practice and theory and limitations are discussed, and finally, future research opportunities are provided ([Table 5](#)).

4. Research papers based on case studies

Case reports are postmortem analyses of applications. Projects reported in such cases were not originally designed as research projects, but in hindsight, it appears that they offer valuable lessons for the application of operational excellence in practice, and therefore, could be the basis for a valuable contribution to the academic literature. In this section, we contrast such case reports to *a priori* designed case-study research. Such publications are also based on applied cases, but case-study research projects are set up from the start as research projects focused on gathering evidence for specific research questions. Such publications are research papers, subject to the principles and practices of academic rigor. Case studies are an established form of empirical research. Where quantitative research methods typically revolve around the statistical testing of specific hypotheses, case-study research is suitable at the exploratory end of the spectrum of empirical research. Such studies usually comprise a limited number of cases (typically 1–10; [Eisenhardt, 1989](#); [Barratt, Choi and Li, 2011](#)). Such small sample sizes are compensated by the richness of detail that case studies often bring, and that is the main motivation for choosing case studies as a research method for exploratory studies. Guidelines for case-study research abound, as in [Eisenhardt \(1989\)](#), [Handfield and Melnyk \(1998\)](#), [Voss et al. \(2002\)](#), [Stuart et al. \(2002\)](#), [Barratt et al. \(2011\)](#) and [Ketokivi and Choi \(2014\)](#). Rather than repeating such guidelines here, we use this section to contrast research papers based on case-study research to the case reports described in the previous section.

4.1 Introduction and research questions

Case-study research is designed from the start from a clear set of research questions, which are the point of departure for selecting the cases, collecting the evidence and designing the coding and analyses schemes. This contrasts sharply with case reports, where the research goal is conceived in hindsight and typically plays no role in the selection of cases or the collection of evidence. An introduction section in a case-study paper typically follows the same structure as in [Table 1](#).

4.2 Literature study

In addition to the structure shown in [Table 2](#), where the authors demonstrate the relevance of the research questions, the literature review in a case-study paper also aims to help make the research question more specific. Ideally, the literature study allows the researchers to

Table 1.
Guiding structure for
the introduction

		Introduction
Section and order of appearance	Description	
1. The research goal and its scientific and managerial relevancy (who cares?)	The researchers state the lessons that they aim to share by presenting the case report, and specify why they are relevant, both from a practical and a scientific point of view	
2. The topic and its definition(s)	The researchers define the methodology that the case report is about, such as lean, six sigma or another approach associated with operational excellence purposes (e.g. artificial intelligence, agile scrum and human resource management)	
3. Positioning in the literature	The researchers pinpoint the contribution by summarizing what is already known and what the open questions are that the case report sheds new light on. Note that this is essentially a summary of the literature review in the next section of the case report	
4. Concise and explicate statement of the key lessons that the case report offers	Explanation of how the findings are advancing the existing understanding reflected in the literature to date. What are the main contributions/insights derived from this case report?	
5. Value and implications		

Source: Authors' own creation

Table 2.
Guiding structure for
the literature review

		Literature review
Section and order of appearance	Description	
1. Introduction of the literature review	Definition of the scope of the review and description of the journals or fields that were consulted	
2. What is already known?	Presentation of the state of the art in the literature about the topic, based on landmark papers, and synthesized in a coherent storyline	
3. What do we not know?	Highlights the lack in our understanding, such as current insights being inconclusive, results being contradicting, too little research and only qualitative research	
4. Key statement of the relevance of the paper for the field: What gap in our understanding does the case address? The statement should establish the relevance and originality of the lessons that the case presents		

Source: Authors' own creation

frame the research question in terms of a number of competing hypotheses or questions about specific gaps in our understanding, instead of the open question that they may have started with. Often, we identify from the literature potential factors of interest, including contingencies, antecedents and moderating influences, which are the building blocks for the proposed central argument. The literature is then concluded by the research model, which is typically a diagrammatic representation of the hypothesized relations between concepts that the researchers want to study in the cases.

4.3 Methods and techniques

Case-study papers are proper research papers, and therefore, they should include an explanation and motivation of the chosen research methods. For case-study research, this includes [Bono and McNamara \(2011\)](#):

- A motivation that case studies are the right research method: Case-study research is a powerful approach for the exploratory end of the spectrum of empirical research: identifying key issues, identifying relevant concepts, variables and factors and identifying essential themes to be taken into account in more quantitative studies (Barratt *et al.*, 2011; Ketokivi and Choi, 2014; Stuart *et al.*, 2002; Yin, 2013).
- An identification of the unit of analysis (Barratt *et al.*, 2011; Yin, 2013): This defines the scope of a case, for example, whether a case is a single project or an entire deployment program, or whether the scope is a deployment in a single department or in the entire company.
- A motivated selection of cases (Voss *et al.*, 2002; Yin, 2013): From theory we can infer in what sort of circumstances the identified problem is pronounced, or maybe we can identify circumstances that we expect to contrast different aspects of the problem.
- Discussion of the measurement instruments for collecting relevant evidence, driven by the research questions (e.g. surveys, observations, existing data and interviews) and how these are developed (e.g. what measures, coding scheme and existing scales) and validated (triangulation): Here, it is important the authors explicitly discuss the coding procedure for capturing the lessons learned. Data collection – mechanisms and systems to code, classify, analyze and synthesize information, and within – and optionally cross-case analysis procedures should be transparent.

4.4 Description of the cases and presentation of the findings

If the study is based on a single or a few cases, the emphasis is on presenting the case as a narrative following the CIMO logic presented in Table 3 (in Section 3.3). Such single-case study designs focus on reconstructing a single application, evaluating what did and did not work well and identifying the mechanisms that could explain these outcomes.

Studies comprising a larger number of cases often focus on contrasting applications in a variety of contexts. The within-case analyses are then typically the steppingstone that allows a cross-case analysis (Eisenhardt, 1989) aimed at finding factors that explain when applications are successful (Strauss and Corbin, 1990; Voss *et al.*, 2002). The discussion is typically organized around a number of themes that were identified from the cross-case analysis. Each of these themes is discussed, citing illustrative examples from the cases as motivation. The main findings should be captured in a few key statistics or comparison table.

Context	➔	Interventions	⬇
Understanding: - The setting and situation for the case - The problem - The stakeholders and their interests - The desired outcomes		- The methodology that the authors followed (e.g., DMAIC) - How the methodology was actually implemented or the courses of action that were actually taken	
Mechanisms	⬅	Outcomes	⬅
- Explanation of why interventions were effective, or why they were not. - What factors or conditions were instrumental in the interventions' outcomes? - What aspects of the interventions worked well and which did not?		- The outcomes of the interventions expressed in various performance dimensions - Evaluation of the outcomes in terms of the original goals: what went well, and what outcomes fell short of their anticipated results?	

Table 3.
Guiding structure for
manuscripts
presenting a case
report

Table 4.
Guiding structure for
project-case report
based results
sections

Section and order of appearance	Results	
		Description
1. Explicate: articulate what the applied approach or methodology was		
2. Validate: critically evaluate how effective the chosen approach really was. What was the desired outcome and to what extent was it achieved?		Ideally, there is a visual presentation of evidence leading to the findings in a qualitative fashion (e.g. a table or figure providing a synthesized insight in the lessons learned/information about the implementation), and there is transparency of the collected evidence provided in the presentation of the results
3. Understand: try to explain the approach's effectiveness, based on the results achieved and from the perspective of relevant scientific theory. What appeared to be the working mechanisms in the approach?		
4. Generalize: discuss in what situations the approach could or could not be effective. How generalizable is the approach?		
Source: Authors' own creation		

4.5 Discussion and conclusions

In the discussion section, the main theoretical contributions are explicated, and it is addressed if and how existing theory is extended or amended (new antecedents, outcomes and contexts), typically by comparing or building upon existing theory, for which the following prescriptions are provided (Geletkanycz and Tepper, 2012) (Table 6).

Finally, in the conclusion section, a brief overview of the research and its findings are given. In addition, implications for practice and theory and limitations are discussed and finally, future research opportunities are provided (similar to Table 5 in Section 3.5).

Table 5. Guiding
structure for the
conclusion section

Section	Conclusion	
		Order of appearance
1		Concise presentation of the lessons learned as a numbered listed
2		Implications for practice
3		Implications for theory or research
4		Identified limitations to the generalizability of the conclusions
Source: Authors' own creation		

Table 6.
Guiding structure for
the discussion
section

Section and order of appearance	Discussion	
		Description
1. Findings are compared to existing theory – Per-finding a discussion of the findings and how it relates to existing theory (already known, by whom, if new, building on what?) – Per-finding discussion of nuances if applicable (e.g. context specificity)		The researchers structure the discussion such that they articulate for each finding what the contributions are, how this relates to past research and what this implies for future research
2. Clear statement of contribution to theory (nuances, accentuations and/or extension)		
Source: Authors' own creation		

5. Conclusion

For researchers considering to submit case reports to the *International Journal of Lean Six Sigma*, this viewpoint proposes a structure intended to guide authors to write up their work such that it makes for a more valuable contribution to the academic literature in the field of operational excellence. Projects reported in case reports were not originally designed as research projects, but in hindsight, it appears that they offer generalizable lessons for the practice of operational excellence, and this motivates their contributions to the literature. The proposed structure helps authors to present and validate the lessons learned from the case and is presented in the form of detailed prescriptions (Tables 1–6), which authors can use as a reference. Case reports are contrasted to research papers based on case studies, which are set up from the start as research projects focused on gathering evidence for specific research questions. Section 4 contrasts the rigorous standards for the design and analysis of such research projects with the after-the-fact analyses done in case reports.

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