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Intervention-based Research in Operations Management

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Contents

Intervention-based Research in Operations Management

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ABSTRACT

Intervention-Based Research (IBR) is a research method where scholars closely interact with practicing managers in understanding and solving complex problems, with the ultimate goal of generating novel theoretical insights. IBR calls for researchers to be actively involved in the problem-solving process, rather than observing it unobtrusively—as required by alternative approaches. IBR is particularly relevant and promising for Operations Management (OM) scholars, whose mission is to engage with practice to provide working solutions to operational problems. This fact is echoed in the rising interest among OM scholars for the application of IBR, the creation of IBR departments at the leading journals, as well as the publication of several articles using this novel research method. Yet researchers may struggle to find complete guidelines for designing and executing IBR projects. This monograph is meant to provide doctoral students and OM scholars with an overview of this

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research method. In Section 1, we make the case for the need for IBR, discuss its relation with engaged scholarship, and compare it with other commonly used research methods. In Section 2, we clarify the epistemological underpinnings of IBR by discussing how it supports abductive reasoning in theory building, and by exploring what is needed, from the researcher and the context situation, for IBR to yield theoretical insights. Section 3 outlines a typical process that researchers can follow when conducting IBR, presents strategies that researchers can take to reduce uncertainty and risks during their engagement, and illustrates some of the best practices that can lead to stronger engagement with the problem. Section 4 showcases recently published IBR papers in OM and uses these papers to help the reader grasp concrete examples of the fundamental methodological tenets of IBR. We conclude by synthesizing the threefold benefits of IBR of solving a problem from the field, generating theoretical insights, and educating aspiring managers on the problem and its solution.

Keywords: engaged scholarship; action research; problem-driven research; research methods.

1

Introduction to IBR[1]

Operations Management (OM) and management research in general have an old and thorny problem in that a preponderance of research articles emphasize theory development over providing advice to practitioners (Tranfield and Starkey, 1998; van de Ven and Johnson, 2006). Implications for practice are normally relegated to a shallow discussion, in the final section of a paper, of bold ideas about how organizations, individuals, or teams can benefit from the research. Such efforts to expound the practical implications of academic research are laudable but let us not fool ourselves; managers seldom read academic research articles, and when they do are unlikely to immediately implement any "practical" recommendations proffered therein. This is hardly surprising as a vast majority of recommendations are often speculative and devoid of pragmatic utility.

This problem is not new. Although researchers and practitioners in OM and other management disciplines have reiterated the need for academics to step out of their "ivory towers" and engage in problem-driven research (Eckhardt and Wetherbe, 2014; Tang, 2017; van Mieghem,

[1]The authors like to thank Professors Joan van Aken, Bradley Staats and Andrew van de Ven for their comments and thoughts in an earlier version of this section.

2013), few of us have done so. This disconnect between theory and practice poses a serious threat to effective teaching of OM to aspiring professionals. It constitutes a deplorable lost opportunity to support and improve the practice of OM and a hindrance to the creation of insightful research. The in-depth knowledge of recent and effective designs of OM processes and systems needed for effective teaching in OM needs to be provided by research. The intersection of research and practice, moreover, is the locus of opportunities to improve both theory and practice.

1.1 Purpose of Business School Research

The purpose of business school research must be understood in the broader context of academic research and its mission within university institutions. Until the XVI century, university teaching was heavily anchored to religious dogma and tradition set by earlier respected thinkers, as reflected in the so-called "ipse dixit" ("he himself, said it") principle. Starting from the XVII century enlightenment scholars rejected this traditional approach, and emphasized instead rationalism and empiricism (Descartes, 1998), according to which knowledge must be produced through observation and reflection (Locke, 1996). These ideas gained further traction in the XIX century, first in Germany and then in US universities, leading to the prescription of "unity of research and teaching" (Ashby, 1967): effective teaching had to be driven by rigorous academic research. This prescription gradually made its way into business schools, which had earlier deemphasized research in favor of a strong vocational focus. With the publication of the Ford and Carnegie Foundation reports (Gordon and Howell, 1959), business schools began a transformation from trade schools to research-based academic professional schools motivated by the primary objective of improving teaching quality. This improvement in teaching was to be based on research.

At this vital stage of business school development, Nobel laureate Herbert Simon proposed that the research agenda of business schools should strike a balance between rigor and pragmatism. He suggested that "the tasks of a business school are to train men (and women) for

the practice of management (or some special branch of management) as a profession, and to develop new knowledge that may be relevant to improving the operation of business" (Simon, 1967, p. 1). Although this view reflected the abovementioned principle of "unity of research and teaching," Simon clarified that knowledge developed by business schools could include both general studies aimed at advancing fundamental knowledge and studies aimed at directly improving business practice (Simon, 1967, p. 1). These recommendations suggested that ideal research projects in business schools should combine a quest for fundamental understanding with considerations of use.

Unfortunately, business school research has seldom achieved this goal. Instead, much of the knowledge produced in business schools after the end of the Second World War has been developed without strong links to managerial practice, resulting in an inward focus on theory at the expense of practical relevance (van de Ven and Johnson, 2006). This gap between research and practice can undermine one of the key purposes of business school research, which is to support effective teaching and improve business practice. In other words, good theory should keep a clear connection with real problems, as epitomized by van de Ven's famous statement that: "there is nothing quite so practical as good theory" (van de Ven, 1989).

Encouragingly, there are many examples of close cooperation between OM researchers and practitioners that have led to seminal publications that have strongly influenced practice and further research as well as teaching. Consider concepts like total quality management (TQM), lean management, and quick response manufacturing, which developed in the business world long before they captured the attention of academics. The activity of engaged academic scholars was nevertheless instrumental to better understanding, theorizing, and generalizing these concepts beyond the contexts in which they were identified (e.g., Fisher *et al.*, 1994; Juran, 1994; Womack *et al.*, 2007) enabling their diffusion to a broader business audience. Remarkably, none of these seminal studies were published in academic journals. Instead, they were written as monographs and practitioner articles. Several hundred articles subsequently published by other scholars in academic journals have further developed and disseminated these concepts using a multitude of

techniques including survey methods, lab experiments, secondary-data research, and analytical models (see, e.g., Cachon and Swinney, 2011; Croson and Donohue, 2006; Netland *et al.*, 2015; Shah and Ward, 2007; Staats *et al.*, 2011).

These examples prove the value of close cooperation between research and practice and benefits of engaged scholarship (van de Ven, 2007). Notwithstanding these powerful examples of the value created using this formidable mechanism for advancing knowledge, we find that OM as a discipline can do better at improving engagement with practice. The rapid and constantly changing nature of OM practice introduces significant and interesting opportunities for OM scholars to develop rigorous research tightly connected to practice. Noteworthy examples include the digitalization of operations networks and markets and implementation of socially and environmentally sustainable practices. Moreover, unexpected shocks like the COVID-19 pandemic and growing geo-political turmoil have also called into question established OM practices like global sourcing, prompting researchers to reexamine old questions, such as make versus buy decisions, in the light of new threats and opportunities. Yet engaged scholarship, despite repeated calls for more relevant business research, continues to be insufficiently practiced not only in our field (Tang, 2017) but in management generally (Spencer *et al.*, 2022). Although the concept of engaged scholarship is not new, we maintain that novel or overlooked methodologies like Intervention-Based Research, the focus of this monograph, are requisite to pursuing its adoption.

1.2 Engaged Scholarship Research

Engaged scholarship is a participative research approach to studying complex problems in social settings (van de Ven, 2007). Compared to traditional academic empirical research, engaged scholarship has three distinctive features. One, it starts from a real business problem, not from a theoretical conundrum that may or may not be relevant to practice. Two, in engaged scholarship produces theory that is informed by expertise of practitioner and other stakeholders, including

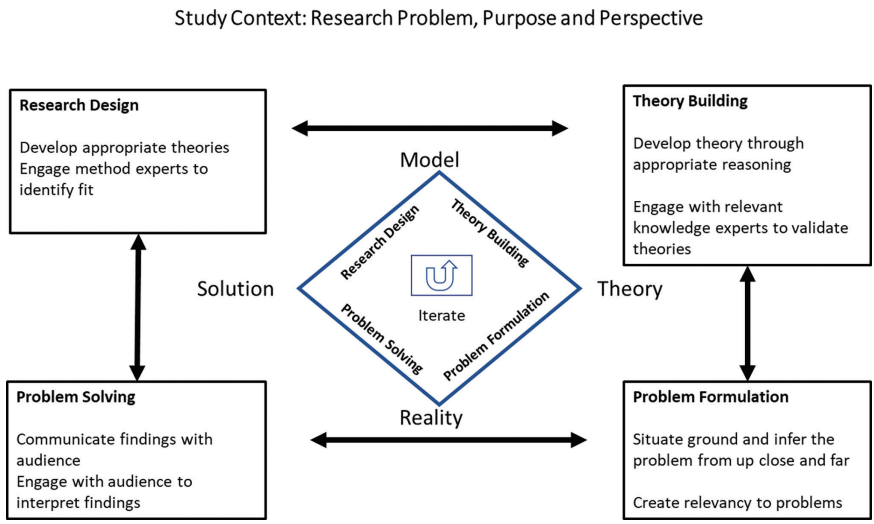

Figure 1.1: Engaged scholarship model for connecting research and practice. Adapted from van de Ven (2007).

researchers. Three, engaged scholarship follows a rigorous methodology that guides both the disciplined and rigorous search for solutions and interactions among the various stakeholders. Figure 1.1 illustrates the steps—problem formulation, theory building, research design, and problem solving—typically involved in engaged scholarship research.

This approach implies that our role as academic researchers studying business problems is to engage deeply with practitioners (from problem formulation to intervention evaluation), to co-produce relevant as well as scientifically valuable solutions. This engagement helps to ensure that researchers not only fully understand a problem, but also generate new theoretical insights. Engaged scholarship is not simply translating scientific into practical knowledge, but rather creating scientific and practical knowledge through learning communities that involve both researchers and practitioners (van de Ven and Johnson, 2006). Participation in such learning communities encourages researchers to solve not just one problem, but by remaining engaged discover and solve other problems. However, engaged scholarship maintains a clear separation between researcher and practitioner.

1.3 Intervention-Based Research: One Approach for Strengthening Engaged Scholarship

While engaged scholarship can be practiced using different methodologies, IBR offers a whole new level of researcher engagement with the problem to *develop novel theoretical* insights. The notion of "engaging with a problem" breaks with the tenet of natural science that dictates that scientists must not influence experimental outcomes and remain neutral and unbiased reporters of observed phenomena. With IBR, Social scientists to some extent forsake the aspired objectivity of natural science and, instead, actively interact with other stakeholders to more deeply understand and address a problem.

Active engagement with a problem with the goal of developing normative knowledge (Simon, 1988) is also employed in the Design Science method popular in the information systems discipline (van Aken, 2005). IBR, like Design Science, presumes researchers' deep engagement with both a problem and its organizational context, but the methods differ in purpose.

Design Science seeks to generate a design artifact or specific solution to a problem (a.k.a. "design proposition") that is of interest to an audience broader than its creators. In the information systems context, for example, a Design Science solution might be an algorithm or process model. The contributions of designed artifacts are intended to be pragmatic (i.e., solve a problem) rather than theoretical (i.e., expand or reformulate extant theory).

IBR, in contrast, leverages the researcher's involvement in tackling a problem first-hand to formulate new theoretical insights (Oliva, 2019). It generates knowledge that explains how problems can be solved through the formulation of causal models and provides insights related to the boundaries for applying these models. IBR is not incompatible with Design Science. A researcher engaged in IBR could also be involved in creating a designed artifact, the difference being that the description of said artifact is not the focus of IBR. With IBR, research attention shifts to reflecting on the experience to generate new theoretical insights including boundary conditions that improve the specificity of the theory. Although the know-how lessons are of interest to practitioners, what

makes the experience potentially generalizable to other settings are updates to existing theory derived through abductive reasoning that explain unanticipated effects of the intervention. Insights generated by IBR are thus relevant and useful to both practicing managers and academicians (Reynes *et al.*, 2001).

A well-known illustration of the academic and practical merits of IBR is provided by the deep engagement of Marshall Fisher and Ananth Raman with fashion retailer *Sport Obermeyer* (Fisher, 1997; Fisher *et al.*, 1994) in which the authors looked at the chronic forecasting challenges of matching supply and demand. Through extensive field engagement, and using historical sales data, the authors developed and implemented a quick response-manufacturing strategy that both minimized stock-outs and markdown costs and yielded rich theoretical insights into the role of reduced lead times and small lot sizes in minimizing forecast errors. As well as benefiting the firm, the engagement produced a number of seminal research articles on reducing supply chain uncertainties.

The IBR approach promotes understanding of a problem not as "isolated parts" but as a "comprehensive whole" (Clark, 1989). By stepping outside of their own perspectives and actively engaging with relevant practitioners and other stakeholders, researchers, who may otherwise be prone to myopia and biases rooted in their disciplines and prior experiences, can achieve a more comprehensive understanding of the problem at hand. This, in effect, allows them to find the global optimum instead of getting stuck at a local maximum. The researchers who engaged with *Sport Obermeyer* on quick response manufacturing acknowledged that their development of improved heuristics that minimized overall inventory costs resulted from engagement with the managers that led to a number of assumptions underlying forecasting strategies being modified and enhanced (Fisher *et al.*, 1994). The foregoing example also illustrates how IBR can improve the relevance of business education by facilitating the creation of pedagogical materials immediately connected to real problems faced by organizations. The engagement with *Sport Obermeyer*, for example, yielded a seminal *Harvard Business Review* article (Fisher, 1997) as well as a teaching case (*Sport Obermeyer*) that continues to be widely used in MBA programs. Relevance for practice does *not*, however, imply immediate use. Years of further research and

development are sometimes required before relevant research outcomes can be usefully applied. Consider, for instance, the series of studies by Chandrasekaran *et al.* (2016), Anand *et al.* (2021), and Chun *et al.* (2022) that investigated quality issues in a major hospital. Each of these studies further developed insights derived from earlier studies thereby cumulatively broadened our understanding on how to sustain quality practices in reducing patient readmissions.

IBR is, of course, not the only way to generate relevant and rigorous management research. Any methodology can in principle achieve the same goal. But only a handful of extremely talented scholars can ask themselves, as Coase (1937) did, "why do organizations exist?" and introduce the market versus hierarchy framework that has shaped research on make-versus-buy decisions for decades. IBR constitutes a valid methodological approach for ensuring an ongoing balance between rigor and relevance by fostering researchers' (i) continuous engagement with organizational actors on specific problems, and (ii) reflection on the theoretical underpinnings of those problems.

1.3.1 Positioning IBR within the Ecosystem of OM Research

To understand how it differs from other popular research approaches, it is necessary to place IBR within the context of the multiplicity of research strategies employed in OM. Figure 1.2 provides a framework for this comparison. The vertical axis represents the predominant method of reasoning, the horizontal axis the type of engagement, adopted by the researcher. Three modes of reasoning are common to social science research: deductive, inductive, and abductive. A researcher who develops a hypothesis based on existing theories and derives insights from subsequent testing using appropriate methods is employing deductive reasoning (Shadish *et al.*, 2001). Inductive reasoning generates insights and testable propositions from observations. Abductive reasoning, like inductive and deductive reasoning, begins with an observation. Unlike inductive reasoning, however, initial explanations do not thoroughly explain the problem, which generates an element of surprise that the researchers turn into a new theoretical explanation through iterative learning between the observation and theory (Mantere and Ketokivi,

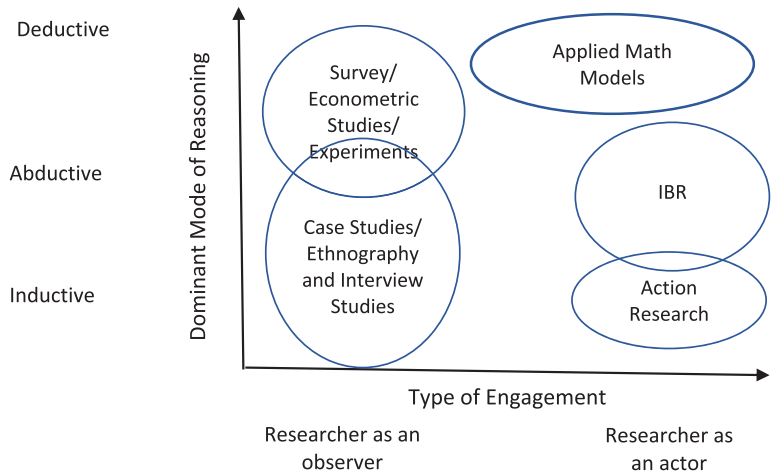

Figure 1.2: IBR in the OM research ecosystem.

2013). We are suggesting not that research studies employ only one mode of reasoning, but that OM research strategies may vary depending on the dominant mode of reasoning, plotted on the vertical axis with abductive positioned between deductive and inductive reasoning.

The horizontal axis plots the two modes of engagement described above, (i) the researcher as observer of the phenomenon of interest, and (ii) the researcher as active participant in the problem-solving process. OM researchers' traditional engagement with problems as observers reflects the former mode, in which a researcher gleans an understanding of its intricacies from frequent interaction with a problem (e.g., by developing case studies). The less commonly employed mode of pursuing a solution to a problem through active participation and collaboration with practitioners, by affording the researchers a deeper understanding of the problem and its complexity, can generate powerful insights. An overview of the different research methods employed in OM and how they compare in terms of these two dimensions is provided in Figure 1.2. As can be seen in the figure, the methods overlap. A researcher who adopts the abductive mode of reasoning, for instance, might employ both econometric and survey methods.

Figure 1.2 positions IBR across these three reasoning approaches inasmuch as researcher and practitioner co-create new knowledge by

iterating between theory and data, the dominant mode of reasoning being abduction, which combines deduction and induction to generate new theoretical insights. IBR also involves active engagement by the researcher, an important distinction relative to methods like Grounded Theory Building, in which, the researcher is not supposed to shape or influence organizational phenomena.[2] Finally, it should be noted that there is a strong tradition of experimental field work based on testing the effects of interventions (e.g., process or organizational redesigns) on operational outcomes (Cook and Campbell, 1979; Shadish *et al.*, 2001). Although the experimental treatment in those studies it is often an intervention, we do not include them explicitly in this study as once the treatment is designed, the researcher is expected to become an objective observer of the intervention's effectiveness as opposed to an enable or facilitator of the change process.

Although all forms are important to OM research, a significant deficit is observed in active researcher involvement in the problem-solving process. Indeed, active engagement by the researcher is sometimes frowned upon by academics of the opinion that it might influence the study design. Yet one of the attributes of active engagement is its capacity to simultaneously exert an immediate impact on practice and contribute to the generation of new theoretical insights.

1.3.2 Issues in Linking the Worlds of Practice and Research

Academics and practitioners have undeniably different goals and focuses of interest. Practitioners tend to be interested primarily in context-specific issues (and less in the generalizability of their problems) and to be rewarded for dealing with these issues to the extent that doing so serves the organization's objectives. Researchers' interest extends beyond problem-solving that has an impact to generalizing their findings, which serves their theoretical interests, pedagogical mission as well as academic careers (Gulati, 2007). The result is that researchers seeking broad

[2] In Figure 1.2, we situate action research (AR) across the abductive and inductive modes of reasoning. Although we argue in Section 2 that it is one of the research models of IBR, AR is often used to structure interventions that do not necessarily drive the reflection that yields theoretical developments. See, for example, Nair *et al.* (2011).

theoretical problems to solve often struggle to capture the attention and engagement of the practitioner community (van de Ven and Johnson, 2006).

IBR strikes a happy medium wherein researchers generate new insights of interest to other academics at the same time that they contribute to the practitioner community by solving real problems. It is important, however, to note two major caveats related to using IBR. The first one relates to the fact that IBR is just another research method and should follow the research question. That is, not all problems can be solved using an IBR. We discuss in Section 2 when and how to use IBR to address OM problems. The other caveat is that IBR, like all research strategies, entails a set of risks that must be weighed by the researcher. Typical risks and possible mitigation strategies are considered in Section 3. A thorough exploration of these risks with their advisors is recommended for PhD students interested in employing IBR.

1.4 Main Objective of this Monograph

This monograph describes the purpose and necessity of IBR in Operations Management. In Section 2, we illustrate how OM researchers can learn from interventions. We investigate specifically the role of abductive reasoning and how it takes shape during an IBR project. We also discuss how IBR can be employed to develop process theories; a concept mostly ignored in the OM research. Section 3 elaborates on the process of conducting IBR and challenges associated with this research strategy as well as the tools and skillsets needed by researchers who would adopt this method. Examples from OM research of IBR used in various contexts including healthcare delivery, manufacturing, and services are provided in Section 4, in which we also discuss how to extract theoretical and practical insights from interventions. We conclude by emphasizing the importance of adding this line of enquiry to OM research and call for more work using this method. We hope that the Operations Management community will find this monograph to be a useful guide for identifying research problems suited to IBR and applying this method to generate new knowledge in exciting new areas of research.

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