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### Alternative research paradigms in operations

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#### Abstract

Due to the heritage and history of operations management, its research methodologies have been confined mainly to that of quantitative modeling and, on occasion, statistical analysis. The field has been changing dramatically in recent years. Firms now face numerous worldwide competitive challenges, many of which require major improvements in the operations function. Yet, the research methodologies in operations have largely remained stagnant. The paradigm on which these methodologies are based, while useful, limits the kinds of questions researchers can address.

This paper presents a review and critique of the research in operations, itemizing the shortcomings identified by researchers in the field. These researchers suggest a new research agenda with an integrative view of operations' role in organizations, a wider application of alternative research methodologies, greater emphasis on benefit to the operations manager, cross-disciplinary research with other functional areas, a heavier emphasis on sociotechnical analysis over the entire production system, and empirical field studies. Some of the alternative research methodologies mentioned include

longitudinal studies, field experiments, action research, and field studies.

Following a description of the nature of research, three stages in the research cycle are identified: description, explanation, and testing. Although research can deal with any stage in this cycle, the majority of attention currently seems to focus on the explanation stage. The paper then discusses historical trends in the philosophy of science, starting with positivism, expanding into empiricism, and then leading to post-positivism. The impacts of each of these trends on research in operations (which remains largely in the positivist mode) are described. Discussion of the importance of a plurality of research methods concludes the section.

A framework for research paradigms is then developed based on two key dimensions of research methodologies: the rational versus existential structure of the research process and the natural versus artificial basis for the information used in the research. These dimensions are then further explored in terms of thirteen characteristic measures. Next, research methodologies commonly used in other fields as well as operations are described in reference to this framework. Methodologies include those traditional to operations such as normative and descriptive modeling, simulation, surveys, case and field studies as well as those more common to other fields such as action research, historical analysis, expert panels, scenarios, interviewing, introspection, and hermeneutics. Examples from operations or allied fields are given to illustrate the methodologies.

Past research publications in operations are plotted on the framework to see the limitations of our current paradigms relative to the richness of other fields. We find that operations methodologies tend to lie on the more rational end of the framework while spanning the natural/artificial dimension, though the majority of research is at the artificial pole.

Last, recommendations are made for applying the framework and paradigms to research issues in operations management. The topics of quality management and technology implementation are used as examples to illustrate how a wide variety of methodologies might be employed to research a much broader range of issues than has currently been researched.



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