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### Empirical research methods in operations management

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#### Abstract

This paper discusses the need for more research in operations management which is based on data from the real world. Tying operations management theory in with practice has been called for over a long period of time, however, many P/OM researchers do not have a strong foundation in gathering and using empirical data. This paper provides a starting point that encourages operations management researchers to use empirical data and provides a systematic approach for conducting empirical studies.

Empirical research can be used to document the state of the art in operations management, as well as to provide a baseline for longitudinal studies. It can also be invaluable in the development of parameters and distributions for mathematical and simulation modeling studies. A very important use for empirical data is in theory building and verification, topics which are virtually ignored in most P/OM research.

Operations management researchers may be reluctant to undertake empirical research,

due to its cost, both in dollars and time and the relative risk involved. Because empirical research may be considered "soft," compared with mathematical modeling, it may be perceived as risky. This paper attempts to provide a foundation of knowledge about empirical research, in order to minimize the risks to researchers. It also provides a discussion of analytical techniques and examples of extremely rigorous empirical P/OM research.

Although operations management researchers may not recognize it, all research is based on theory. The initial step in conducting empirical research deals with articulating the theoretical foundation for the study. It also includes determining whether the problem under investigation involves theory building or theory verification.

In the second step, a research design should be selected. Although surveys are fairly common in empirical P/OM research, a number of other designs, including single and multiple case studies, panel studies and focus groups, may also be used, depending on the problem being studied. Third, a data collection method should be selected. One method, or a combination of several data collection methods, should be used in conjunction with the research design. These include historical archive analysis, participant observation, outside observation, interviews, questionnaires and content analysis.

The implementation stage involves actually gathering the data. This section of the paper focuses on using questionnaires as the method of data analysis, although some of the concepts discussed may be applicable to other data collection methods, as well. A brief overview of data analysis methods is given, along with documentation of the types of data analysis which have been used in various types of empirical research conducted by operations management researchers over the past ten years. Potential outlets for publication of empirical P/OM research are discussed and their history of publishing such research is documented.

Underlying every step of the process are considerations of reliability and validity. Conducting empirical research without considering its reliability and validity is pointless, because the researcher will not be able to generalize from the results. This should be considered in each of the four stages listed in the approach described above.

A number of conclusions are discussed. These include the need for more empirical research and the need for P/OM researchers to become more critical readers of the empirical research done by others. Colleagues in the social sciences can be a valuable source of information about conducting empirical research. Industry contacts can be

useful, as well, in pilot testing, finding industry sites and determining consensus on the definition of terms. Finally, researchers in operations management need to be more aware of the theory which underlies their work. Empirical research can be highly useful in both theory building and theory verification.



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