



Thomas Bernhard Ladinig

Continual process improvement under causal ambiguity

Dissertation Summary

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Research questions of the dissertation

This study examines strategic, quantitative, and behavioral factors of continual process improvement in a complex, small-volume, batch production system of a premium car manufacturer's business unit. Operations management theories are linked to qualitative and behavioral analyses to increase their applicability and usefulness for practitioners in a multi-level and inter-disciplinary case study at the business unit. Practical application of theories and scientific methods is aggravated by causal ambiguity and bounded rationality which makes it difficult for management to fully understand the impact of their decisions on the system. This study aims to reduce the impact of causal ambiguity and complexity by developing a new approach to implement scientific results, involving management into the research process. It furthermore compares the results of behavioral analyses of management's understanding about decision problems to the results of more traditional OM/OR methodologies.

This dissertation is focused on the practical application of new methodologies and human, or behavioral factors in real-world problems based on theory-

driven exploratory case studies. The main research question is how those concepts can be integrated into holistic frameworks for highly applicable and useful research interventions. Specifically, continual process improvement project selection is studied as an example for causally ambiguous problems in OM/OR. One outcome of this research is therefore a new and integrated framework for the selection of critical process improvement activities.

The study draws from several disciplines and different methodologies to integrate new concepts, usually not widely adopted by OM/OR, in an inter-disciplinary way. It also aims to increase our understanding of causal ambiguity from a more practical point of view to solve macro-level theoretical issues presented in the literature.

Methodology

A macro-level theoretical analysis is conducted to first analyze competitive priorities based on the Theory of Production Competence. This defines the scope of the practical applications within two separate case studies at the business unit to efficiently select critical process improvement activities. A lens model, based on Social Judgment Theory, is applied to deal with imperfect

decision making by visualizing the results of a discrete event simulation and a management judgment analysis. The second study is using a structured conceptualization method, concept mapping, in combination with behavioral quality management to map the conceptual domain of quality linkages within the business unit.

Both studies take behavioral factors into account to analyze management's understanding, judgments, and experiences when making complex decisions for causally ambiguous problems. They visualize those factors as new inputs for better decision making in combination with more traditional methods (discrete event simulation and nonmetric multi-dimensional scaling). This helps management to assess causal relationships to make better decisions when facing causally ambiguous problems.

The outcome is also presented in a specific way to further formalize the results of the analysis in form of action proposals. This results in an integrated and holistic framework from macro-level theories to practical application on the process-level which is the goal of this research.

Results /findings

The results of both analyses visualize the conceptual domain as well as cause and effect relationships of a set of factors within the business unit and the preferences of management towards them. This behavioral approach can facilitate decision making regarding improvement project selection and can prevent errors in group decision making due to issues related to behavioral operations management. The case studies revealed substantial differences in preferences of the management team, which were also not aligned towards competitive priorities. By combining concept mapping, judgment analysis, and the results of the simulation, a mutually acceptable action proposal was created to select the most efficient and effective improvement activities to enhance quality and flexibility - the two competitive priorities of the business unit.

Author's publications on the topic

Thomas B. Ladinig, Krishna S. Dhir & Gyula Vastag (2020). Sensemaking support system (S3) for manufacturing process improvement, *International Journal of Production Research*. DOI: 10.1080/00207543.2020.1733700

Thomas B. Ladinig & Gyula Vastag (under review – 2nd round). Mapping quality linkages based on tacit knowledge to define tools and methods of quality management. *International Journal of Production Research*.