



A Methodology for Monitoring Efficiency of Supply Chain Network Designs

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Project Description

Research Project & Axia Institute Grand Challenge

This project develops an approach of effectively evaluating and monitoring the realized efficiency of supply chain network designs based on multiple factors. More specifically, the methodology:

- focuses on multi-factor efficiency based models that compare the realized performance of a supply chain network against ideal targets
- assists in identifying any specific upward or downward trends in efficiency
- helps trigger a network redesign need to improve performance.

This project is aligned with two Axia Institute grand challenges:

1. "Quantitative Management of Raw Materials & Production", by developing a quantitative methodology to effectively evaluate and monitor the realized efficiency of supply chain network designs based on multiple factors.
2. "Novel, Evidence-based Tools for Management of Products & Sales", by identifying factors/metrics and their relative importance through case company interviews and extant literature.

Value Created

Value Created and Impact of Research:

1. Provides the managers with a methodology to monitor the efficiency of supply chains over time and respond quickly to any negative trends in performance thus assisting in redesign.
2. Aids in cost reduction, increased customer service levels and improved reliability of supply chains.
3. The developed methodology and related effectiveness can be disseminated through scholarly publications and be marketed to support other firms.

Research Approach

Project Plan

Most performance factors/metrics stand in relationships that are either conflicting or complementary with other factors, which may have unequal importance to the decision makers. To overcome these issues, the following steps will be followed:

- Identification of key factors through case company interviews
- A multi-criteria relative prioritization analysis (Analytic Hierarchy Process) will be utilized in identifying the key success factors, relative importance (weights), and related targets that are expected.
- Multi-factor productivity models with relative importance weights will be used to determine the efficiency of network design.
- Process monitoring tool (such as a control chart) will be developed to assist in network redesign decisions.

The following data is planned to be collected:

- supply chain costs,
- inventory levels,
- customer service levels,
- quality rates,
- utilization

Results & Future Directions

- A system performance evaluation and monitoring methodology that allows the decision-maker to track the efficiency of supply chain network designs over time.
- A spreadsheet based decision support tool for the use of the case company.
- A research paper for publication in a top-tier journal in supply chain management.
- Extension of the methodology to identify specific types of inefficiency in the network leading to improvement.