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**Modarress Fathi, Batoul**

**AN EMPIRICAL EXAMINATION OF STATISTICAL QUALITY CONTROL AND  
ITS RELATIONSHIPS WITH QUALITY, QUALITY COST, AND PRODUCTIVITY**

*The University of Nebraska - Lincoln*

Ph.D. 1986

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PREVIEW



AN EMPIRICAL EXAMINATION OF STATISTICAL QUALITY  
CONTROL AND ITS RELATIONSHIPS WITH QUALITY,  
QUALITY COST, AND PRODUCTIVITY

By

Batoul Modarress Fathi

A DISSERTATION

Presented to the Faculty of  
The Graduate College in the University of Nebraska  
In Partial Fulfillment of Requirements  
For the Degree of Doctor of Philosophy

Major: Interdepartmental Area of Business

Under the Supervision of Professor Sang M. Lee

Lincoln, Nebraska

August, 1986

**TITLE**

AN EMPIRICAL EXAMINATION OF STATISTICAL QUALITY

CONTROL AND ITS RELATIONSHIPS WITH QUALITY,  
QUALITY COST, AND PRODUCTIVITY

**BY**

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AN EMPIRICAL EXAMINATION OF STATISTICAL QUALITY  
CONTROL AND ITS RELATIONSHIPS WITH QUALITY,  
QUALITY COST, AND PRODUCTIVITY

Batoul Modarress Fathi, Ph.D.

University of Nebraska, 1986

Advisor: Sang M. Lee

For more than eighteen years there has been a substantial decline in productivity growth rates of most U.S. industries. This decline is symptomatic of two problems: low product quality and high quality cost.

These problems have been so embedded in traditional manufacturing practices in the U.S. that they have gone unrecognized, while the Japanese have continuously improved their productivity rate with high product quality and low quality cost. One of the main factors for their success is implementation of statistical quality control (SQC).

The objective of this research was to develop a descriptive model for a successful implementation of SQC, to improve productivity. Three propositions were introduced: 1) implementation of SQC in manufacturing systems and manufacturing supportive areas would consistently improve product quality; 2) improved product quality would lead to lower quality cost; and 3) production of high quality products would enhance productivity, customer satisfaction, and the market share. The research also sought to find an explanation for the

American-Japanese cost-productivity differential.

Research was conducted in three phases: sending questionnaires to managerial personnel of 1,000 companies; interviewing managers and designers of eight companies under American and Japanese management; and collecting documents from companies and associations proposing SQC programs in the U.S.

Statistical analysis of the questionnaires supports the research propositions that implementation of SQC increases productivity through production of high quality items and reduction of quality costs.

Research findings revealed distinctive quality control differences between U.S. and Japanese firms, particularly in design, distribution centers, and consumer services. Implementation of SQC during the design process improves the productivity rate by designing more reliable products, substituting less expensive materials in product components, decreasing experimentation and testing, and reducing the tasks for production control and inspection. Extending statistical quality control to distribution centers and consumer service has led to increased quality, customer satisfaction, and market share. These differences in quality control practices explain a significant pattern of the cost-productivity differential between U.S. and Japanese companies.

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B.M.F

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