

Analysis of key linkages using path analysis in Baldrige performance model for the manufacturing sector

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Abstract

Malcolm Baldrige National Quality Award Criteria for Performance Excellence represent an incorporated presentation management model. The model has evolved in parallel with high-performance management tradition and know-how of winning companies and experts in quality management. Evans (1997) proposed casual linkages among criteria elements—results and management practices—based on an input-output analysis and logical modelling. They can drive improved alignment, employee and customer satisfaction, and better results. The Baldrige criteria, as well as other national programs (such as Deming, NQI, EFMQ) and U.S. state-level versions of the Baldrige, are comprehensive, yet not prescriptive, so organizations may interpret them in a myriad of ways. However, little research to validate Baldrige criteria linkages have been performed. In this paper, the Visual PLS software is used to explore and validate some of the subjective beliefs that underlie the Baldrige framework. Specifically, they focus on the relationships among key external (exogenous) results and internal (endogenous) performance metrics.

Keywords: Baldrige model, path analysis, manufacturing sector

1. Introduction

Malcolm Baldrige Criteria is a key guideline for Malcolm Baldrige National Quality Award. To qualify for this award, organization has to go through an assessment conducted by a group of assigned Baldrige Assessor. These assessors used the Malcolm Baldrige Criteria and Assessment Guidelines as a benchmark to gauge the performance level of the organization in relation to the scoring guidelines of the criteria. The needs of the Criteria for Performance Excellence are alive in seven Categories, as follows: Leadership, Strategic Planning, Customer Focus, Measurement, Analysis, and Knowledge Management, Workforce Focus, Process Management and Result. The question is would implementing Malcolm Baldrige Criteria make an organization achieve business excellence. Although there is no direct linkage between the Malcolm Baldrige Criteria and Business Excellence, evidence shown that a Baldrige winner could proved its business sustainability as a result in implementing the Baldrige Criteria. Study on Malcolm Baldrige Criteria and its respective revisions, revealed that the criteria is build upon a set of core values and concepts. Therefore, by implementing Malcolm Baldrige Criteria effectively, certainly the organization can able to show high level of competence in terms of business excellence. The hypothesized linkage in Figure1 has been validated by the path analysis by using visual PLS software. It was founded that four out of the 13 hypotheses about the linkages among endogenous variables were validated. Also, six of the linkages out of nine linkages between the endogenous variables and the exogenous results were significant.

2. Review of Literature

The Baldrige Award criteria framework suggests clear linkages between practice and results, directly between the human resource focus and process management categories,

and indirectly from the others. For example, Evans (1997) proposed an influence diagram model of specific results linkages, suggesting areas of strong correlation and implying causality, which forms a basis for using results for improvement. Handfield and Ghosh (1995) used structural equations modeling to empirically test the linkages, but their results showed little evidence of the relationship between quality practices and business results. Wilson and Collier (2000) [5] also used structural equations modeling, and their results suggest a strong relationship between quality practices and organizational performance. Pannirselvam and Ferguson (2001) showed that internal practices such as human resource management and information management had significant effects on performance. Yet, despite these efforts, several researchers have continued to call for more research to validate these linkages (Kannan *et al.* 1999; Wilson and Collier 2000 [5]; Flynn and Saladin 2011). In this project, the gap has been addressed by testing and validating some of these linkages

3. Objective of the Study

The Primary Objective of the present study has been focused on Examination of Key Linkages in the Baldrige Performance Excellence Model for the Manufacturing Sector.

The Secondary Objective of the study is:

- Path analysis is used to test the fit of major frameworks
- Study the strength of these relationships using path analysis

Hypothesized Linkages

- H1: Employee Satisfaction has a significant impact on Service Quality
- H2: Employee Satisfaction has a significant impact on Product Quality
- H3: Process Performance has a significant impact on

- Service Quality
- H4: Process Performance has a significant impact on Product Quality
- H5: Process Performance has a significant impact on Financial Performance
- H6: Process Performance has a significant impact on Productivity
- H7: Productivity has a significant impact on Financial Performance
- H8: Work System Improvement has a significant impact on Process Performance
- H9: Employee Satisfaction has a significant impact on Process Performance
- H10: Work System Improvement has a significant impact on Productivity
- H11: Employee Satisfaction has a significant impact on Market Performance
- H12: Service Quality has a significant impact on Customer Satisfaction
- H13: Product Quality has a significant impact on Customer Satisfaction
- H14: Customer Satisfaction has a significant impact on Market Performance
- H15: Customer Satisfaction has a significant impact on Financial Performance
- H16: Leadership has a significant impact on Employee Satisfaction
- H17: Strategic Planning has a significant impact on Market Performance
- H18: Quality Practices has a significant impact on Process Performance
- H19: Leadership has a significant impact on Market Performance
- H20: Strategic Planning has a significant impact on Financial Performance
- H21: Quality Practices has a significant impact on Service Quality
- H22: Quality Practices has a significant impact on Product Quality

4. Research methodology

4.1. Research design

Purpose of the study

A Descriptive Study was undertaken in order to ascertain and emphasizing the importance of seven major categories of MBNQA’s “Criteria for Performance Excellence” (CPE). The criteria are built upon a set of interrelated core values and fundamental concepts. The study acts as a foundation for integrating key organizational requirements within a results oriented framework that creates a basis for action and feedback.

Type of Investigation

In this study multiple factors were identified, which influenced one another and in turn influence the overall efficiency. Hence the study was mainly focused on explaining the important variable associated with final result and also focused on finding the strength of the relationship between the variables. The study situation required a Correlation Study.

Unit of Analysis

The study aimed at measuring the strength of the relationship between key variables in Baldrige Performance

Excellence Model. The manufacturing sector was chosen for the study. Hence each manufacturing unit was considered as the Unit of Analysis.

Time Horizon

The data gathered for the study was applicable only for the current year. The results may change in the consecutive years. Hence the study was cross sectional in nature.

Data Collection Method

The study was based on Primary data. The data was collected from forty one manufacturing firms. The collection procedures involved visiting the firms in the City and get the necessary data for the study by Questionnaire method and direct interview from the concerned persons.

4.2. Sample design

Sample size

The sample size for the study was 41 manufacturing firms functioning in Tamil Nadu.

Sampling Technique

Samples are selected based on Convenience Sampling Method. This Sampling method was selected why because the population was just too large and it is impossible to include every firm. The firms are selected because of their convenient accessibility.

Tools Used For Analysis

- Visual Partial Least Square (PLS) Software
- Partial Least Squares (PLS) Regression/Path Analysis

Limitations

Some areas of potential concern that need to be taken into account are,

- Sample size, respondent biases, employee – employer relationship

Another concern is that a self-reporting questionnaire is recognized as being subjective rather than objective.

4. Analysis and Interpretation

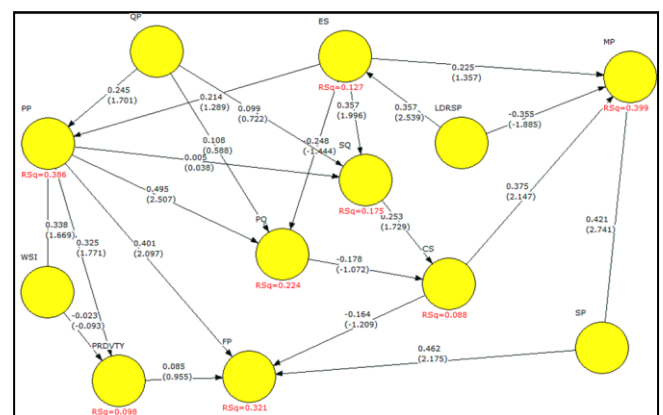


Fig 1: Hypothesized Model of the Baldrige Result Linkages

The hypothesized linkage in Figure1 has been validated by the path analysis by using visual PLS software. It is shown in figure 2. It was founded that four out of the 13 hypotheses about the linkages among endogenous variables were validated. Also, six of the linkages out of nine linkages between the endogenous variables and the exogenous results

were significant.

Validated Linkages

Linkages among endogenous variable

- Process Performance has a significant impact on Product Quality
- Process Performance has a significant impact on Productivity
- Work System Improvement has a significant on process performance
- Leadership has a significant impact on Employee Satisfaction

Linkages among endogenous variable and exogenous variable

- Employee Satisfaction has a significant impact on Service Quality
- Process Performance has a significant on Financial Performance
- Service Quality has a significant impact on Customer Satisfaction
- Customer Satisfaction has a significant on Market Performance
- Strategic Planning has a significant on Market Performance
- Strategic Planning has a significant on Financial Performance

5. Conclusion

The values obtained under path analysis shows there is a strong path exist among these latent variables suggests the importance of many fundamental management practices that are embedded in the Baldrige requirements, such as a focus on process performance and strategic planning, and attention to the design of work systems and their linkage to other categories, such as financial performance. By strengthening the practices that lead to improved levels of internal performance, the analysis indicates that improved performance of production/delivery processes will likewise occur. Second, high levels of the endogenous variables are correlated with exogenous performance results as measured by Market performance, customer satisfaction, and financial performance. This provides evidence that improving the performance of endogenous variables will positively impact the most important external business performance measures. This result holds true by the statistical method used to test and validate the hypotheses. The relationship between two sets of latent variables is validated by more sophisticated methods, structural equation modelling, are needed to account for measurement error and to concurrently validate the causal linkages within the entire model. Thus, this research provides new evidence of the validity of the Baldrige model and its examination/self-assessment process that seeks to validate strong business results as an outcome of high-performance management practices.

6. References

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