

National Textile Center FY 2003 (Year 12) Project Proposal

Project No. S03-PH01

Competency: Management Systems

Sustainability as a Source of Competitive Advantage

Project Team:

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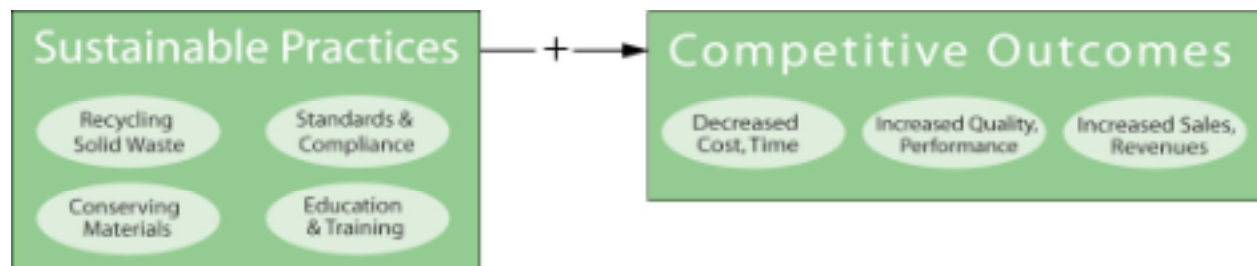
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Objective:

The goal of this project is to improve competitiveness in the textile industry through use of sustainable (or environmental) practices. More specifically, the project examines which sustainable practices (e.g., solid waste recycling, reduction of material consumption, use of rapidly renewable materials, etc.) can help to achieve which competitive goals (e.g., decreased cost, increased quality, increased sales, increased revenues, etc.). To accomplish this, the team will: (1) develop a first-of-its-kind model to predict which sustainable practices result in which competitive goals (see figure below); and (2) build a database of sustainable practices and outcomes in order to test the model empirically.



These research objectives were developed through visits and personal interviews with leaders in the carpet industry. The carpet industry is the focus of this study since they have been aggressively and publicly pursuing sustainable practices for over 10 years. Interviews with representatives of C&A Floorcoverings, J&J Industries, Milliken, and Carpet and Rug Institute (CRI) confirmed the need for empirical research on sustainable practices as a source of competitive advantage in the carpet industry. However, our outcomes will be applicable beyond the carpet industry, and will provide lessons for the entire textile industry.

Relevance to NTC Mission:

This research advances competitiveness of the U.S. textile industry by advancing the state of the art. Most competitive advantage derived from traditional manufacturing and supply chain analysis has been realized in the industry; however, sustainable practices represent a new source of competitive advantage. In addition to improving environmental stewardship, sustainable practices such as solid waste recycling and conserving materials can decrease costs, increase quality, increase sales, and increase revenues (CRI, 2001; interviews with C&A representatives 8/02). Sustainable practices also create competitive advantage by facilitating compliance with federal environmental regulations such as Executive Order 13101, which specifies that government purchasers should buy sustainable products whenever possible and require sustainable materials when creating new specifications (including CIDs). As specifications increase, the impact of such regulations will broaden, both for producers and for customers. Increasingly, non-government customers are also demanding that their suppliers use sustainable practices and materials, for reasons of environmental stewardship and so that customers can disclose such practices in annual reports and advertising.

Visits to leading carpet manufacturers and meetings with key representatives confirmed the relevance of the issues above, and reinforced the importance of sustainable practices as a source of competitive advantage. Our meetings also confirmed the dearth of empirical research on sustainability and competitive advantage in the carpet industry.

The multi-disciplinary project team is particularly well-suited to this complex and cross-functional project, because our members (from business, engineering, design, and statistics) can address the multiple parts and perspectives demanded in this study. In addition, team members have experience with related research topics, including financial challenges in the textile industry (e.g., Rusinko and Pastore, 2002).

State of the Art:

Although NTC and other research organizations have funded scientific and technical research on sustainability issues, there is no record of a study on the competitive value of sustainable practices. A broad literature search and focused interviews with representatives of the carpet industry, leaders in sustainable practices in the textile industry, indicate that use of sustainable practices as a source of competitive advantage in the textile industry is an important but under-researched issue.

Currently, sustainable practices are being used as a source of competitive advantage in other industries, including wood products and electric utilities. Research has indicated that sustainable practices can lead to: (1) a cost-based competitive advantage through continuous improvements in resource usage and waste reduction; and (2) the creation of value for customers through targeting more environmentally sensitive segments of the market (e.g., Miles and Coven, 2000; CRI, 2001). Visits and interviews with carpet industry representatives including CRI, C&A, J&J, and Milliken, confirmed that potential for such competitive advantage also exists in the carpet industry, as well as in the textile industry, overall. Therefore, the purpose of this research is to develop and test empirically a first-of-its-kind model to explain which sustainable practices (e.g., solid waste recycling, saving materials, etc.) can help to achieve which competitive goals (e.g., decreased cost, increased quality, increased sales, increased revenues, etc.). Therefore, industry members can use this model to choose the sustainable practices that are consistent with their competitive goals.

Approach:

To assess which sustainable practices can help to achieve which competitive goals, this study will focus on the commercial carpet industry. The U.S. commercial carpet industry is approximately a \$4 billion industry. For over 10 years, this industry has been grappling with various types of environmental regulations on their product, including Executive Order 13101, LEED (Leadership in Energy and Environmental Design) Specifications, and U.S. Green Building Council (USGBC) specifications. These mandates and specifications are creating new market drivers for sustainable products. Therefore, the carpet industry—with their history of sustainable practices and the corresponding impact on competitive goals—can provide lessons for the rest of the textile industry.

The study will use a three-stage approach. Stage one, which has already been started, consists of collecting general information on sustainable practices and competitive outcomes from commercial carpet manufacturers who are members of CRI. CRI members manufacture over 90 percent of U.S. carpeting, and are dedicated to improving sustainability practices. Manufacturers already interviewed include C&A Floorcoverings, J&J, and Milliken. At the same time, measures and questions for interviews and surveys are being developed from independent sources (e.g., EPA; LEED; USGBC, etc.)

Stage two is the formal data collection stage, which will be informed by the results of stage one. It includes designing and administering interviews and surveys for commercial carpet manufacturers in CRI. Data will be collected through interviews, surveys (telephone, email, and U.S. mail), and other forms of secondary data (e.g., reports, etc.). The data will measure variables in the above figure (e.g., sustainable practices and competitive outcomes). While obtaining some types of information may be problematic due to proprietary considerations, general and non-proprietary information can be collected through relative (versus precise) measures. Specific relationships between sustainable practices and competitive outcomes will be examined (as indicated in the above figure), but the initial hypothesis or proposition can be stated as follows:

H1: Sustainable practices (e.g., recycling, conserving materials, education, etc.) are positively related to competitive outcomes (e.g., reduced costs, increased quality, increased sales, etc.).

The model will also test which sustainable practices are related to which competitive outcome variables. (NOTE: Initially, the simple model illustrated above will be tested. Subsequently, if indicated by results of stage one, effects of moderators and mediators (e.g., cost of virgin materials; regulation; consumer preferences; etc.) will also be tested.)

Stage three will analyze the data from Stage two. Analytical methods will include regression analysis, correlations, means, distributions, Chi-squares, and t-tests. Students will be involved in data coding and some analysis. Cases to be used in classes will be developed. Results will be analyzed with respect to applications to the textile industry, overall.

A theoretical model will be established to correlate sustainable practices and processes to competitive advantage. Representing competitive advantage, Y , as a multi-valued vector, it can be assumed without loss of generality:

$$Y = (y_1, y_2, y_3, y_4, \dots y_n)$$

Where y_i represent the elements of competitive advantage, such as decreased cost, decreased time, increased quality, increase sales, etc.

Then competitive advantage can be considered as a function of sustainable practices, in addition to traditional metrics. Representing sustainable practices as the vector $\mathbf{X} = (x_1, x_2, \dots x_n)$ (such as recycle, reuse, reduction, rapidly renewable materials, etc.) and traditional metrics $\mathbf{Z} = (z_1, z_2, \dots, z_b)$, then

$$Y = Y(\mathbf{X}, \mathbf{Z})$$

And the change in competitive advantage due to changes in sustainable practice can be represented (assuming process independence) by

$$dY = \partial Y / \partial x_1 dx_1 + \partial Y / \partial x_2 dx_2 + \dots$$

The sign and magnitude of each of the differential terms will indicate the sensitivity of competitive advantage to each specific sustainable practice. Because Y is a multi-value vector, the individual practice terms can be correlated with individual components of competitive advantage.

This Year's Goal:

Finish stage one and complete the survey design in stage two. CRI, C&A, J&J, and Milliken have agreed to cooperate with our research.

Outreach to Industry:

The team has already met and done some preliminary interviews with the research staff at CRI, as well as with major carpeting manufacturers that are aggressively pursuing sustainable practices and products (C&A, J&J, and Milliken). We will continue to work closely with the industry throughout the study. Findings will be shared with members of the textile industry, presented at industry meetings and conferences, and published in textile journals.

Key References:

The Carpet and Rug Institute, "Sustainability Report 2000," 2001.

Miles, Morgan P. and Jeffrey G. Covin, "Environmental Marketing: A Source of Reputational, Competitive, and Financial Advantage," *Journal of Business Ethics*, 23:299-311; 2000.

Rusinko, C. and Pastore, C., "Using the Technological Community to Address Financial Challenges in the Textile Industry," Currently under review at *Journal of Textile and Technology Management*.

New Resources Required: None.