Characterizing viability of small manufacturing enterprises (SME) in the market

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Abstract

This paper examines characteristics of survived small manufacturing enterprises (SMEs) competing to be suppliers to mass merchandisers. It intends to examine various product and management characteristics of small manufacturing enterprises (SME) to determine the critical factors that lead to their long-term survival. Since survey data are usually correlated, fuzzy, inconsistent, and incomplete, we used the adaptive learning network (ALN), an artificial intelligence (AI) technique to build the model. The ALN is non-parametric and known to be much better than multivariate statistical approaches in handling survey data. A sample of over 1600 firms was analyzed in this study to determine the primary factors that are attributable to long-term survival of SMEs and their influences.
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Keywords: Survival of small manufacturing enterprises (SME); Viability of SME; Supplier to giant retailers

1. Introduction

Small manufacturing enterprises (SME) have significant intangible assets but typically have limited capital and other resources to support their manufacturing and marketing. In addition, their product market is constantly changing and globalizing so that their competency in getting and managing scarce resources becomes critical to their survival. In spite of these limitations, small business failure rate appears to be lower than previously thought. Headd (2003) reported that over half of small firms with employees remained in business after four years and that surviving firms were likely to have paid employees, adequate start-up capital ($50,000 or more), and experienced owners. He stressed, however, that many firms lacking these and other "success" qualities did not necessarily fail.

Often their owners still described their venture as a success even after closure because it allowed the owners to be independent, to earn extra income at a crucial time, or to successfully sell the business as part of an exit strategy. Headd's work involved examining firms survived for four years, and also calls into question the meaning of survival of the SMEs. Our study examined firms that survived over an eight to ten year period since a long-term survival of the SMEs is an important criterion for success.

This paper examines characteristics of survived small manufacturing enterprises (SMEs) competing to be suppliers to mass merchandisers. It examines various product and management characteristics of small manufacturing enterprises (SME) to determine the critical factors that lead to their long-term survival. Since survey data are usually correlated, fuzzy, inconsistent, and incomplete, we used the Adaptive Learning Network (ALN), an artificial intelligence (AI) technique to process these survey data. The ALN approach is non-parametric and known to be much better than multivariate statistical approaches in handling survey data. Using an artificial intelligence approach, we attempt to determine the factors that are attributable to

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long-term survival of SMEs and their degree of influences. In the following, literature review on successful small manufacturers is presented and the Adaptive Learning Network (ALN) is discussed. The data description and model development are also presented, followed by the empirical results and discussion.

2. Literature review

Successful manufacturers possess several characteristics which separate them from other unsuccessful ones and allow them to survive long-term in the marketplace. They excel in product quality, continuous improvement, customer service, employee input, and employee training (Chaneski, 2004). According to Roth and Miller (1992), "superstar" manufacturing firms have formal product quality initiatives characterized with continuous improvement and zero defects, when compared to those of the low-performing firms. Successful manufacturing firms normally use an in-process inspection system along with pre- and post-process inspection (Abdul-Aziz, Chan, & Metcalfe, 2000). These successful companies must have process improvement, process control, and employee involvement (Yusof & Aspinwall, 2000). Small manufacturers may favor more informal means of quality assessment over formal programs (Sun & Cheng, 2002); however, Bentley (2003) suggested that small firms must embrace lean manufacturing techniques such as Six Sigma or ISO 9000 for successful performance and quality improvement.

Successful manufacturers provide their customers with solutions that make their life easier and by keeping them informed of money-saving ideas and industry changes (Chaneski, 2004). Successful manufacturing companies develop an intimate relationship with their customers and are more capable than larger firms in adjusting to customer preferences (Bentley, 2003). Successful SMEs have a similar competitive advantage factor that allows them to create a niche in the market by changing their product mix to satisfy customer needs (Gadenne, 1998). Pelham (2000) found that market-oriented manufacturing firms were better performers because they respond quickly to negative customer feedback, competitor activities, and customer changes. Good customer service is important on one hand but manufacturing firms must make their employees happy by providing quality material and information available to them (Chaneski, 2004). Employee relationship was as important as good business performance (Roth & Miller, 1992; Corbett and Harrison, 1992). Dossenbach (2005) supported the need for good labor relations and suggested that manufacturing success depends on company-wide solidarity, which is achieved through open communication, integrity, and employee empowerment.

Success means simply staying in business especially to small manufacturers in the mass merchandising market. Mass retail buyers considered only 1 in 300 small firms to be viable suppliers and their long-term quality partners (Udell, Atehortua, & Parker, 1995). Mass merchandisers also use product quality and price, among others, to select their suppliers. For example, small and large electronics firms selected suppliers based on quality and price (Pearson & Ellram, 1995), while the main requirement for British importers was a quality product (Piercy & Cravens, 1997). Donovan (1996) agreed that pricing and product quality are important, but he suggested that small manufacturers must improve their order processing in order to be considered as potentially successful suppliers to mass retails. Mass retailer also examines management experience, employee input, and cash flow analysis when they review SMEs as their suppliers (Knotts, Jones, & Udell, 2003). Small manufacturers vying for suppliers to mass merchandisers had a better chance at obtaining buyer review when they met high standards in the areas of technology transfer (product imitability), commercialization stage (market-readiness), merchandising potential (local vs. national appeal), demand stability, and perceived appearance (Jones, Knotts, & Udell, 2004; Kim, Jones, & Knotts, 2005).

Small firm success is often a result of the firm's ability to match a quality product with a well-run firm. Customers wanting long-term partnerships with small manufacturers are interested in getting quality products at reasonable prices, but for these small firms to accomplish this goal they must generally be run by experienced managers with well-trained and motivated employees. The firms must be healthy and properly capitalized in order to be able to take advantage of any reasonable opportunities presented in the marketplace. To this end, our study reviews the results of a long-term screening and educational project used by small manufacturers to assess their viability as suppliers to the mass retail market.

3. Data description and model development

The sample consisted of small manufacturers who participated in a supplier evaluation program developed at the request of a large mass merchandiser. All participating firms were first required to complete a questionnaire for a firm assessment rating (FAR) of their management practices and to submit documentation to substantiate their claims. The firm assessment instrument included 34 questions grouped into five categories: marketing management, strategic management, production operations, and financial management as shown in Appendix. These participating firms were also required to submit a packaged, market-ready sample of their products for product evaluation rating (PER) that is assessed by a market professional. These PER questions included 43 items and were grouped into six categories: societal impact, business risk, demand analysis, market acceptance, competitive capabilities, and experience and strategy.

About 1690 (80.0%) companies out of 2113 potential suppliers completed both the self-assessment and external product evaluation. Nineteen percent (321 firms) of this sample were owned and managed by a female manager and 2.9% (39 firms) were not identified by gender