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A survey of structured continuous improvement programs in the Canadian food sector

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ABSTRACT

This paper presents the results of a quantitative survey of structured continuous improvement programs in the Canadian food sector, including the motivational factors underlying the implementation of such programs. Surveys were distributed to a sample of corporate, manufacturing and quality professionals within the Canadian food industry. More than one-half of the respondents indicated that the organization by which they were employed used continuous improvement methodologies. Company ownership and size were not significant in predicting a company's use of such programs, but processed food companies were 10% more likely to use them than non-processed food companies. Companies that used continuous improvement were less likely to have product recalls than companies that did not. All motivational factors assessed in this study, with the exception of speed to market of new products and line item fill rate, influenced an organization's decision to implement continuous improvement.

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1. Introduction

Continuous improvement is a systematic approach to the measurement, analysis, and improvement of business processes to identify critical areas that can produce breakthrough results in market penetration, product quality attributes, quality assurance and/or manufacturing processes, customer satisfaction, cycle time and/or the cost of doing business. A structured, integrated continuous improvement program provides opportunities for both incremental continuous improvement and radical process redesign. While organizations use structured continuous improvement methodologies to obtain and sustain a competitive advantage, implementation requires capital investment, resource allocation and organizational commitment (Antony, Kumar, & Madu, 2005; Keller, 2001; Mann & Kehoe, 1999; Miller, 2001; Terziovski & Sohal, 2000).

Within a structured continuous improvement program, multiple continuous improvement methodologies can be used to deliver the company's objectives. Surveys conducted by Blanchard (2006), Higgins (2006) and Antony et al. (2005) identified the following as primary improvement methodologies: dashboard metrics, lean manufacturing, Six Sigma, total quality management (TQM) and HACCP. Terziovski and Sohal (2000) reported that basic continuous improvement tools (e.g. dashboard metrics) are used more than advanced continuous improvement tools (e.g. lean manufacturing and Six Sigma) in the Australian manufacturing sector.

Selected measures that depict key outcomes that are critical to customer satisfaction and to business success can be combined to produce a balanced scorecard. The balanced scorecard approach was first introduced by Kaplan and Norton (1992) who recognized that financial metrics were not the only success factor for organization performance. Kaplan and Norton (1992) proposed that metrics such as competency, knowledge, customer focus, innovation, and operational efficiency are critical in describing an organization's innovation and improvement levels which drive future financial metrics. From the balanced scorecard, organizations have derived the dashboard metric. Dashboard metrics use visual aids such as graphs and charts to summarize and communicate performance to employees and management. By monitoring dashboard metrics, organizations can identify opportunities for continuous improvement (Evans & Lindsay, 2005).

Six Sigma is a continuous improvement tool which focuses on the identification and elimination of product defects from processes through the measurement and analysis of data generated by the process under measurement. Defects are identified by focusing on customer-defined critical to quality (CTQ) attributes of the

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product as defined by the Voice of the Customer (Goh, 2002). Six Sigma methodology is applied to the process to eliminate process/product defects while ensuring customer CTQs are satisfied. Antony et al. (2005) identified four key aspects of Six Sigma methodology which are applied to each project: (1) systematic define–measure–analyze–improve/innovate-control process referred to as the DMAIC model, (2) bottom-line impact with respect to financial savings to the organization, (3) analysis of the process to determine process stability and to identify innovation/improvement strategies that reduce process variation and increase process capability, and (4) creation of a continuous improvement culture which focuses on Six Sigma training and mentoring.

Lean manufacturing is a methodology used to transform complex processes to a smooth continuous production flow, which delivers customer value more rapidly, improves workflow, standardizes processes and eliminates waste. Waste, in the context of lean manufacturing, is defined as non-value added processes which consume resources. The following lean concepts can be used by an organization to eliminate waste and ensure value stream flows: kaizen, just-in-time scheduling, Kanban cards, and 5S (Keller, 2001).

Hazard analysis critical control point (HACCP) is defined as a science-based, risk assessment and management program for food safety, which is voluntary for food manufacturers in Canada except those registered under the Meat Inspection Act. It is the globally accepted approach to food safety control; promoted by the World Health Organization, HACCP is mandatory in several countries worldwide. HACCP is used to identify, analyze and control hazards before products are distributed to the customer. Within the HACCP system, critical control points (CCPs) are steps within the manufacturing process where hazards can be controlled via prevention, elimination or reduction of the hazards to an acceptable level. Motivational factors for implementing HACCP programs have been reported (Herath & Henson, 2006) to include both satisfying regulatory requirements and improving product quality and safety. Business benefits were the ability to sell products for higher prices, reduction in product wastage and reducing cost of goods sold.

Total quality management (TQM) can be defined as a management philosophy of embedding quality knowledge and awareness into all job functions and processes. The objective of TQM is to provide products and services which satisfy customer requirements and consistently produce these products and services within specifications. The TQM philosophy was summarized in the Plan, Do, Study, Act (PDSA) or Plan, Do, Check, Act (PDCA) cycle by Deming in 1990 (Capezio & Morehouse, 1995). The PDSA cycle is a continuous improvement platform which can be used to improve the quality of products and services, including services produced by food supply and distribution companies. A case study of two United Kingdom food supply and distribution companies (Beardsell & Dale, 1999) identified that the company adopting TQM as part of its approach to business experienced a reduced number of errors when compared to a second company that had not adopted TQM. Beardsell and Dale (1999) reported that the company that demonstrated a reduced error rate was also using multiple tools and techniques within its daily business. Benefits of implementing TQM were also identified through a survey distributed to the Wisonsin cheese industry. Managers within the Wisconsin cheese industry concluded that the implementation of TQM within their sites increased the quality of their products, improved productivity, and positively contribute towards exporting capabilities (Chaudhry, Tamimi, & Betton, 1997).

Implementing structured continuous improvement programs requires that organizations invest both monetary and human resources in training, leadership alignment, identification of the "right" resource and allocation of that resource to the project, focus on the customer, reward and recognition of team members, and communication of successes and failures (Antony et al., 2005; Keller, 2001). Numerous benefits have been reported (Table 1). General Electric Company reported that lean and Six Sigma initiatives resulted in a $2.8 billion (USD) savings from operating activities between 2002 and 2005 (General Electric Company, 2005). Bama Companies Inc., a pastry manufacturer, used Six Sigma and HACCP methodologies to achieve savings of more than 17.3 million (USD) between 2002 and 2005 (Daniels, 2005). Mark (2006) described a case study of a Canadian food manufacturing company, World's Finest Chocolate, which used lean manufacturing to reduce waste by 23–70% and lower "unknown" production waste levels from $1.1 million to $67,000 within 4 years.

Additional critical success factors (CSFs) have been identified for the implementation of structured continuous improvement programs. The study conducted by Antony et al. (2005) identified management involvement/participation in continuous improvement

Table 1
Business benefits of structured continuous improvement programs in industry

Business benefits	Program	Source
Reduction in process variability	Six Sigma	Antony et al. (2005)
Increase in profitability	Six Sigma	Antony et al. (2005)
Reduction in the cost of goods sold	Six Sigma	Antony et al. (2005)
	General continuous improvement	Terziovski and Sohal (2000)
Reduction in waste and rework	HACCP	Henson et al. (1999)
	Six Sigma	Keller (2001)
Increase in productivity	Six Sigma	Antony et al. (2005)
Reduction in set-up, cycle time and equipment downtime	Six Sigma	Antony et al. (2005)
	Six Sigma	Keller (2001)
	Six Sigma	Knowles et al. (2004)
	General continuous improvement	Terziovski and Sohal (2000)
Eliminate unnecessary process steps	Six Sigma	Keller (2001)
Eliminate unnecessary movement of product and/or personnel	Six Sigma	Keller (2001)
Reduction in customer complaints	Six Sigma	Antony et al. (2005)
Improved capacity	Six Sigma	Keller (2001)
Improved employee environment	HACCP	Henson et al. (1999)
	General continuous improvement	Terziovski and Sohal (2000)
Improved sales	Six Sigma	Antony et al. (2005)
Reduced inspection	Six Sigma	Antony et al. (2005)
Reduction in operational costs	Six Sigma	Antony et al. (2005)
	HACCP	Henson et al. (1999)
	Six Sigma	Knowles et al. (2004)

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