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## Model for supporting lasting managerial efforts in continuous improvement: A case study in product engineering

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### Abstract

Lasting continuous improvement in product engineering, a process to produce and develop high value products, is critical to companies' competitive position. Although continuous improvement described in literature as an important principle for business development, creating a culture of ongoing improvement is not a trivial task. While poorly designed processes and misguided use of tools may explain difficulties in achieving successful continuous improvement, extent research reports that the main barrier to success is lasting managerial effort. Research has been conducted on identifying the management as a pertinent success factors, but little focus has been directed towards supporting efforts to overcome managerial barrier to succeed. Thus, this paper aims to provide a model as a theoretical contribution supporting managerial effort in achieving lasting continuous improvement based on an action research approach within product engineering. This paper will be of value to practitioners by guidance in managerial efforts to overcome the barriers for the management. For academics, this study will contribute on a better understanding of enablers to overcome the pertinent success factors; lasting managerial effort.

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### 1. Introduction

Globalization and worldwide competition exaggerate the demands for companies' competitiveness. Improving the internal processes to increase time efficiency and decreasing costs becomes essential. Businesses must deliver high quality goods and services as quickly and promptly as possible and at competitive cost. The parameters influencing the entire business performance must constantly be improved in line or faster than international competitors. To survive under such conditions, Continuous Improvement (CI) becomes a substantial strategy for companies worldwide. In the same time, it is important to emphasize that CI alone gives no guarantee for surveillance in global competition. In the early 1990s an American company won the US National Quality Award, but went out of business same year. A thesis how this could happen, is that the award criteria had no evaluation features on how the organization responded on outside potential and real threats [1]. Most companies can be

forced out of business by aggressive competitors who have located an outside potential and exploited this as an inherent weakness in its target company. Clearly, survival and growth also depends on how CI is integrated towards important business elements as the outside threats and possibilities [1].

Even if CI has been widely recognized for decades, CI still faces many challenges. One of them is to remain stable over years [2]. Stability requires the CI to be integrated as a lasting managerial effort. If the persisting element of CI dissipates, the continuity disappears and the long-term benefit of CI reduces dramatically [2]. Companies losing effort will gradually fail in manage sufficient increase in value adding over time – and slowly lose competitiveness against those who manage the lasting systematic improvement work better; or turn it all around – these companies lose the opportunity to make profitable business over time. The question is why companies lose the vital sustaining attention for improvement. Clearly, there is a need to understand this question and how the pitfalls connected to CI can be prevented. Although

existing literature and studies emphasize the relationship between CI and management, too much focus is on the management connection to practical quality improvement tools [3, 4]. Thus, this article aims to provide a model supporting managerial effort in achieving lasting CI.

Against this background, how can an organization develop an environment for lasting CI? This study investigates the managerial circumstances leading to interrupted CI, and how to develop a holistic CI environment, robust for the occurrences deflecting the CI. Furthermore, this study focuses on building a strong fundament and management ownership for the CI right from the beginning. Thus, by early managerial effort on strategic direction and a simultaneous link to the planning of CI implementation.

## 2. CI in a managerial and lasting perspective

In the literature, there are several definitions for CI. One definition is “The planned, ongoing and systematic process of ongoing, incremental and company-wide change of existing practices aimed at improving company performance” [5]. The Chartered Quality institute, former Institute of Quality Assurance, defines CI more widely: “...a type of change that is focused on increasing the effectiveness and/or efficiency of an organization to fulfil its policy and objectives. It is not limited to quality initiatives. Improvement in business strategy, business results and customer, employee and supplier relationships can be subject to continual improvement. Put simply, it means getting better all the time” [6]. Supplemental, CI should be implemented in the whole organization; including all employees at entire levels [7] and the CI activities should be regular and connected to the day to day routines [8]. Finally and to complete the definition, CI have to be sustainable and focused towards improvement [9].

CI is from a practical point of view frequently connected to the Deming circle, defining CI in four never-ending phases Plan-Do Check-Act (PDCA) [10]. This iterative and repetitive nature of improvement is traceable to several other cyclical scientific methods as DMAIC and Fords 8D methodology [11]. A3 management detailed explained in Jon Shooks *Managing to Learn* is also derived from Deming’s PDCA [12].

Osterling and Martin [13] highlight that lasting managerial effort is the cultural shift that can be the most profound, and the most challenging to realize. In a CI enterprise, leadership is responsible to create strategy and the workforce is authorized to design and implement the tactical solutions required to execute the strategic plan. This frees leadership from the day to day follow-up, so they can focus on performance measurement, strategy and removing operational obstacles, and at the same time, the workforce knowledge base and level of fulfillment grows exponentially.

A large survey conducted in Industry Week in 2007 found that only 2 percent of companies having a CI program achieved their anticipated results [2]. With this background, the Shingo Prize committee, which gives awards for excellence in lean manufacturing, compared winners that had continued to improve with those not sustaining their progress. They found that companies turned backwards simply copying

the improvement methodologies, while those that continued improving had turned the initial CI efforts into a culture, starting with leaders who were passionate about striving for excellence. In this context, CI can be considered as a never ending management commitment on the way to excellence. As a consequence, the committee changed the price criteria to emphasize developing a culture for CI [2].

## 3. Research methodology

The research methodology aims to contribute providing a model supporting managerial effort in achieving lasting CI based on action research.

Reason and Bradbury define action research as “An interactive inquiry process that balances problem solving actions implemented in a collaborative context with data-driven analysis or research to understand underlying causes enabling future predictions about personal and organizational change” [14]. They also emphasize; “Action research is about working towards practical outcomes and also creating new forms of understanding, since action without reflection and understanding is blind, just as theory without action is meaningless”.

Since this study is simultaneous and strongly connected to develop a new model for lasting CI, the need for ideas and solutions were more present than the need for quantitative data. Referring to the definition of action research, this study supports “research to understand underlying causes enabling future predictions about personal and organizational change” rather than the term “data-driven analysis”.

The case company is an enterprise located in northwestern part of Norway, providing state of the art technology and equipment for aluminum casting and melt treatment. The company has high core technology competence and develops continuously new products. In projects, the enterprise performs project management, engineering, installation and testing. Suppliers produce the parts and components.

The case company has numerous earlier attempts to introduce CI. The company confirms that these initiatives have stranded more or less because of losing managerial attention over time. Consequently, the company aims to find a new approach to succeed in sustainable CI work. To avoid repetition of earlier unsuccessful attempts, the new approach has to be developed before introducing a new CI program.

The team contributing in this study consists of the 7 members of the top management team and external project leader from Sintef Raufoss Manufacturing. The purpose for the team was to develop the model for persisting CI simultaneously as the implementation proceeded [15]. During the research period, the team regularly questioned whether something still is missing to make a proper fundament for sustainable CI. If the answer of this question distinguished from clear “yes”, new supplementary progress raised. The model ended up with 9 + 3 steps suitable to develop a robust environment sufficient for lasting CI.

During the progression of the steps, the need for methodologies for rapid generation of ideas and solutions commenced. Brainstorming is a seductive methodology to

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