

# Six Sigma: The role of goals in improvement teams

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Received 1 May 2005; received in revised form 1 August 2005; accepted 3 August 2005

Available online 27 December 2005

## Abstract

The tenets of goal theory have been well established as a motivation mechanism in the management literature. However, some quality-management advocates, such as W. Edwards Deming, often criticize the use of goals. This research investigates the tension between goals and quality management in the Six Sigma context. We find empirical support that goals can be effective in Six Sigma improvement teams when teams adhere to the Six Sigma tools and method. However, challenging goals are counterproductive when Six Sigma teams do not use the tools and methods rigorously. This research reconciles the differences between quality management and goal theory by showing that the Six Sigma tools and method interact with goals.

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**Keywords:** Quality management; Six Sigma; Goal theory; Teams; Process improvement

## 1. Introduction

Much has been written about quality management over the last few decades (Ahire et al., 1995; Sousa and Voss, 2002). Most of the research focuses on studying quality-management practices and associated success factors (Kaynak, 2003; Sousa and Voss, 2002). However, research on how motivational factors influence quality-management outcomes is scant. Motivation is the process that accounts for an individual's intensity, direction, and persistence toward a goal (Robbins, 2003, p. 155). While goal theory research suggests that specific, challenging goals lead to higher performance (Locke and Latham, 1990), at least one quality-management authority has expressed a conflicting view. For example, Deming

(1986) viewed arbitrary numerical goals as counterproductive. Research in quality management from a goal-theoretic perspective can help resolve these conflicting viewpoints.

Reviews of the goal-setting literature have consistently demonstrated the effectiveness of individual goal setting on performance (Locke and Latham, 1990; Locke et al., 1981). In fact, Miner (1980) rated goal theory "high" in both criterion validity and usefulness in application. (Criterion validation indicates "how well scores on a measure correlate with the criterion on interest" (Singleton and Straits, 1993, p. 122). This gives an indication of practicality or usefulness of a measure.) Also Pinder (1984) said, "goal theory has demonstrated more scientific validity to date than any other approach on motivation . . . Moreover, the evidence indicates that it probably holds more promise as a motivational tool for managers than any other approach."

Research on the effects of goals on group performance, however, is still emerging. O'Leary-Kelly et al. (1994) performed a quantitative meta-analysis of

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goals in the group setting and found a significant relationship between group goals and group performance. None of the studies in their meta-analysis considered the effect of goals on quality-improvement teams. Quality-improvement teams are central to quality improvement (Scholtes et al., 1996) because effective teams can perform significantly better than a collection of individuals (Mohrman et al., 1995; Katzenbach and Smith, 1993). Setting challenging group goals can promote team effectiveness (Locke and Latham, 1990) because goals tell teams what needs to be done and how much effort to expend.

Little research in quality management uses goal theory. Some quality-management movements, such as the Zero Defects, have argued for setting very high goals. However, some quality thinkers have been critical of the goal-theoretic perspective. For example, Deming (1994, p. 41) said “. . . a goal that lies beyond the means of its accomplishment will lead to discouragement, frustration, and demoralization . . . . A numerical goal accomplishes nothing.” Deming systematically rejected the use of goals as a source of motivation (Carson and Carson, 1993). Deming’s “negative views on quantitative goal setting are at odds with both the historical management prescriptions and contemporary research on goal setting and motivation” (Duncan and Van Matre, 1990, p. 5). Carson and Carson (1993) compare and contrast Deming’s views with goal theory and reconcile differences when possible. Hackman and Wageman (1995) considered research issues related to quality management and noted, “It is not surprising that there is disagreement among the TQM authorities about goal setting, because the nature of the work done by quality teams raises some complex issues about how goals and objectives are properly framed.” The conflicting views of goals in quality management (e.g. Deming versus Zero Defects) suggest the need for more scholarly investigation. Empirical testing of goal theory in the quality context can help reduce the confusion between goal theory and quality management.

Recently, Linderman et al., (2003) developed a set of propositions about Six Sigma from a goal-theoretic perspective. Schroeder et al., (2003) provide a definition of Six Sigma and compare it with other quality-management approaches. These researchers argue that nothing is radically new in Six Sigma but Six Sigma does place a strong emphasis on challenging specific goals (see also Pande et al., 2000). In fact, the name Six Sigma suggests a goal of 3.4 parts per million defective. The Six Sigma approach to process improvement also employs numerous goals; for example, setting project

improvement goals to increase performance by a factor of 10 (10×), hiring Black Belts on the basis of cost-saving goals, and selecting improvement projects based on financial and strategic goals. As a result, Six Sigma provides an ideal context to study the relationship between goal theory and quality management. Our research begins to test the tenets of goal theory in Six Sigma projects. Because Six Sigma is consistent with quality-management principles, these results should also be generalizable to other quality practices.

## 2. Theoretical development

Goal-setting theory suggests that challenging goals lead to enhanced performance because they mobilize effort, direct attention, and encourage persistence and strategy development (Locke and Latham, 1990). According to goal-setting theory, goals are effective because they indicate the level of performance that is acceptable (Locke and Latham, 1990). Specific goals are critical to individuals because they establish a minimum acceptable performance level, but ambiguous goals either do not make clear the appropriate performance level or indicate to individuals that a range of performance levels is acceptable (Locke and Latham, 1990). Difficult goals, if accepted, lead to greater individual effort and persistence (Locke and Latham, 1990; Locke et al., 1981; Tubbs, 1986). However, assuming that the results of goal theory for individuals also apply to groups may be subject to the ecological fallacy (Singleton and Straits, 1993, p. 69). The ecological fallacy can occur when erroneous information from one level of aggregation (e.g. individuals) is used to draw inferences about another level of aggregation (e.g. groups). In this setting, the effect of goals motivating individuals may differ from that of groups. As a result, further research needs to be conducted at the group level in goal theory (Weingart and Weldon, 1991).

In response to this phenomenon, scholars have been studying goal theory in group settings (Weingart and Weldon, 1991; Weldon et al., 1991; Weingart, 1992; O’Leary-Kelly et al., 1994; Durham et al., 2000; Knight et al., 2001). In general, scholars have found a significant relationship between group goals and group performance (O’Leary-Kelly et al., 1994; Locke et al., 1997). Goal theory also suggests that specific goals result in higher levels of performance than vague non-quantitative goals such as “Do best” goals (Locke and Latham, 1990). “Do best” goals are goals that are implied by the task or occur when the subject is told to do the best he or she can. O’Leary-Kelly et al. (1994) found that goal specificity also applies to group goals.

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