Team Effectiveness: a correlative study of leadership influence in the manufacturing environment

Kenneth E. Rauch
Indiana Wesleyan University

The correlative study within this article considered the association between servant leadership and team effectiveness in the manufacturing sector of business and industry. The quantitative study had a sample size of 3896 at 28 manufacturing locations within the same organization. The Spearman rank correlation was used to determine the direction and significance of the association between the independent variable of servant leadership and dependent variables of manufacturing team effectiveness.

The exploratory data analysis revealed significant correlation between servant leadership and a reduction in both absenteeism (H1) and attrition (H2) rates. As a result, an exponential curve was created and absenteeism was shown to decrease roughly 41.1% for each increase of one unit within the five unit scale of servant leadership, while attrition tended to decrease roughly 22.4% for each increase of one unit in servant leadership.

The implications related to these findings are significant in the manufacturing environment as business and industry struggle with increased economic growth, shortage of skilled labor, and employee attrition. It is hoped that this research study inspires additional empirical research into the potential value of servant leadership in the industrial workplace.

In a business climate that features shared technology, instant communication, and worldwide challenges, the presence of effective teams represents competitive advantage, especially in industrial manufacturing settings. Within the contemporary search for understanding of what facilitates team effectiveness, plant-based case-study strategies are becoming a widely used method and help reduce the gap between theory and practice (Hill, Nicholson & Westbrook, 1999). As empirical research efforts continue, leadership influence may prove to be a significant component of team effectiveness.

Background
Early leadership studies dealt with the individuality of the leader because many researchers believed that the key to unlocking the secrets of leadership was held in an individual leader’s inherent and distinctive talents (Bird, 1940). The notion was that, in times of need, a Great Man (leader) would reveal himself. Subsequent studies focused on identification of the unique traits that distinguished leaders from those who were not leaders. Failure to find universal leadership traits led researchers to posit that leaders adopt appropriate leadership behaviors in relation to those with whom they serve. Researchers then speculated that the leader’s ability to lead is contingent upon various situational factors.

As the 20th century ended, leaders began to engage employees with vision and passion by injecting enthusiasm and energy, all in an effort to transform their follower (Burns, 1978; Coleman & La Roque, 1990; Kirby, Paradise, & King, 1992). Mutual influence of leader and follower in facilitating performance and organizational effectiveness is a common theme that permeates current leadership research efforts. Shared or distributed leadership styles allows the employee to take initiative, embrace risk, stimulate innovation, and cope with uncertainty (O'Toole & Lawler, 2006). An emerging theory in this sphere of leadership study is servant leadership. Handy (1995), in his *The Age of Paradox*, differentiated the old-fashioned "follow me" form of leadership from what he called distributed leadership. He suggested that distributed leadership is present in the stewardship of all participants in servant leadership. An essential component of this mindset asserts that leaders serve the people they lead, thereby implying that they are an end in themselves rather than a means to an organizational purpose (Greenleaf, 1977). Servant leadership, however, differs from other leadership approaches by avoiding the common top-down command and control style, instead emphasizing partnership, trust, empathy, and the ethical use of power. The objective is to enhance the growth of individuals, increase teamwork, and expand personal involvement in the organization.

As interest in the historical importance of the leader has transitioned to consideration of the potential of followers, research interest in servant leadership theory has increased. Leading authors of leadership and organizational development have continued to research and discuss the effects of servant leadership on employee satisfaction and organizational effectiveness (Blanchard, 2007; Depree, 1989; Senge, 1990). At the same time, a number of companies have adopted servant leadership as their corporate identity. In *Focus on Leadership: Servant Leadership for the 21st Century*, Spears (2002) identified the following companies that have incorporated servant leadership into their corporate philosophy: The Toro Company (Minneapolis, MN), Synovus Financial Corporation (Columbus, GA), Southwest Airlines (Dallas, TX), The Men’s Wearhouse (Fremont, CA), and TD Industries (Dallas TX) (p. 9). Servant leadership is an emerging leadership theory that exhibits promise in revitalizing and energizing employees as business and industry brace for the challenges of the 21st century and beyond. Consequently, servant leadership is receiving increased consideration and mounting acceptance in the corporate world.
Significance of Research

The significance of providing empirical research related to leadership and team effectiveness is important in today's business environment. Recent studies have examined the importance of the development of employee influence in the leadership process (Bryant, 2003; Hallinger & Kantamara, 2000). It has been reported that the majority of workers today are not fully engaged and this engagement gap is costing U.S. businesses 300 billion dollars per year in lost productivity (Bates, 2004; Johnson, 2004; Kowalski, 2003). In many organizations, the followers’ desire for inclusive leadership and follower involvement is linked to a relationship that appears to be damaged. Deal and Kennedy in their book, The New Corporate Cultures (2000), suggested that the balanced image of a corporation as the servant of many constituencies has shifted to a single focus on shareholders and short-term financial performance. This shift has undermined an unspoken, long-standing belief in the shared interest between employer and employee. This widely shared principle carried the promise that if employees worked to the best of their abilities, a company would provide a positive working environment, job security, and reasonable compensation.

Based on this damaged relationship, leadership research has an increasing interest in the study of the involvement of followers within the leadership dynamic. Employee performance affects organizational achievement, and leaders of organizations influence follower achievement (Northouse, 2004; Yukl, 2002). Research that increases understanding of leader influence on follower achievement is significant. This study acknowledged the follower-focused nature of servant leadership and joined other research efforts in confirming the possible correlation or lack thereof between servant leadership and the effectiveness of organizations (Gibson & Vermeulen, 2003; Irving, 2005; LaFasto & Larson, 2001; Naquin & Tynan, 2003).

The study also attempted to offset the unbalanced focus of prior empirical inquiry into servant leadership theory that has favored not-for-profit (NFP) organizations. In the past, scholars focused primarily on spiritual and educational organizations (Dillman, 2004; Drury, 2004; Hebert, 2003; Hoshaw, 1985; Iken, 2005; Irving, 2005; Sullivan, 1994; Van Kuik, 1998; Walker, 1997; Woodward, 1988). This inclination toward the NFP sector could lead some researchers to conclude that servant leadership theory assessment is somewhat contextually constrained. Thus, the study has the potential to generate increased interest in servant leadership and team effectiveness research in business and industry.

Nature of the Study

This study was designed to provide data related to servant leadership and team effectiveness variables inside the manufacturing environment and represent the findings in a correlative format. The
context of the study is contained within the manufacturing segment of business and industry in the Midwestern U.S.

Team Effectiveness Measurements

Based on the widespread use within the manufacturing environment, the Balanced Scorecard Method / Key Performance Indicators were used in the study when selecting measures of effectiveness (Atkinson & Brown, 2001). Kaplan and Norton (1992) first introduced the Balanced Scorecard concept in their Harvard Business Review article, “The Balance Scorecard – Measures that Drive Performance.” The scorecard provides managers with a comprehensive framework that translates a company’s strategic objectives into a coherent set of performance measures. The company featured in this study, while utilizing the Balanced Scorecard Method (BSC) concept, selected measures of effectiveness from the Key Performance Indicator (KPI) guidelines in the area of human resources.

Likert and Pyle (1971) were among the earliest proponents of human resource-related accounting measures and listed the following benefits:

- To furnish cost value information for making management decisions to attain cost effective organizational objectives,
- To allow management personnel to monitor effectively the use of human resources,
- To provide a sound effective basis of asset control, and
- To aid in the development of management principles by classifying the financial consequences of various practices.

In 1991, the Swedish government proposed a legal obligation for organizations with more than 100 employees to provide an account of personnel costs such as attrition, absenteeism, and training in their annual reports (Grojer & Johanson, 1998). The proposal was based on the opinion that human resource investment translated to market advantage and profitability. The study measured the effectiveness of each sample group by gathering data related to attrition and absenteeism. To determine effectiveness levels, these measures were compared to established manufacturing industry averages.

Selection of specific BSC / KPI Measurables for the Study

A review of the literature shows that traditional performance measurement systems (based on traditional financial measures) have failed to identify and integrate the critical factors that contribute to business excellence (Eccles, 1991; Fisher, 1992; Kaplan, 1984; Maskell, 1992). Authors have posited that examinations of employee-driven measures are important and should be a focal point of a leader’s attention (Porter & Stern, 2001). The skills of employees are company assets just like tangible assets therefore, employees with fundamental skills are an important source when organizations seek to raise capabilities and profits (Porter, 1985). In studies focusing on manufacturing organizations, effective teams report benefits that include increased productivity, lower attrition rates, and increased quality while maintaining a safe work environment (Manz & Sims, 1987).
The BCS / KPI performance measurable system provided the framework for the study’s dependent variables. The studies performance indicators were taken from typical manufacturing BSC / KPI measurements and included: absenteeism and attrition. The study recognized that correlative findings involving servant leadership and team effectiveness within business and industry that did not feature the BSC / KPI generated goals would be rendered inconsequential and insignificant within the manufacturing leadership community. Much of the development of leadership theory within the manufacturing segment is predicated on the belief in the interplay between leadership and goal achievement. The dependent variables of attrition and absenteeism provide a would-be competitive advantage in most manufacturing environments. The value and relevancy of these effectiveness measures are examined below.

Attrition
Firms that focus on their specific human resource advantages by attracting and retaining highly skilled human capital increase their competitive potential in markets (Chadee & Kumar, 2001). Dressler (2005) used a web-based survey to gather data regarding the cost of attrition. The findings placed the total cost of each occurrence at $5,700 for workers with low-complexity jobs and almost $10,000 for high-complexity jobs. The effect on profitability is evident.

Absenteeism
Absenteeism is viewed as a measure of team effectiveness in most countries (Goodman & Pennings, 1977). Literature investigating the causes of absenteeism has identified management style as an important factor (Nicholson, 1977; Steers & Rhoads, 1978). In the competitive manufacturing environment, absences can have considerable economic consequences for individual organizations. At a time when an ever increasing number of employees telecommute or work in virtual offices, manufacturing still relies on attendance at each manufacturing facility to meet daily production requirements. Reduction in absenteeism provides a potential competitive advantage in most manufacturing environments.

Servant Leadership Measurement
Servant leadership is measured in the study by using the Organizational Leadership Assessment (OLA) instrument (Laub, 1999).

Research Questions
The research study was designed to answer the research question: To what extent are established manufacturing performance measurables correlated with the presence of servant leadership within the organization? Two hypotheses were tested to determine correlative relationships between the independent variable of servant leadership and team effectiveness dependent variables.

Hypotheses
Hypothesis 1

H1\(^{0^1}\): No significant relationship between employee absenteeism and servant leadership as measured by the OLA.

H1\(^{1^1}\): Significant relationship between employee absenteeism and servant leadership as measured by the OLA.

Hypothesis 2

H2\(^{0^2}\): No significant relationship between employee attrition and servant leadership as measured by the OLA.

H2\(^{1^2}\): Significant relationship between employee attrition and servant leadership as measured by the OLA.

The following pages review the data collection process and response rates, and presents graphic displays and descriptive statistics for each variable.

Population

A Midwest-based automotive parts manufacturing organization agreed to participate in the study, allowing for anonymous representation of their company, all individual sites, and the participants. Twenty-eight individual manufacturing facilities participated. A total of 4557 subjects were enlisted for the study, and 4052 OLAs were completed and returned. The participation from the 28 sample sites produced a high percentage of completed OLA’s (Table 1).

Table 1.
Individual Sample Population Data

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<tr>
<td>Z</td>
<td>78.6</td>
<td>187</td>
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</tr>
<tr>
<td>Rate</td>
<td>95.6</td>
<td></td>
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</tbody>
</table>

TOTALS: 4557 4052 88.9%

The number of completed surveys returned represented an 88.9% response rate. This response rate implies that data from the sample of participants can be considered representative of the larger group. The high response rate is consistent with the researcher’s expectations when the sample group was selected. Collection of the OLA responses coincided with mandatory monthly communication meetings in which employees are often asked to complete written training, surveys, and questionnaires. The voluntary nature of the request was communicated when the consent form was read, and participants followed past practice, completing the survey as part of their monthly communication meeting agenda. Union representatives at several facilities expressed traceability and retaliatory concerns related to the data gathered for this study. In response to these concerns, no respondent demographic information was gathered. This eliminated potential investigative information such as the age of the workforce, work experience level, and educational backgrounds.

Findings

Exploratory Data Analysis

Team Effectiveness Measurements

Figure 1 depicts the data points for the mean OLA rating for each of the 28 locations included in the current research study.
Figure 1. Histogram of Servant Leadership Levels (OLA)

The overall OLA measurement average was 2.94. This placed the combined average for the 28 plants at an “organization two” on the OLA rating scale. The 28 sites’ average on the OLA scale positions the organization as one that exhibits “poor organizational health” with regard to servant leadership. Although at the upper end of the “organization two” scale, the 2.94 score places this organization at the lower end of the Likert scale (1-5) of servant leadership measures. Thirteen of the 28 sites fell within the range of 2.25 and 2.75 as represented by the main peak of the histogram in Figure 1. A smaller grouping of locations was in the 3.2 to 3.7 range.

The team effectiveness measures for each facility were provided by the plant’s human resource manager. These measurements were common to each facility and reflect the same formula for calculation and are standard measures within business and industry. The totals represent an average of the first four months of 2007. The Spearman rank correlation was used to determine the direction and significance of the association between the independent variable of servant leadership and each of the two dependent variables of team effectiveness. The SPSS 15.0 software was used for correlative computations, descriptive statistics, and all analyses for hypothesis tests.

Absenteeism

The Bureau of Labor Statistics defines absenteeism as the ratio of workers with absences to total full-time wage and salary employment. Absences are defined as instances when persons who
usually work 35 or more hours per week worked less than 35 hours during the reference week for one of the following reasons: own illness, injury, or medical problems; childcare problems; other family or personal obligations; civic or military duty; and maternity or paternity leave.

Figures 2 and 3 highlight the data that represent the individual absenteeism rates for all research sites.

![Histogram of Absenteeism Rates (H1)](image)

**Figure 2. Histogram of Absenteeism Rates (H1)**

The histogram demonstrated a cluster of data points in the 2.0% - 4.0% range. The overall appearance was a left-skewed distribution. Several groups of distant data points created a somewhat bimodal appearance.

A scatterplot (Figure 3) was created to offer a visual display of the relationship between absenteeism and the OLA for the 28 locations surveyed. There appears to be a moderately strong negative correlation between the OLA and H1. That is, as the servant leadership increases, absenteeism rates generally decline. For example, locations with an OLA of 2.5 had absenteeism rates of 3% to 10%, while locations with an OLA of 4 had absenteeism rates of only 2% to 4%.
Attrition

Attrition rate (H2) is defined as the number of total separations during the period of measure divided by the average number of employees who worked or received pay during the same period.

Figures 4. and 5 represent the attrition rate for the research sites.
The histogram demonstrated a bimodal distribution main cluster of data points in the 3.0% - 4.0% range and a smaller group from roughly 1.6% to 2.3%, representing the second largest individual grouping of data points. While this attrition rate appears quite high, given it occurs at locations with low OLA scores, it is not overly surprising.

A scatterplot (Figure 5) was created to offer a visual display of the relationship between the OLA and the attrition rate for the 28 locations surveyed. It appears that as servant leadership increases, the attrition rates generally exhibit a decline. Seven locations with a strong OLA measure between 3.5 and 4.4 had attrition rates below the industry average. In contrast, 7 of 10 sites that experienced a poor OLA measurement (between 1.5 and 2.5) exhibited attrition rates above the manufacturing industry averages.
The attrition measurements in the preceding figure tended to indicate a moderately strong negative correlation between the OLA and the H2 dependent variable of attrition.

Absenteeism (H1)

The H1 null hypothesis was: no significant relationship between employee absenteeism and servant leadership as measured by the OLA. Table 2 confirms a moderately strong negative association between the OLA and H1 with a Spearman’s rank correlation of -.599. The p value of .001 provides strong evidence for the alternate hypothesis: a relationship between servant leadership and the plant’s absenteeism rate.

Table 2
Spearman’s Rho 2-Tailed Correlation Coefficient for H1

<table>
<thead>
<tr>
<th>Spearman's Rho</th>
<th>OLA</th>
<th>H1</th>
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<tr>
<td>Correlation</td>
<td>1.0</td>
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<tr>
<td>(Coefficient</td>
<td>00</td>
<td>.599(++)</td>
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<tr>
<td>rho</td>
<td>LA</td>
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** Correlation is significant at the 0.01 level (2-tailed).

Attrition (H2)

The H2 null hypothesis was: no significant relationship between employee attrition and servant leadership as measured by the OLA. Table 3 confirms the association between the OLA and H2.

Table 3
Spearman’s Rho 2-Tailed Correlation Coefficient for H2

<table>
<thead>
<tr>
<th></th>
<th>OLA</th>
<th>H2</th>
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<td>Sig. (2-tailed)</td>
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<tr>
<td></td>
<td>Correlation</td>
<td>1.00</td>
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<tr>
<td></td>
<td>Coefficient</td>
<td>.547(**)</td>
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<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.003</td>
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<td>N</td>
<td>28</td>
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</table>

** Correlation is significant at the 0.01 level (2-tailed).
Spearman’s rank correlation of -.547 indicates a moderately strong negative correlation, and the p value of .003 is significant with regard to the attrition hypothesis. Thus, statistical evidence of a relationship between servant leadership and attrition rates was established. The evidence relating servant leadership to both H1 and H2 was extremely strong, being significant not only at the .05 level but also at the .01 level. The alternative H2 hypothesis is supported within this sample population. In summary, it is concluded that H1 and H2 demonstrate a moderately strong negative correlative value with regard to the OLA.

Modeling Absenteeism and Attrition as Functions of Servant Leadership

Having established a statistically significant relationship between both absenteeism (H1) and attrition (H2) and servant leadership (OLA), it is reasonable to model each of these performance measures as functions of servant leadership. The development of equations to represent how H1 and H2 decrease with increasing levels of servant leadership is needed to increase the understanding of the established correlation. A linear equation provides the simplest model but does not necessarily match the data’s curvature seen in the scatterplots. Thus exponential models were also explored, representing a quantity starting at a fixed amount then decreasing by a certain percentage with each unit increase of servant leadership (OLA).

Based on the Spearman rank measure that revealed significant correlation between OLA and H1, a linear regression line and an exponential curve were created in Figure 6 and the corresponding numerical output provided in Table 4.
Figure 6. Exponential and Linear Regression Curve for H1.

Table 4
Linear and Exponential Curve for H1 versus OLA

<table>
<thead>
<tr>
<th>Equation</th>
<th>Model Summary</th>
<th>Parameter Estimates</th>
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<tbody>
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<td></td>
<td>R</td>
<td>F</td>
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<tr>
<td></td>
<td>Square</td>
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<td>Linear</td>
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<td></td>
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<tr>
<td>Exponential</td>
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<td>1</td>
</tr>
<tr>
<td></td>
<td>2.606</td>
<td>6</td>
</tr>
</tbody>
</table>
The parameter estimates contained in the regression output provide the following models for H1 versus OLA:

- Best linear model: \( H1 = 10.91 - 2.18 \text{OLA} \)
- Best Exponential model: \( H1 = 18.35e^{-0.53\text{OLA}} \)

\( e \) is the base of the natural logarithm, \( e \approx 2.18 \)

The exponential model provides a better visual fit of the data (compared to the linear model) as it captures the upward curve seen in the scatterplot in Figure 3. Furthermore, the higher \( R^2 \) value (.327 versus .297) indicates that the exponential model will have smaller errors when using OLA to estimate H1. (An \( R^2 \) value near 1 indicates that the model captures nearly all the variation in the dependent variable, while \( R^2 \) near 0 indicates that the model provides little or no useful information in estimating the dependent variable value.) It is useful to observe that the exponential model can be rewritten as \( H1 = 18.35 \times 0.589^{\text{OLA}} \) (since \( e^{-0.53} = 0.589 \)), implying that the absentee rate is multiplied by .589 (=58.9%) for each increase of one Likert scale unit of OLA. In other words, absenteeism tends to decrease roughly 41.1% for each increase of one unit in servant leadership.

Based on the significant correlation of H2 (.547), a linear regression line and an exponential curve were created for H2 and represented by Figure 7 and the regression output is displayed in Table 5.
Figure 7. Exponential and Linear Regression Curve for H2

Table 5. Linear and Exponential Curve Data for H2 versus OLA

<table>
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<td></td>
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</table>
The parameter estimates contained in the regression output provide the following models for H2 versus OLA:

- Best linear model: \( H2 = 5.68 - 0.826 \text{OLA} \)
- Best exponential model: \( H2 = 6.58e^{-0.253\text{OLA}} \)

\( e \) is the base of the natural logarithm, \( e \approx 2.18 \)

The exponential model provides a similar visual fit of the data (compared to the linear model), and the similar R\(^2\) value (.327 versus .297) indicates that the exponential model has comparable errors when using OLA to estimate H2. Thus it is not obvious whether the linear or exponential model is a better fit for representing H2 versus OLA (whereas for H1 versus OLA, the scatterplot showed a clear curvature).

The exponential model can be rewritten as \( H2 = 6.58 \cdot .776^{\text{OLA}} \) (since \( e^{-0.253} = .776 \)), which implies that the attrition rate is multiplied by .776 (= 77.6%) for each increase of one Likert scale unit of OLA. In other words, attrition tends to decrease roughly 22.4% for each increase of one unit in servant leadership.

**Implications for Practice**

The findings revealed that both absenteeism and attrition tend to decrease as servant leadership influences increase. The implications related to these findings are significant within the manufacturing environment. As a result of the shortage of skilled labor and continued economic growth, retention of employees is one of the most critical issues facing leaders today. The negative costs related to attrition in the workplace are obvious:

- costs to recruit and train new employees,
- loss of specific knowledge and experience, and
- decreased productivity and work quality.

The research evidence also pointed to the effectiveness of servant leadership in reducing absenteeism in manufacturing. The implications of cost avoidance related to absenteeism and the resulting improvement in teamwork and positive work environment are noteworthy. This finding provides a potentially significant impact on profitability within manufacturing. Absenteeism in business and industry translates to:

- lost productivity,
- increased use of premium wage usage for replacement workers,
- accumulated absenteeism incidents leads to progressive discipline and eventual termination,
- increased training and exposure to part quality defects,
- teamwork disruptions in the assembly environment of manufacturing, and
- administrative costs to secure replacement employees, reassign remaining employees, and recordkeeping.
As business and industry struggle with the shortage of skilled labor, economic growth, and employee turnover, positive employee attendance patterns becomes more critical.

To leverage the potential advantages of servant leadership in reducing absenteeism and attrition in the manufacturing environment, leaders may consider each of Laub’s 1999 servant leadership subsets when interacting with employees:

Valuing people. Leaders approach others with an understanding that each person is valuable. Value to others is demonstrated by active listening and careful consideration of what is being shared.

Developing people. Leaders understand the potential of others to grow as servants and leaders. Special attention is given to create a learning environment.

Building Community. By working together and serving others, leaders model collaborative behaviors that build a partnership for team achievement.

Displaying Authenticity. Leaders must understand that they have a number of things to learn from followers. This openness leads to follower trust and increased involvement.

Providing Leadership. Leaders initiate action to serve the needs of the organization and team, not for personal aspiration. Leaders serve and set direction as they communicate with the followers.

Sharing Leadership. Servant leadership recognizes the fact that leaders have positional authority, but an important distinction is that power is shared in decision making and followers are encouraged to act.

To facilitate this consideration of servant leadership, leadership training within the manufacturing segment of business and industry must offer instruction in servant leadership. Greenleaf observed that everyone is born with or is able to develop servant leadership characteristics. As researchers continue to learn about servant leadership and further empirical studies are initiated, more conclusions can be drawn as to its usefulness in leadership development.

Summary

In recent years there has been increased interest in the examination of servant leadership. Respected leadership and management expert, Ken Blanchard, when addressing a group of leaders stated, “The world is in desperate need of a different leadership role model . . . . We need servant leaders, instead of self-serving leaders” (Oliver-Mendez, 2006). The overall interpretation of results found that servant leadership had strong correlations with reductions in employee attrition and absenteeism. The implications of cost avoidance related to reduced absenteeism and attrition and the resulting improvement in teamwork and creation of a more positive work environment are noteworthy. The findings related to this study provide preliminary evidence of the potential effectiveness of servant leadership in the for-profit segment of business and therefore, warrant further examination. Organizations that include servant leadership in their leadership practices may translate to organizations that exhibit manufacturing efficiency and energized teams.

Virtually no one ever has the final word by conducting a study that provides a definitive explanation to the research questions of the day. Conflicting opinions among researchers reflect the fact that empirical research is a dynamic progression of discovery. It is a privilege to conduct original
empirical research, and hopefully, this embryonic study of business and industry adds a small brick to the wall of knowledge of servant leadership and will inspire additional interest and research in this promising leadership area.
REFERENCES


